SECOND EDITION

THE MUSCLE & STRENGTH PYRAMID

NUTRITION

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This book is not intended for the treatment or prevention of disease, nor as a substitute for medical treatment, nor as an alternative to medical advice. Use of the guidelines herein is at the sole choice and risk of the reader.

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FOREWORD

The Jason Bourne of physiology. The top-secret, weaponized body comp playbook. Enemies are willing to kill for it. He holds the nutrition code that can save or destroy the world. That's the spy novel I would write if Eric Helms was my protagonist. But Helms is also the musical Macklemore of muscle building and strength progression. The same flow that Eric used to freestyle his way through rap battles in the military is the foundation of the writing you're about to enjoy.

Seriously, did you know Dr. Helms can rap?

I almost choked on my muscle and strength-building nutrition pyramid steak when he told me. Apparently, his grandmother-approved rosy cheeks are capable of spitting dope rhymes on command... "*Adiposity enzymatic catalyst, burnin' FFAs dual fist, DNA loci spin a twist, eviscerating triglycerides in a mist...*" I can see that. It's a good picture of Eric's harmonic personality. He is a thoughtful, steady scientist. He is a deep-thinking academic. He has the excellent and rare ability to see beyond myopic interests and biases to provide accurate interpretation of research. And he can drop a sick lyric, dubstep his way through a phone message, and can out-photobomb anyone with an exaggerated, goofy expression. Don't even try to match his wit.

Let's talk about someone I like even more than Eric — me! It was ten years ago that I was speaking at a fitness camp in Sacramento. A college student politely introduced himself to me. He had read my articles in bodybuilding and fitness magazines and came to hear me pick apart antiquated nutrition methodology and ridiculous contest prep douchebaggery. I'm not necessarily an angry contrarian, nor am I part of the cynical, myth-busting mob, but Eric and I share a goal — maybe a need — to keep reliable, responsible information flowing to diligent students of the sport. Eric and I both were once young teens who looked to writers and magazine heroes for our formative progress. Sometimes we were let down, and sometimes the information we trusted was dangerous and potentially harmful. Eric is among those who credit me for being the first to dig deeper into physiology, shattering decades of bad practice that has cost people their health, and sometimes their lives. We both pursue our roles as educators with much humility and responsibility.

I would have never expected that my work twenty years ago as the first full-time contest prep coach would give rise to a global coaching industry. Back then, there was no social media and smartphones didn't yet exist. There was no script; there was no plan; there was no intent. But there was interest. There were ambitious athletes and students like the future Dr. Helms, who were ready to take the baton and sprint down the track. Terms like "science-based" and "evidence-based" became banners of chivalry as this new generation battled their way through university labs and exercise science programs. Now you can even take a college course on "Bodybuilding Nutrition." That's just weird. But it is a direct result of how this new era has legitimized the pursuit of maximum performance. I can't think of anyone who has added more credibility to these efforts than Eric Helms. He is the real deal — the leading edge of the pyramid.

Speaking of pyramids, do you want to hear another irony? The first graphic I ever created to teach nutrition to clients in 1997 was "Dr. Joe's Building Blocks of Nutrition." Guess how my building blocks were laid out? Identical to Eric's Muscle and Strength Nutrition Pyramid, with one transposition — I scaled meal timing one notch greater in importance. He's young; he'll come around, haha. I bring this up to emphasize how much I respect Eric's sense of foundational direction. He's not swayed by a fad or a single study. He grounds his students and clients in the truths of biology and builds upward. That's uncommonly spectacular.

I have to imagine it was difficult for Eric not to roll this book into a 600-page text. Metabolic science isn't a short topic. But usefulness is sometimes more important than just purging all you know onto paper. I think you'll appreciate Eric's discipline synthesizing the most important principles from the most relevant topics. This is a manual meant to be understood and used. Listen closely as he differentiates between universally accepted physiology and areas that take nuance and experimentation. Genetics are genetics and body composition change is a unique experience for everyone. There is science and there is the application of science. I'm grateful to Eric's sensitivity and academic maturity in reminding readers throughout.

Science happens because a thinker — maybe a bit of a dreamer — is

observant enough to notice something important. Then they pick it apart to see how it works. Then they use experience and logic to test it. They hypothesize "what ifs" and they test some more. The good stuff stays. It's proven. But it's constantly tested in new contexts and even better discoveries are made along the way. Some of the best scientists are also the best artists — they refine the style and application of innovation. You and I both have the privilege of watching this happen with us and for us in the career of Dr. Eric Helms. Don't take your eyes off this guy or you'll miss your best opportunity to learn and grow in the nutrition and training industry. I'm honored that he was once a fan and student of mine; I'm now his greatest fan and value his work as a top-notch colleague.

Eric's first career choice, one that he worked toward in the military, was to become an FBI agent. See, I told you — the Jason Bourne of nutrition and performance science. That fact alone gives insight into how meticulous the brain of Dr. Helms operates. This book may not save or destroy the world, but it could make or break the pursuit of your best physique, your biggest lifts, and your health. I'm proud to announce it to you, and I look forward to hearing how much impact it has on your life.

Joe Klemczewski, PhD

PREFACE

A few years ago I saw a need for a system that comprehensively covered the big picture of nutritional strategies, approaches, and theories for people interested in muscle and strength development. This decision was spurred by my years of experience working with individuals who wanted to improve their physiques through the manipulation of weight training and nutrition, but who all seemed to be lacking the same understanding of context and who were all plagued by black and white thinking.

I typically can tell if someone has some deep-rooted misconceptions about nutrition based on the questions they ask me. Very commonly in the fitness field, you will be asked questions like, "Should I take the yolks out when I eat eggs?" or "Is bread bad?" Well, that's kind of missing the whole point. Does it fit with your energy balance? Does it fit in with the fat or carbohydrate intakes that you have available for the day? Such queries may sound perfectly reasonable, but in fact, they imply a fundamental lack of awareness of what is important in the realm of nutrition.

As some of you may already know, I am a part of a team called 3D Muscle Journey. We are a group of coaches, writers, podcasters, and professionals who help people pursue their goals with drug-free bodybuilding, powerlifting, Olympic lifting, strongman, and anyone else who may be interested in strength or muscle mass gains, in a holistic way that focuses on career sustainability as an athlete and human. We do this in a couple of formats. We have our ongoing coaching service which is primarily for people who actually need consistent ongoing guidance, and we also have our one-off consultations which are often done as a standalone service for those seeking guidance but not necessarily continued coaching.

Without fail, something that I have learned from consulting with people in these one-on-one discussions is that typically, the reason they aren't getting to where they want to be is because they don't have a system. They don't have an understanding of prioritization, and they can't differentiate between big rocks and pebbles. I think that honestly, the fitness industry as a whole needs to take responsibility for this lack of awareness.

I can't tell you how many articles I run into with titles like "10 Foods That Will Get You Ripped!" or "10 Bad Foods That Bodybuilders Should

Always Avoid." These articles jump right into food choices without any mention of what your calorie intake should be, what your macronutrient composition should be, and pretty much just focus on the quality of foods when you look at them in isolation. The problem is that we don't eat food in isolation. We have diets. So as I like to say to my clients and to anyone who will listen, there's no such thing as a good or bad food, but there is such a thing as a good or bad diet.

It is because we in the industry present ideas and thoughts that are easy to turn into small sound bites that are "packageable" and sellable, but don't have any context, that people run into trouble. More often than not, the smart, well-intentioned, motivated people that I talk to have a lot of potential for success; however, they end up not making any progress because they have the proverbial cart before the horse.

As you can see, we've got this fancy little cart here, it's got its lead, but it's hooked up to nothing and it's just hanging out here in front of the horse. Now the horse is sitting here going,

"Hey, I want to pull this cart, but I can't do it while I'm behind it." This expression of 'putting the cart before the horse' means that you are focusing on the details before you know the context of those details and the big picture.

For example, let's say you're an aspiring race car driver, and you've spent months researching race courses, strategies for competition, mechanical engineering as it relates to improving handling and top speed, and how to select a good pit crew. But you haven't yet learned to drive and don't have your driver's license. This may sound like a ridiculous error to make, but believe me, people do the equivalent of this every single day when it comes to nutrition.

So, I decided to design what I call "The Muscle and Strength Nutritional Pyramid". It is a five-step pyramid with Level 1 as the foundation, the most important level. Then, as you move up into Levels 2 through 5 the level of importance gets progressively lower. I also acknowledge the overarching themes of mentality, adherence, lifestyle, and behavior that are linked to all levels of the pyramid. These concepts will be discussed in this text before, after, and throughout the explanation of the pyramid itself. While all elements of the pyramid are important, it's critical that we discuss the most important things before we discuss the least important things.

This is the whole reason I've made this pyramid. To help create some context and general guidelines for you to follow in an order that makes sense scientifically for reaching your goals.

Lastly, I also want to let you know what this guide is not. In this book, I take the position of focusing primarily on what to do, not what *not* to do. While there is a time and a place to identify incorrect information and to discourage harmful practices, I think as professionals a greater proportion of our time should be spent on producing useful, actionable content, than myth busting. So while I do turn many misconceptions on their head in this text, it's always in service of providing you with helpful information. Sound good?

Ok then, let's dive in.

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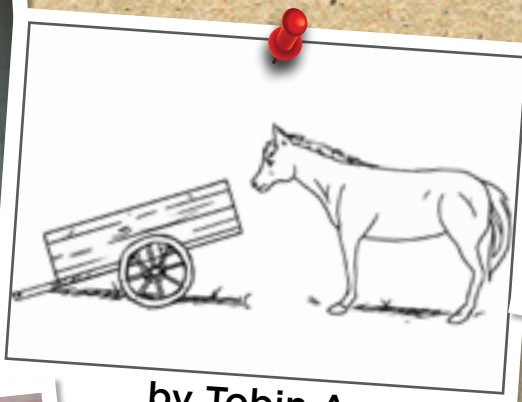

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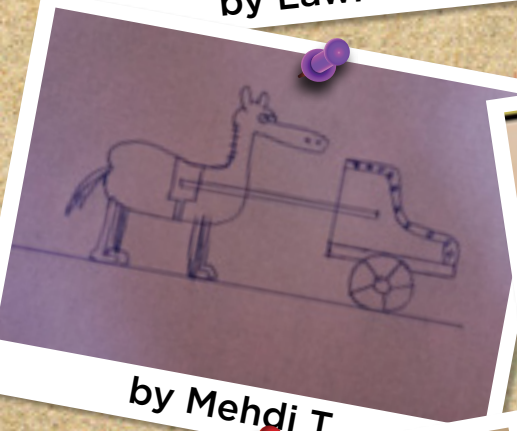

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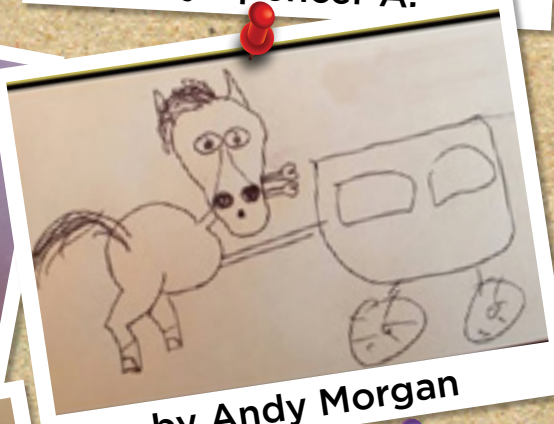

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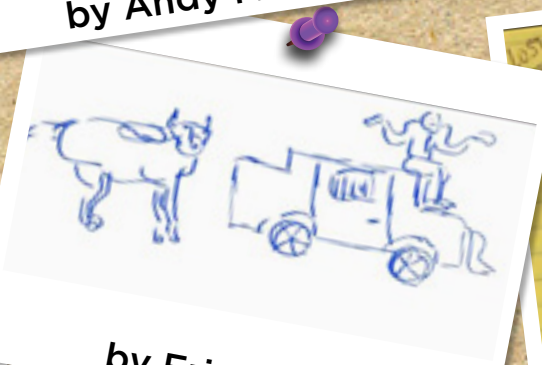

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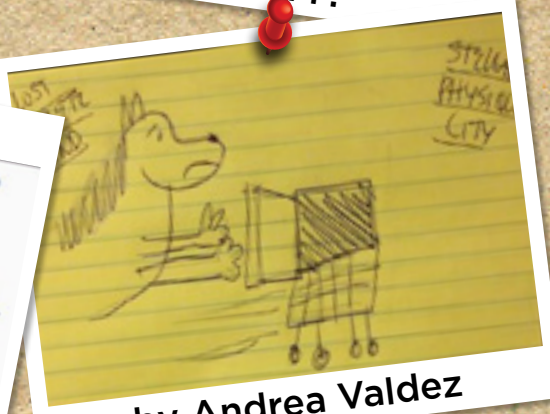

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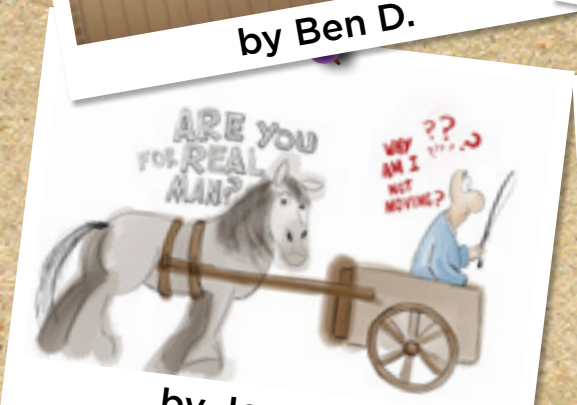


by Jorge M.

by Ajay Taware

by Cristian T.

WHAT'S NEW IN THE SECOND EDITION

First and foremost, I consider the Muscle and Strength Pyramids evolving documents because they are science-based, and science provides us with new insights on best practice over time. That said, I highly doubt the order of the levels of the pyramid will change as they are based on fundamental principles; however, the recommendations within each level do change as more research is conducted. So, in this brief section, I'll discuss what's changed, and what's been added since the first editions were published in December 2015.

What's Changed

In Mindset & Materials, there is a deeper discussion of when tracking nutrition and body weight might and might not be appropriate, and why.

In Level 1, Energy Balance, Calorie Intake, and Rate of Bodyweight Change, there is a deeper discussion around determining maintenance, and whether tracking caloric intake is necessary initially.

In Level 2, Macronutrient Composition of The Diet, protein and fiber recommendations have been altered slightly. The discussion of low-carb diets has been significantly expanded, and there is more guidance on minimum carbohydrate and fat intakes as they relate to fat loss.

In Level 3, Micronutrients and Water Intake, fluid, vegetable, and fruit intake recommendations have been updated to better align with published research and the most recent data.

In Level 4, Nutrient Timing and Frequency, diet break and refeed recommendations have been altered slightly and updated based on the latest research.

In Level 5, Supplements, the information for all supplements previously listed in the first edition has been updated slightly based on the latest research. An "A, B, C" tiered ranking system is now used to classify the supplements.

What's Added

In Mindset & Materials, the concept of approaching your goals with varying levels of reliance on external cues (weighing and tracking) is introduced.

In Level 1, a discussion of energy availability is added with signs and symptoms to be wary of. Additionally, a section on how to determine whether you should 'bulk' or 'cut' has been added.

In Level 2, there is now discussion of how to set protein if your body fat is very high. There is also a complete section on ketogenic diets.

In Level 3, there is a visual chart to help you determine hydration levels as well as different intake recommendations for fruits and vegetables if you are gaining or cutting.

In Level 4, there is now a discussion of protein digestion as it relates to protein timing concerns.

In Level 5, there is now a discussion about citrulline malate and glutamine.

In addition to these changes, there are now three new entire chapters that precede Behavior and Lifestyle.

Making Adjustments and Measuring Progress covers how to determine if you are progressing towards your goals through four different methods. We also cover the issues with body fat testing, and how to adjust your nutrition plan over time to ensure continued progress.

Peaking for Competition is a complete discussion of the ins and outs of peak week for physique competitors, and making weight (and changing weight classes) for strength athletes.

The Recovery Diet discusses what to do when a diet ends, as you transition to maintenance or surplus. It begins with a brief set of guidelines for non-competitors and then in great detail covers how to make the transition from the inseason to offseason for physique athletes. It concludes with a model for long-term, global periodization, including guidelines for training stress, cardio, energy intake, body composition, and appropriate nutritional paradigms for all phases of physique sport.

Like the first edition, this edition concludes with Behavior and Lifestyle. However, there are extensive additions on the potential psychological pitfalls of relying too much on external nutrition cues (tracking nutrition and body weight) and how to use qualitative approaches guided by

satiety, hunger, and habit based methods to avoid them.

I hope you enjoy these additions as much as we have enjoyed writing them. I would like to express a sincere thank you to everyone who asked questions in the website support section and gave feedback to make these second editions what they are.

INTRODUCTION

Let's start with a brief overview of what is included in the chapters of this guide.

Mindset and Materials

The beginning section covers everything necessary to own and understand before implementing The Pyramid and its levels. There must be a balance between accuracy, flexibility, and consistency as you work to achieve your nutritional endeavors, otherwise, adherence becomes a serious issue over time. We will discuss the psychological outlook required to stay sane and satiated, the physical tools sometimes needed to track your progress, and the pitfalls to be aware of as you embark on your journey.

The Levels of the Pyramid

Once we have some basic understanding of what we will need upfront, we will then get into the meat of the matter. All levels of The Muscle and Strength Nutrition Pyramid will be very intricately described with many recommendations, values, and equations for setting up a sound nutrition plan as it pertains to your particular goals.

Now as a brief introduction to The Pyramid, here are the levels in order of decreasing priority.

Level 1 — Energy Balance, Calorie Intake, & Rate of Body Weight Change

In this first and most important level of The Pyramid, we will go over how to determine your caloric needs, specifically as they relate to recommended rates of body weight change for muscle gain and fat loss.

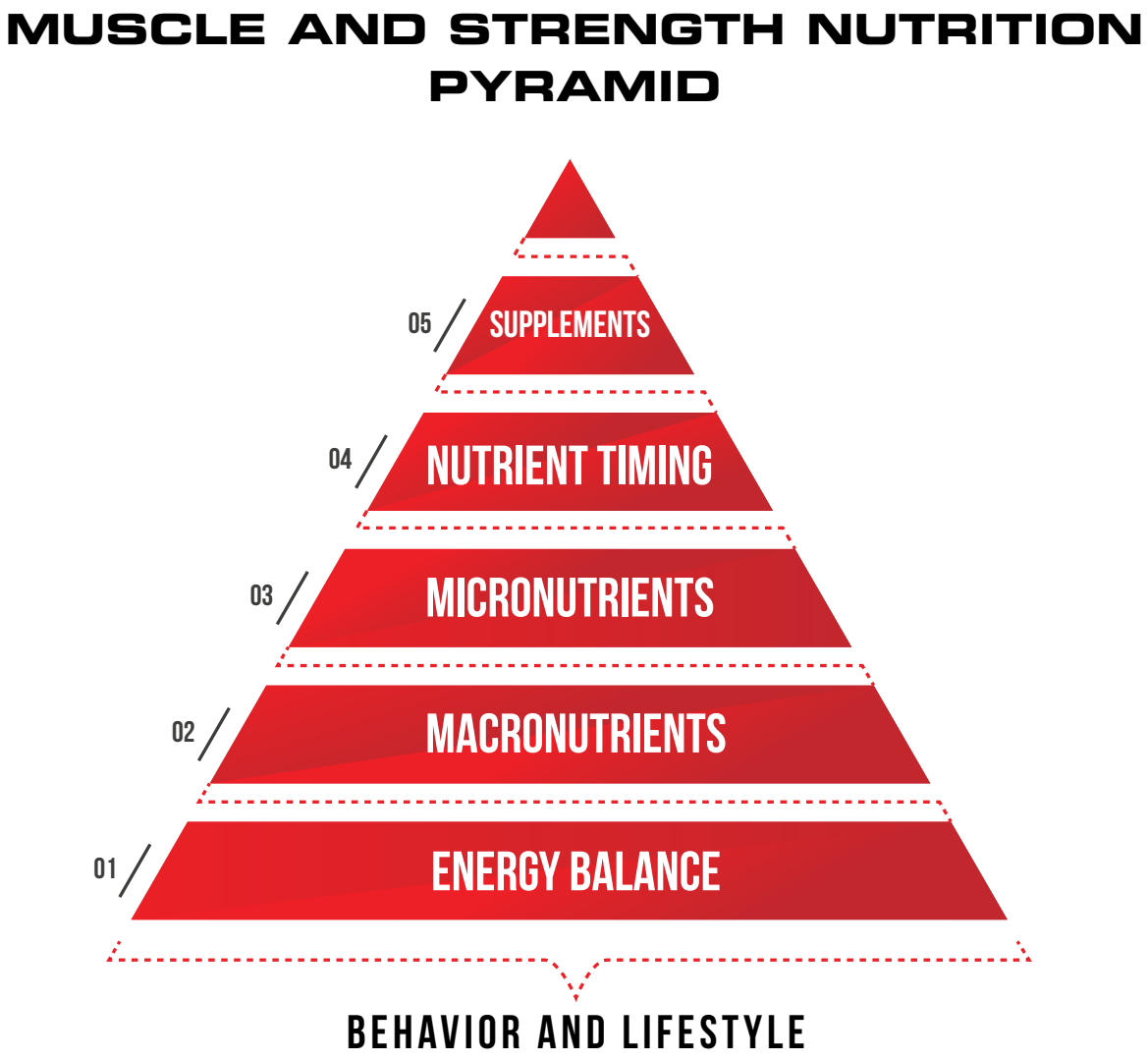
Level 2 — Macronutrient Composition of The Diet

Here we will go over the function of the macronutrients and then establish macronutrient intakes that are appropriate for most athletes in various conditions. I'll also introduce some alternative guidelines for those who may fall outside of the norm, and then discuss how to

identify where you fall within the spectrum of all of these values. To close it out, we will go over fiber intake recommendations for health and nutrient absorption.

Level 3 — Micronutrients & Water Intake

This section will go over the types of micronutrients and how to use your food choices to fulfill their daily requirements. We will then finish Level 3 with fluid intake recommendations and how to tell if you are consuming enough to keep yourself hydrated and functioning properly.



Level 4 — Nutrient Timing & Frequency

This level discusses how to distribute calories over different periods of time. We will do this on both a broad and acute scale, diving into the timeline of the whole diet, over the course of a week, over the course of a day, and in relation to training.

Level 5 — Supplements

Supplements are the least important part of The Pyramid and are not necessary for success, barring that you do not have some type of nutritional deficiency or condition that requires them. In fact, in the grand scheme of things, the vast majority of supplements on the market don't do anything except burn a hole in your wallet. That said, some are based on sound science and are therefore worth discussing as they can provide a small benefit. And because there are so many ineffective or unnecessary supplements on the market, we also need to discuss how to differentiate between the useful ones and the not so useful ones. Once we've learned how to evaluate them, I will present a list of options and doses for you to consider.

Making Adjustments and Measuring Progress

Levels 1–5 focus primarily on how to set up a nutritional structure or plan. However, as it's often said in the military, "No plan survives contact with the enemy." In this case, what I mean is that a plan must be adjusted over time, and to do that, you must know how to assess whether it's working. This chapter is all about how to assess your progress and know when and how to make adjustments to achieve your goals. We provide multiple options for how to assess and measure progress based on your goal and situation, and also how to modify your plan.

Peaking for Competition

After you've set up your plan and then adjusted it to reach your goal, if you're a competitor, your job isn't quite done. Lastly, you have to put on the finishing touches before you hit the stage or the platform. This chapter is all about peaking for a physique competition through the

manipulation of your 'peak week' and making weight without hurting your total if you're a strength athlete. In it, we cover the full gambit from carb loading, to water, sodium, electrolytes, and the pros, cons, and utility of various acute weight loss strategies.

The Recovery Diet

For physique competitors, getting into true contest shape is an incredible challenge. Unfortunately, when the season ends the challenge doesn't. To get on stage you have to overcome all the internal signals telling you to eat and gain weight. Then, you step off the stage after the last show of the season and you somehow have to find your way back to health, both mentally and physically. This chapter provides a framework for how to do that.

Behavior & Lifestyle

And lastly, in the final portion of this text we'll discuss how to implement these guidelines into your way of life. This can involve everything from navigating alcohol consumption, eating out, how to track in more flexible ways as you gain experience and have different goals, and even a discussion of whether you should track and weigh *at all*.

I will then close this guide with some of my ideas on how to better relate to other people in your life while you progress towards your goals. We will discuss the support of family and friends, and what to do when people ask you for advice.

As you can hopefully tell, The Muscle and Strength Nutrition Pyramid is not a rigid program to be followed in an extreme manner. I believe it is very valuable to create discussions around the implementation of your diet within your lifestyle throughout the process of changing your behaviors, so that is what you can expect throughout the remainder of this text.

To help you with the calculations in the coming sections, we have created a special page on the website for you with a spreadsheet calculation aid on it here. The password for the page is "nutrition-aid".

MINDSET AND MATERIALS

We will start this guide by discussing your entire mentality towards nutrition, which can affect all levels of The Pyramid.

This is a broader and less definitive and quantitative topic than the rest of this book, but I can't express how important this is. You can have a lot of theory and a lot of knowledge and still never get to where you want to go if you don't know how to apply those concepts consistently and how to make them a part of your lifestyle and behavior.

This section will conclude with a discussion of the tools you need to implement the information in this guide and actually ensure that you're able to meet the guidelines of the levels within The Pyramid in accordance with your goals. I also introduce some concepts around your relationship with food, and the potential pitfalls of focusing more on your nutrition and body composition and how to handle them.

To Track or Not to Track?

Before I teach how you to accurately quantify your diet on a regular basis, and measure and monitor your progress towards your goals, I think it's vital we start with a discussion around the potential pitfalls of doing so.

Make no mistake, there are substantial and important differences between being a recreational bodybuilder or lifter, and a physique competitor or strength athlete. A competitive physique athlete has to achieve a level of leanness in order to get on stage that often results in the loss of a normal menstrual cycle among women, a decline in testosterone in men, disrupted sleep, higher levels of stress hormones, hunger hormones, a decline in satiety hormones, a reduction in total daily energy expenditure disproportionate to weight loss, decreases in lean body mass and strength, higher levels of fatigue, and is often associated with a diet that carries a higher risk of micronutrient deficiencies [1-9].

To push oneself to this point, below a body-fat range that your body "wants" to have from a biological perspective and past what would be considered physically healthy, requires a long and intensive diet. The emotional toll of contest prep should not be understated, as competitors

experience a decrease in mood state, preoccupation with food, irritability, and physique athletes are more likely than non-competitors to have eating disorders, poorer body image, and to experience true clinical conditions like 'the female athlete triad' and 'relative energy deficiency in sport' [1-9].

Likewise, similar problems are prevalent in weight-class restricted athletes [10]. There is no avoiding monitoring and manipulating your body weight to some degree in weight-class sports such as powerlifting or weightlifting, and the practice of regularly weighing oneself and tracking one's food is also associated with greater incidence of disordered eating, and poorer body image [11].

For all of the above reasons, it's very important to consider if, why, how, when, and how much you'll track your food and body weight. Going back to the differences between competitive and recreational physique competitors and strength athletes, consider that without a specific weight class cutoff, or the requirement of getting on stage to have your appearance judged in competition, you might be able to achieve your goals without regularly tracking your calories, macros or body weight. In fact, beyond just being possible, it might be *better* if you can avoid long-term, continuous tracking. Sit with that for a moment, and we'll come back to it later in this chapter and I'll cover how to do this in bits throughout the text, and in detail at the end of the book in the Behavior and Lifestyle chapter.

Accuracy, Flexibility, and Consistency

Implementing quantitative changes to your diet is all about balancing these three qualities. If you become overly focused and accurate, you're going to lose some of your flexibility, you're going to lose your sanity, and inevitably you're going to make a diet very difficult to follow.

We only have so many things that we can focus on at a time, and our willpower and ability to juggle and handle multiple stresses is not infinite. You can't expect to chase down every grain of rice that falls off the food scale every time, 3 to 5 times a day while hitting your macros with perfect accuracy and expect for that to be a sustainable plan. That will

stress you out eventually or at the very least take your time and energy away from more important things in life.

What will stress you out even more than the process of trying to be overly detailed and accurate is what happens once you run out of energy to do this, and you can't do it consistently anymore. Then, you start to bounce back between the extremes of losing control completely and overeating, and rigidly tracking until you lose it again. Living in the two extremes is something to avoid, and to do so we really want to make sure that we have a balance of these three factors.

We want to be only as accurate as we need to be in order to be consistent enough that we can get to our goals. Different goals are going to require different levels of accuracy, but they all require consistency, which means adapting your flexibility to your goal. In research, dietary restraint is highly associated with folks who can lose weight, but *flexible* dietary restraint is associated with those who lose weight, keep it off, and stay sane while doing so [12]. So determining the appropriate amount of flexibility for your situation is very important.

For example, a bodybuilder who is in the final stages of prep trying to get shredded glutes is going to need more accuracy than someone who has an undetermined time limit to lose 100 lb. Likewise, a bodybuilder in the off-season trying to put on muscle mass is going to have different accuracy requirements from a bodybuilder during contest prep, or from someone who is trying to get lean but isn't a bodybuilder and is just trying to shape up for the summer.

The more accurate you are, perhaps the more consistent you will be in hitting your targets and achieving your goals. However, you might also be more stressed depending on how rigid you are in your pursuit of accuracy, which could negatively impact long-term consistency. The less accurate you are, the more flexible you might be. But if you are too inaccurate and way too flexible to the point where you're not consistent, you won't get to your goals.

As you can see, this is a balancing act that must always be appreciated when considering nutrition. It's important that we discuss different ways to align your dietary approach with your lifestyle and goals.

The Trouble With "All-or-Nothing" Thinking

Now knowing that we have to consider the 'accuracy to flexibility ratio' in order to improve consistency, let's go over one of the biggest mindset challenges that can get in your way of finding a healthy balance.

The approaches listed below can all end up being counterproductive in the long run because they fall under the umbrella of all-or-nothing thinking, which can be a huge short-circuit to many people's progress. In fact, in the literature that shows those with flexible dietary restraint are more successful, sane, and able to maintain their weight loss compared to those with rigid dietary restraint, the mediating factor between flexible and rigid dieters is whether or not you think of food in a black and white, all or nothing manner [13].

Rigid Meal Plans

Since I'm not a registered dietitian (RD), it's not within my scope of practice to provide specific meal plans. But even if I were an RD, I wouldn't write meal plans. The main reason I don't write meal plans for my clients, other than providing them as an example so my clients can initially see how to match foods to their nutrient targets (which by the way is a great teaching tool), is because meal plans are often viewed in a binary fashion. Either one thing or the other, zero or one. People see it as, "I'm on the meal plan," or "I'm off the meal plan." In our minds, we then gauge success in black or white terms; I've either followed the diet and I was good, or I'm off the diet and I was bad.

For example, a meal plan might direct you to have an apple at noon, and instead you have a banana. If you view a meal plan as an immutable plan that must be followed, you may feel like you screwed up, get down on yourself, and because you see the day as already lost, eat a whole large pizza. The banana might have had the exact same macro-nutrition profile as that apple, but because of the mindset, you feel like you blew it and you go on a big binge.

I understand the allure of meal plans. They're easy and straightforward to follow. You don't have to learn about the macronutrient profiles of foods to follow them; you don't have to plan out your meals or your

days on your own. It can be nice to just be told what to do. But you can't have a strict meal plan while you go on vacation, you can't have a strict meal plan and go out to eat, and you can't have a strict meal plan without getting into the mental traps of not knowing what to do when you're off it. If meal plans aren't flexible (e.g. provide options at each meal and tell you the calories or macros), they don't teach you about nutrition, they tend to be socially isolating and when following them you don't learn how to integrate nutritional knowledge into your lifestyle. In many cases, strict meal plans won't help you get to your long-term goals. They can be a short-term solution.

Consider that most people in this day and age are great at losing weight; the larger problem is that they just can't keep it off. This is why we need long-term solutions, and this is why I don't advocate rigid meal plans.

That being said, there's nothing wrong with having meal plans so you can get an idea of what the daily structure of a healthy, performance-supporting eating schedule might look like, or if you are going to track, how to hit your macros (which is a concept we will fully cover in Level 2 of The Pyramid). By seeing a couple of different examples, trying them out, and then learning how to make variations on the plan, or diverge from the plans while still hitting your targets (if you are tracking), you can teach yourself to navigate your nutrition on your own.

So I would highly recommend that if you do use meal plans that they're a learning tool in your quest for flexibility and consistency, rather than a final outcome. Treat them like your nutritional training wheels.

Like I said earlier, not everyone should be weighing and tracking their food and recording their macros, but for those who have a goal where this is necessary, or are doing it for a short-term period to better understand portion control, some useful resources exist. For one, check out **the FitGenie app** if you are an iPhone user (for now, one day we'll be on Android). This is an app based on the concepts in this book, that uses AI to adjust your macros to your goal (weight loss, maintenance, or gaining), and also can give you meal plans to hit your targets, based on your food preferences. A similar tool if you don't have an iPhone is **EatThisMuch.com**.

"Magic" Macros

Once you've gone through the calculations in Level 2 of The Pyramid, depending on your goals, you may have a period of time where you are tracking certain macronutrient targets that you will aim for each day. This means you will have a particular amount of dietary fats, carbohydrates, and protein to consume each day, in grams.

That being said, they are still just numbers. You've decided they fit your needs based on this guide, but remember it's not like they are the end-all-be-all. They will change over your lifetime as you get older, gain and lose weight, change your activity levels, or as you experiment and find out what works best for you. Also, most of the time, ideally we shouldn't have to quantitatively track them (more on this later in the book).

To illustrate why being too attached is not necessarily a good thing, let's say you were supposed to hit between 190 and 210 grams of carbs. You "blew it" and ate 215, then because you have an all-or-nothing mindset, you go eat that same pizza we talked about earlier as if you'd been on a rigid meal plan. The problem here was obviously the pizza, not the 215 grams of carbs that put you 5 grams over your range.

So don't put your macros on a pedestal as this defeats the purpose of why we provide quantifiable numbers in the first place. You're not going to always be 100% accurate, sometimes you'll mis-track, sometimes you'll misread the label, sometimes you'll look up and just realize you just kind of blew it and went over. Just stop there, and get back on track the next day. Like a meal plan, the macros you are targeting aren't magic.

It's good to be consistent, but don't get into the black-and-white thinking of being either "On my macros," or "I'm off, so I might as well just give in and say screw it." That's what we want to avoid. The all-or-nothing thinking that eventually leads to bingeing. We want to majorly steer clear of that mentality, especially while we're dieting.

The "Good Food vs. Bad Food" Approach

Now, this is something that is very prevalent throughout the entire fitness community as a whole. Many people advocate it and have done

so for years. These believers in the "good food vs. bad food" mindset include some very smart people, people with great physiques, and a lot of people that have had quite a lot of success with their own goals.

However, despite the fact that you can achieve success with this approach I don't see it as a long-term solution and I think that it can lead to developing unhealthy relationships with food. We shouldn't have to maintain borderline eating disorders just to keep a lean physique.

As opposed to trying to avoid the consumption of "bad foods", I think a better mindset to adopt is approaching nutrition with the goal of being inclusive instead of exclusive.

What this means is that we want to adopt an approach of including "healthy" foods that have a high micronutrient density and other desirable qualities (like a high fiber content), versus excluding foods that might not have these qualities. (We will learn all about micronutrients later on in Level 3 of The Pyramid; for now, just know that these are the vitamins and minerals that your body requires.)

There are very few, if any, foods that are actively unhealthy for you (assuming you don't have a clinical condition). Meaning, there are no foods that if eaten once, regardless of quantity, will immediately and measurably harm your body. The only plausible negative connotation associated with say, a Twinkie, a Pop Tart, and other foods commonly labeled as "bad" is that they are relatively devoid of micronutrients, fiber, and protein.

Some people refer to these foods as "empty calories", which is probably a slightly fairer description than simply labeling them as "bad". This term means that while these foods contribute to your calorie (Level 1 of The Pyramid) and macronutrient counts (Level 2 of The Pyramid), they won't do much to satisfy your micronutrient requirements (Level 3 of The Pyramid). While this description is relatively accurate, it doesn't mean these foods should be villainized and completely avoided.

The main thing to be aware of is that "empty calorie" foods can only cause issues if they dominate your diet (as an aside, this is more likely to happen when dieting). It's not that we need to remove them entirely;

it's that we need to make sure that we have included the "healthy foods" first to ensure our bodies are nourished and taken care of. After that, feel free to have the "bad foods" (which really aren't bad at all) in moderation as this will improve your flexibility and therefore your consistency. By allowing yourself to diet while consuming a wider range of foods that might include "treats" in moderation, you will feel more normal, have more flexibility, less restriction, and ultimately more long-term adherence and success.

This is the reason that the seemingly normal approach of "good vs. bad food" or "clean vs. dirty food" can potentially cause problems. While it is true that high-level bodybuilders have and will continue to be very successful eating only from a short list of foods that are deemed by the bodybuilding Gods to be "clean", it doesn't mean that this is the only approach that can deliver success (it also doesn't mean that they can adhere to this approach after their diet has concluded).

Remember, you don't get extra credit for eating only healthy foods. Once you've met your basic requirements you don't get gold stars for consuming additional micronutrients. There's no food critic in your throat who tells you, "This is good, this is bad, this is good, etc." There's just your body getting its nutrient needs, and once it gets more than enough, it doesn't continue to benefit from more. It's not a question of whether a bowl of oatmeal is better than a candy bar. Rather than assessing which food is good or bad, you need to assess if your entire diet is good or bad. Believe it or not, a rigid "clean vs. dirty" diet can actually result in a poorer nutrient profile than an approach that includes a broader spectrum of foods (more in Level 3).

One of the most critical components to a healthy lifestyle and diet is nutritional variety. For example, Okinawans (the people who inhabit the island of Okinawa, Japan) are some of the longest living people on the planet. They also happen to have one of the highest food varieties of any culture in the world [14]. In contrast, there are some bodybuilders who want to be this healthy but simply aren't because of the rigidity of their diets. Claiming to be all about health, but only eating from a list of 10 foods is an ironic proposition. If the rules of the diet you follow say that you have to cut out gluten, dairy, red meat, "processed"

foods, fruits, legumes, starches, and whole eggs, you end up with an incredibly limited diet that is unlikely to satisfy your micronutrient needs [1]. I've seen it time and time again (and experienced it myself), where following a very rigid diet results in the self-fulfilling prophecy of eventually being unable to digest foods not on the "clean list" without incredible discomfort due to the loss of the enzymes and gut bacteria that are essential to the digestion of a wide variety of foods.

Tools for Tracking

If you are a competitive bodybuilder going through contest prep, or a powerlifter dropping a weight class, having a high degree of accuracy and consistency is paramount. To do this requires quantifiable ways of ensuring you are meeting your intake goals and making progress. This requirement is fulfilled by tracking body weight and aspects of your food intake.

For people who aren't competitive athletes, there is also potential value in tracking at certain stages of your journey. When you are starting out, tracking helps you understand how your habits compare to general portion sizes, see what foods are dominant in which macronutrients, gain awareness of mindless eating, observe the effect that your eating habits have on your body, and teaches you how to structure a basic diet for health and performance. Additionally, there are time points throughout your life where it is useful to once again track your food and weight. These time points occur intermittently such as if you go through a fat loss phase, and despite making qualitative changes, you plateau, so you use tracking and weighing as a "check-in" to evaluate why progress might have ceased. Likewise, in a non-dieting state, you might use tracking as an "audit" to ensure the habits you've picked up are still serving you the way you think they are (more on this to come at the end of this book). Outside of those scenarios, non-competitors shouldn't be tracking regularly because the more you rely on external cues (body weight, calorie tracking, etc.) the more you can lose touch with internal cues (hunger, satiety) which can lead to disordered eating [15].

But if you need to track and weigh, you'll require a food and a body weight scale. I would highly recommend that both of these items be digital, as they are much more accurate. You can find them from $10 to

$30 in most stores in the U.S. or online, and all you have to do is just make sure that the batteries don't run out. You don't want one of those non-digital scales that are loaded with a little rubber band because they are very inaccurate.

How to Track Food

The reason that you should weigh foods, as opposed to measuring their volume (when possible), is because measurements of volume are often inconsistent in comparison to weight.

One cup of the same food can produce very different values depending on the form of the food, how you pack the food into the cup, and whether the cup is level or not. A cup of diced apples, apple slices and a cup of mashed apple have different nutritional profiles. Also, cups are not uniformly manufactured. For example, a food label might say, "1/2 cup oats (45 g)," but when you actually use the cup you have at home and weigh the oats out, the scale reads 54 g or 40 g. When you look at a food label and it states "100 grams (1 cup)," be mindful that 1 cup of this food (using the measuring cup you have at home) may not be 100 g. To ensure accuracy, weigh foods when possible.

Additionally, it's a good idea to weigh foods in their uncooked state. The amount of time a food is cooked for affects how much moisture it retains. A food with higher water content before cooking weighs more, but it has the same nutrition profile after it is cooked when it weighs less because the water has evaporated from cooking. The opposite is true for foods like dried pasta and rice which weight more after cooking due to an increased water content. Since you won't always cook foods for the exact same length of time, a good way to ensure consistent measurement and tracking is to weigh foods prior to cooking.

You will also want some way of tracking the nutrients in your foods. This can be done on a digital spreadsheet, with a piece of paper and a pen, or using an integrated online food database (which is probably the easiest and most convenient). Some popular databases are FitGenie, MyFitnessPal, LiveStrong, FitDay, MyMacros, and CalorieKing, but there are many others. These computer-based applications can also usually be accessed on a smartphone which is useful while traveling, going

out to eat, going to a grocery store, or eating anywhere else outside of your normal element. These applications often have information about ready-made food products as well as uncooked foods which can be helpful. Just be aware that there can be mistakes in these databases, due to their reliance on user input. So anything you consume often is worth checking in *multiple* places (government databases are often pretty reliable, Googling a food and "calories" will show the USDA nutrition facts, e.g. "strawberries calories").

As we make our way through The Pyramid we'll discuss specifically which nutrients to track and what target ranges are appropriate for you given your goals and profile.

How to Track Body Weight

Body weight is one of the most important variables we can track to gauge if we're actually getting to our goal. However, also remember that tracking your body weight can be stressful and in some cases cause more problems than it's worth [16]. While a competing bodybuilder or a powerlifter cutting a weight class has to ensure progress and might be forced to use the scale, if you are someone who just wants to get to a healthier body fat, you will very likely be able to get there without the scale. If you focus on changing your nutritional habits by following the guidelines in the Behavior and Lifestyle chapter, you might find you get leaner without having to regularly quantify your body weight changes. If you struggle with the scale psychologically, keep in mind that the information here is specific to those who need to weigh themselves as you read this section. Also, even for the competitive strength and physique athletes who do check the scale while dieting as described here, if you find that doing so is throwing you for a mental loop, take 1–2 weeks off weighing. Just focus on doing what you need to do with your diet and training and let the hard work, work. Take a break from monitoring to stay sane during the process.

In the first level of The Pyramid, we'll discuss the appropriate rate of body weight change for your goal. After going through Level 1, you may determine that your current goal is to lose 0.5 to 1% of your body weight per week, or to gain 2 lb (~1 kg) per month, which means you're only putting on ~0.4–0.6

lb (~0.2–0.3 kg) per week. But, how do you measure something as small as a 0.4 lb (0.2 kg) increase in a weekly time period if you only weigh-in on Saturdays under very different conditions? You can't.

What I recommend is to have a daily weigh-in first thing in the morning, after you use the bathroom, before you eat or drink anything, nude, and record the number. It's not that we care about the single day's weigh-in (we don't, and focusing too much on your daily weight can drive you crazy [16]), rather it's that you're going to use your daily weigh-ins to generate an average weight for the week.

This can be easily automated using an Excel (PC) or Numbers (Mac) spreadsheet using the "average" equation function built into the software. There is also a phone app called Happy Scale that averages and smooths out your weigh-ins for you to predict actual weight loss over time. You could also just do it long hand with pen and paper. Or you can search the web for "average calculator" and Google will have quite a few options for you to use for free as well. There are many ways to do it, but the main output we need is a weekly average, compiled from weigh-ins at roughly the same time of day, from *at least* three morning weigh-ins per week (in most cases, more in Behavior and Lifestyle), under the same conditions, to get as consistent data as possible. Once you have your average, the goal is to compare your average weight from one week to the next. Over a week, averages will flatten out daily fluctuations in body weight and give you a workable, reliable number.

It is totally normal for your body weight to fluctuate 1–2% on a daily basis due to shifts in water (sometimes more for some people). This is caused by day-to-day fluctuations in food intake, sodium intake, alcohol, and stress hormones, or from hormonal shifts during certain phases of a menstrual cycle (among other things). But what you'll notice is that when you get a weekly average, that number is much less variable and much more comparable when looking at a previous week's average. These averages become even more consistent if you perform the weigh-ins as I recommend (first thing in the morning, nude, after you use the bathroom before you eat or drink anything). Additionally, the weigh-ins will be more reliable when your diet is more consistent (which this guide will help you do). Even if you do find that there is

some variation comparing one week to the next, you will be able to see those trends and you can decide to track averages over 14 days if needed to ensure you can tell if you fall within the coming guidelines for body weight change. In fact, for most people I recommend not making changes until you have 2–3 weeks of averages to compare, to really smooth out these numbers and show you the real trends.

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LEVEL 1

ENERGY BALANCE

And now we dive into the actual hierarchy of The Muscle and Strength Nutrition Pyramid. As mentioned in the Introduction, these concepts will be delivered in order of importance from the foundation of The Pyramid (Level 1), to the top of The Pyramid (Level 5).

Each level provides the foundational knowledge for subsequent levels. Too often, information in Level 4 or 5 is delivered without context in the fitness world and this creates a lot of confusion. For example, a recommendation about when to consume protein is fine and good, but only if you understand what protein is and how it fits in with your energy and protein needs. The foundation levels of The Pyramid are the levels that give you the biggest return on your intellectual investment, and often covering these bases makes it much easier to understand and implement many of the concepts that are covered in the higher levels.

This is why the system is to be followed as such. In order, one step at a time, and always with respect to the preceding Levels.

That said, for most people looking to benefit from the information in this guide, their goals fall into a couple of different categories. There are those who are trying to acutely put on muscle, and those who are trying to lose body fat.

Now even though most people typically want to achieve both of these outcomes, trying to do both simultaneously, while certainly possible, is not necessarily the most efficient approach to achieving these goals once you have your initial "newbie gains" solidified. Certainly, someone who is a rank beginner (or returning to training after a period of detraining) will make progress in both areas at the same time due to having a low threshold for adaptation. Indeed, it's not uncommon to increase your body weight by 5–10% without an increase in your body fat percentage over the course of a year as a newbie. Likewise, for those who don't gain weight or even those who start out in a fat loss phase (if they are overweight to start), you can expect to gain a similar amount of muscle mass while seeing body fat decrease. But after a certain point, it may make more sense to focus on one or the other at any given period of time. So if you're a late-stage novice, intermediate, or advanced trainee, your efforts would best be aimed toward either

fat loss or muscle gain at any one time.

In this first and most important level of The Pyramid, we will go over how to determine your caloric needs, specifically as they relate to recommended rates of body weight change for muscle gain and fat loss.

How to Find Maintenance Calories

To determine the appropriate amount of calories to consume for our planned gaining or cutting phases, we must first establish a baseline target that would theoretically result in no change. The estimation of caloric intake that would simply keep you at your current body weight is referred to as your maintenance calories. To determine maintenance, you can either track body weight and calories to ascertain the relationship between the two variables, or you can estimate maintenance calories with an equation. Both ways give you a value for maintenance calories, but the former is ideal for reasons I'll explain.

Finding Maintenance by Tracking Weight and Food Intake Over Two Weeks - My Preferred Method

The ideal method that I'll introduce first requires more time, energy, and thought, but results in a much more accurate, individualized estimation of maintenance calories. To begin, you must obtain a digital body weight scale, a digital food scale, and an online account with a free food-tracking database like MyFitnessPal (or others). Earlier in this book we covered specific recommendations on how to weigh, track, and measure. So before you decide to go through this process, make sure to look back on the Mindset and Materials section of this guide.

Once you've gathered these resources, the next step is to spend 2 weeks weighing and tracking your food as best as you can when you prepare it, and estimating your caloric intake when you aren't preparing your own food as accurately as possible. Once again, earlier in this guide we covered how to be accurate when not preparing your own food, so go back and read this section as I want to re-emphasize that you need to be familiar with tracking and measuring before starting this process.

The goal of food tracking is to get a daily caloric intake that closely

represents what you eat on a day to day basis. In conjunction with tracking calories, you will also step on the scale every morning, in the same conditions (like we covered in the previous section of this book) and record your body weight.

At the end of two weeks, you will have 14 weigh-ins and 14 calorie values. First, determine your average caloric intake by adding all 14 calorie values together and dividing by 14. Now, if you only got say 3–4 weigh-ins per week, and 3–4 days of tracked calories, that's fine, just so long as they were evenly distributed and represented your normal habits. Specifically, if you tracked and weighed Mon-Fri and but you didn't on the weekends when you typically go out to eat more, that's probably not going to be accurate. Do your best to record all your habits, don't judge them or modify them, and estimate as best as possible when eating out. So, if you've done that, let's say as an example, this value came out to 2100 calories.

Then, split your weigh-ins into 2 weekly averages, by adding your first 7 weigh-ins together and dividing by 7 and doing the same thing with your last 7 weigh-ins as seen below.

BODY WEIGHT	
Week 1	Week 2
141.7	141.8
142.1	142.2
142.7	143.0
141.7	1v41.7
142.5	142.5
141.9	142.8
142.1	142.0
Average ~142.1 lbs	Average ~142.3 lbs

Now you see that you are slowly gaining weight. But what does this mean with regards to calories? Well, we know that 1 lb (~0.5 kg) of

adipose tissue contains ~3500 calories [1]. Therefore we can estimate how much of a surplus or deficit you are in based on weight change. While the "3500 calorie rule" isn't perfect since not all weight gained or lost is fat and energy expenditure changes over time [2], this value is still a good way to roughly estimate maintenance calories.

Reason being, you are using a short-term period of 2 weeks and you haven't manipulated your diet to result in significant changes in body weight or expenditure yet. Thus, changes in weight are predominantly fat and water and using a 7-day average will eliminate the "noise" of water weight fluctuations. So, you can be reasonably sure that the short-term changes in body weight you observe will be well represented by the "3500 calorie rule."

The only time I wouldn't advise using this method is if you just started training or are just coming off from a training layoff or injury, as in this case muscle mass can rapidly change and potentially invalidate the equations. However, if you are a natural lifter not coming back from a layoff, not a complete novice lifting for the first time, and if you are relatively weight stable, this is a very easy way to estimate maintenance calories with appropriate accuracy.

Hypothetically, if you gained 1 lb (~0.5 kg) of fat in a week, you would be, on average, consuming ~500 calories more than your maintenance per day, as 7 days x 500 calories = 3500. So if you only gained 0.2 lb (~0.1 kg), you simply multiply 3500 x 0.2, which is 700 calories. Meaning, in the above example you are in a weekly surplus of ~700 calories.

On a day to day basis, on average, that means you are consuming 100 calories more than your maintenance (700 calories divided by 7 days). Thus, you know that since your average intake over 14 days was 2100 calories, you know maintenance is roughly 2000 (2100 - 100 calories).

That said, if there is some sort of time constraint keeping you from this 2-week recommended method of determining maintenance calories, a secondary approach would be to roughly estimate using some basic calculations. Just be warned that it can be far less accurate than actual tracking, but can still yield some sensible results.

Estimating Maintenance by Calculation

Now keeping in mind that there are huge amounts of individual variation here, a good way to ballpark this for most people would be to first take your body weight in pounds and multiply it by 10 (or multiply your body weight in kilograms by 22) and then multiply that value by an activity multiplier. As an example, let's do a calculation for a male that weighs 200 lb (90 kg), when we multiply by 10 (22) we get a theoretical baseline of 2000 calories.

Step 1: Baseline Multiplier; Not Accounting for Any Activity

200 lbs x 10 = 2000 calories

Then we multiply that by an activity multiplier. Now when I say "activity", it's not just dependent on whether you're a construction worker or sitting at a desk all day, a full-time athlete, or a weekend warrior. This also includes something called NEAT, which stands for non-exercise activity thermogenesis. Or more simply put, any activity outside of exercise, including subconscious movement.

So yes, someone sedentary will have a lower maintenance than someone highly active, but a part of the reason there is such large individual variation is that NEAT is one of the main ways we regulate energy expenditure. Meaning, if we diet and lose weight, or eat more food and gain weight, our body typically will adapt to some degree to maintain our "normal weight". It does this by making us burn more or fewer calories, and a lot of that is a function of just fidgeting, postural support and control, and subconscious movement. It's not something we can really modify. Some people will sit at their desk all day and burn a whole lot more calories than I ever will, simply because I have a "thrifty metabolism" [3].

Additionally, almost everyone reading this book will probably (or should, in most cases) fall in the range of lifting weights 3–6 times per week. So, taking into account individual variability and also your exercise schedule, we can use the numerical range of 1.3 to 2.2 as an activity multiplier. From my experience, I would say about 90% of people fall in this range.

So what that means is that yes, there are going to be people who need 2600 calories to maintain 200 lb (not very much for a person that size), all the way up to maybe 4400 calories (a lot for a person that size). Most will fall in the middle range, but some won't. So there really is a large variation, and there are people who are even further outside of those ranges believe it or not. Below, I show how to use the activity multiplier, notice there is a range at each level to represent individual differences.

Step 2: Using An Activity Multiplier

LIFESTYLE & TRAINING FREQUENCY	ACTIVITY MULTIPLIER
Sedentary plus 3-6 days of weight lifting	1.3 – 1.6
Lightly active plus 3-6 days of weight lifting	1.5 – 1.8
Active plus 3-6 days of weight lifting	1.7 – 2.0
Very active plus 3-6 days of weight lifting	1.9 – 2.2

Baseline Multiplier x Activity Multiplier = Estimated Calories For Body weight Maintenance

Depending on lifestyle and individual differences, these calculations can equate to a 2600 – 4400 calorie range for maintenance in our 200 lb (90 kg) male example.

Now I know what you are wondering: "How do I know which value to choose, what determines each level of activity?" Well, that's why it is best to actually take the two weeks to fully track your intake as discussed earlier. However, if you want to get started faster, just take the middle value of 1.7 as your multiplier. Then, if you gain or lose weight too quickly after 2–3 weeks, just adjust your intake. This is a perfectly valid approach as well.

Is Tracking Your Caloric Intake as a First Step Even Necessary?

One thing I'll continually bring up throughout this book are ways you can use more internal vs external cues to reach your goals, as doing so maintains a better awareness of your hunger, satiety and bodily needs versus solely relying on calorie and macro tracking, which can erode your ability to gauge hunger and satiety.

In the case of energy balance, simply trending towards being a little less or more full after meals can result in moving from smaller to larger surpluses to facilitate appropriate rates of weight gain. Likewise, subjectively decreasing energy based on satiety and hunger cues may even allow you to accomplish mild cuts that don't take you to unsustainable levels of leanness. To reduce or increase energy intake qualitatively, modify your energy intake subjectively by assessing your satiety after meals. For example, if you are not gaining weight at an appropriate rate, try to be more full, and eat more calorie dense foods. If you are not seeing visual changes in leanness every 2–3 weeks (or weight loss on the scale, if you don't feel like you can visually assess this) while trying to lose fat, try to be less full after meals, and eat more fibrous, high-protein, low-calorie foods that provide more satiety with less energy.

Not convinced? Feel like this is a less committed cop-out to tracking macros or that you might not be able to reach your goals without tracking? Something to keep in mind is that muscle gain has occurred in every study I've ever seen where well-designed resistance training was used as an intervention in untrained individuals, regardless of whether the participants tracked their nutrition or not. How? Because their hunger went up and they consumed more food to provide the energy needed to grow muscle. See? It's almost like our bodies have some natural system of regulating energy intake and output — oh that's right it's called hunger and satiety! On a serious note, I'll discuss these concepts in more depth in the Behavior and Lifestyle chapter; also, to do this blended approach of internal energy regulation based on the external cue of body weight change, you have to know what appropriate rates of weight gain and loss are in the first place.

Should I Gain or Should I Cut?

Ahh, the eternal question. Some of you may have read that last sentence of the previous paragraph, "You have to know what appropriate rates of weight gain and loss are in the first place," and thought, "Hold on, I'm not even there yet, I don't know if I should be trying to gain muscle or lose fat!" Well, you aren't alone. If I had a nickel for every time someone asked me, "Should I bulk or cut?"...well, let's just say I'd need an additional room in my home just for piggy banks.

The answer to this question depends on more than just your current body composition. It's not quite as simple as saying: cut if you are high in body fat, gain if you are not. There is also an interaction with training experience. Indeed, I wouldn't advise someone with obesity who is just starting a weight training program to purposely go on a fat loss plan. Just becoming more active alone can give someone who was previously sedentary more finely tuned hunger signals [4], and body-fat percentage will go down even if muscle is gained without fat mass losses. Also, metabolic health will improve purely from resistance training without dieting. In this case, I'd only advise you to institute a caloric deficit once the initial "magic" of newbie gains end, and if at that point you still had a goal of lowering your body fat (which as I said, may happen anyway just from lifting regularly).

In the case of someone who is generally not very muscular, but is also higher in body fat than average (often referred to as "skinny fat"; I'm not a fan of the term, but it hopefully helps you understand what I'm referring to), I also don't recommend cutting. However, I also don't really recommend gaining at the rates I recommend later in this chapter for novices either. In this case, once again, just let the magic of partaking in serious progressive resistance exercise (for guidelines check out The Muscle and Strength Training Pyramid) do its thing for 6 months, without focusing on instituting a significant deficit or surplus. With a low starting level of muscle mass, you're ripe for putting on muscle regardless of your nutrition (outside of it being totally off base). After letting this initial phase occur, you will probably have a much better foundation to work from.

The times the answer to this question are cut and dry, is when you

aren't a novice. If you have a few years under your belt of training, and you fit into the "intermediate" or "advanced" categories (defined later in this chapter), gaining or cutting does pretty much just come down to your body fat level. However, the answer to this question is also not as critically important as you might believe. There is a common notion that if you aren't reasonably lean, efforts at gaining will produce a disproportionate amount of fat and little in the way of muscle. This concept is called your 'P-ratio', which is simply defined as the proportion of fat to muscle you put on when gaining weight. Indeed, there is research showing that very lean people — who are naturally lean, not who dieted — gain more lean body mass during periods of overfeeding, and people with obesity gain more body fat during periods of overfeeding [5].

However, what two things that are frequently misunderstood are: 1) putting on more lean body mass when overfeeding occurs in *naturally* lean people who walk around lean. If you dieted to get really lean, your body if anything, is actually a bit more primed for fat storage. Also; 2) that this relationship is based on observations of individuals who aren't resistance training. If you start lifting weights this drastically changes the game. Nutrient partitioning in your now highly active skeletal muscle is much more favorable for muscle gain as you are providing a stimulus for growth and regularly depleting your muscle of energy and pushing them to become energy efficient and adapt. If it was true that individuals with a high body fat couldn't gain muscle mass effectively, sumo wrestlers wouldn't have the highest recorded lean body masses of any athlete...but they do [6]. Likewise, super heavyweight powerlifters would be weaker than weight classes below them, but they aren't.

Now don't get me wrong, this isn't a license to go on a dreamer permabulk! But rather, I'm saying don't be the guy who is afraid to enter a surplus because they aren't 8% body fat, or the gal who is afraid because they aren't 16%.

There probably should be some limit to how high your body fat is before you decide it would be better to cut versus bulk, but it's for logistical reasons not "anabolic resistance". Essentially, you don't want to only get a month or two out of your gaining phase before you have to diet.

If you are a powerlifter you don't want to be too far above your weight class, and for bodybuilders, you don't want to be too far off stage weight. In either case, the inevitable diet to come will be unnecessarily hard or long if you are. Likewise, for recreational lifters, you probably don't want to be so high in body fat at the start of a gaining phase that you aren't happy with your body shortly after starting it. Essentially, in each case you want enough of a runway to be able to spend at least a few months in a surplus. My rough guidelines are a maximum of ~15% body fat for men and ~23% body fat for women for beginning a gaining phase. After starting, allow your body fat to climb ~3–5% in the course of a gaining phase before you do a brief 'mini cut' (I'll bring this concept up throughout the text, but for a full description see the end of The Recovery Diet section) to clean things up a tad before you rinse and repeat. But remember, this is The Muscle and Strength Pyramid, not the constantly-cutting-to-be-aesthetic (but not actually succeeding) pyramid. A general recommendation (for those who aren't starting with high body fat level) is to have a minimum of a 4:1 ratio of the time spent in a gaining phase vs a cutting phase. Thus, if you spent four months in a surplus putting on muscle, you earned yourself no more than one month to do a mini cut.

Now, the tough part is actually assessing your body fat level (see Making Adjustments and Measuring Progress). Everyone stores body fat differently. Also, having more or less muscle mass can make a given body fat level look better or worse. So in the end, just make your best guess as to whether you are below or above the cut-off. If you are somewhere in the range where either a cutting or gaining phase could be appropriate and you can't tell where you fall and what you should do, don't worry, it doesn't matter which you choose to do. You hopefully realized that though, now that you are no longer under the false impression that your gaining phase will be sabotaged if you don't start it lean enough.

In Summary:

- Don't try to get super lean before doing a gaining phase, you'll be so hungry you'll gain too quickly, and after dieting to a very lean level you're actually more primed for fat storage. Don't diet to the

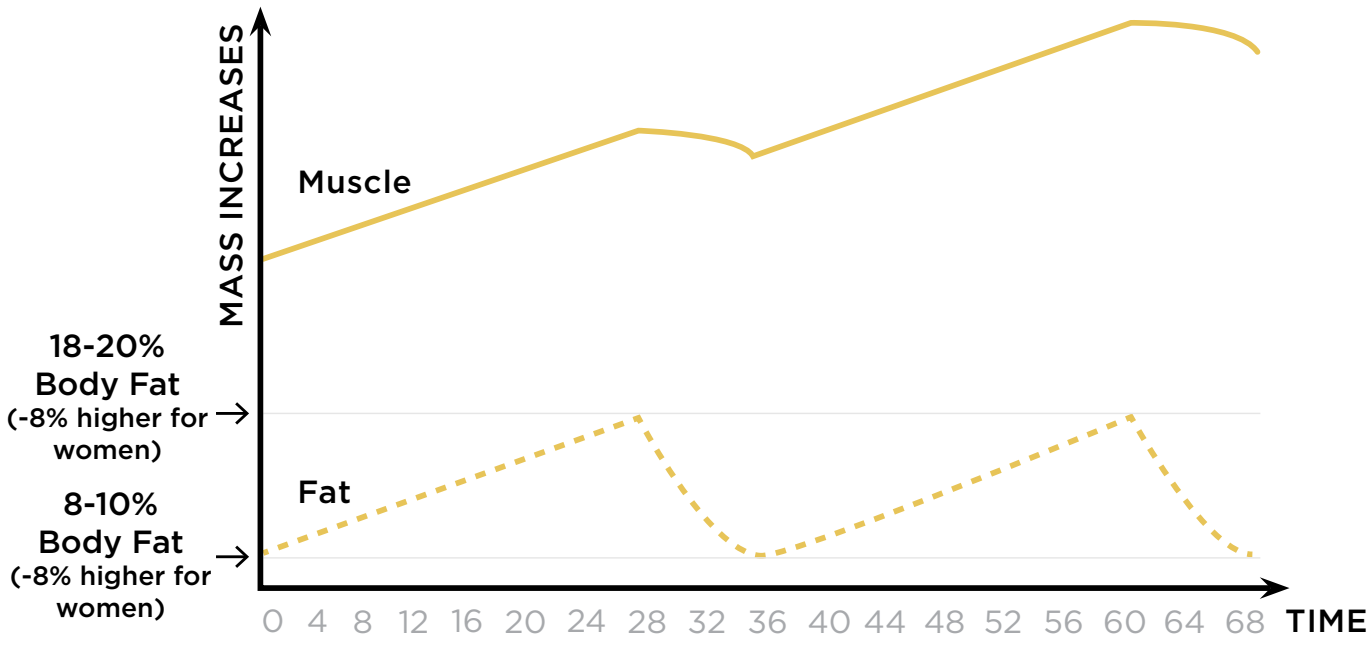
point where you are really feeling food deprived and hungry (this is often around 8–10% or lower for men and 16–18% or lower for women, but also depends on how you dieted).

- If you're a novice trainee with obesity or who is starting with a relatively high body-fat level, train hard for 6 months, establish a basic structure with your eating and then reassess. You might find you substantially improved your body composition.
- If you're a novice trainee who is both higher in body fat than they'd like (but not overweight) and also doesn't have much muscle mass yet, just eat around maintenance and train hard for 6 months, then reassess.

Men and women have different 'essential body fat' levels — the body fat essential to life and physiological function (largely not subcutaneous body fat). Meaning, even in shredded, stage condition, a female competitor will be at a higher body-fat percentage than a male. While individual differences do come into play, on average this value is around 2–4% for men and 8–12% for women. Thus, I often present examples of bodybuilding contest condition in this text as around 4% body fat for men, and 12% body fat for women (actually, measuring body fat accurately is another story, which we'll cover in the Making Adjustments and Measuring Progress section). Likewise, when I present body fat examples of men and women they will be ~8% apart and should be seen as equivalent.

- For the non-novice male over 15% body fat or female over 23%, you can go into a surplus for a gaining phase and you will put on muscle, but it will come with some body fat as well. If you don't want to push your body fat too far over these levels, you should consider a fat loss phase first.
- For the non-novice male up to 15% body fat or female up to 23%, it's fine to start a gaining phase. For competitors, you'll probably be able to push it until you gain 3–5% more body-fat percentage points before you should consider a mini cut. This will ensure your next contest prep diet isn't more difficult. For non-competitors, in my experience this point is where many (but not all people) want to trim up. However, you should know it's not unhealthy at all to be in the high-teens of body fat for a male, or high-twenties for a female.

GRAPH SHOWING THE GAINING ZONE



Deciding Appropriate Rates of Weight Loss

If you are tracking and weighing, the next step in setting up a diet is to take maintenance calories and use that information to determine an appropriate caloric intake for your goals. For weight loss, I'd recommend that you aim to lose weight at a rate of 0.5 to 1.0% of body weight per week to minimize muscle and strength loss [7]. With the 200 lb (90 kg) male example we talked about earlier, this would be 1 to 2 lb (~0.5 to 0.9 kg) per week.

As previously discussed, 3500 calories roughly equates to 1 lb (~0.5 kg) of adipose tissue; so if you drop 500 calories per day, then you'll drop roughly 1 lb (~0.5 kg) per week if the majority is fat. Again, this is not an exact science, but it's a good rough estimate to start from.

So, if we know our 200 lb (90 kg) male's maintenance calories, we could subtract 500 to 1000 calories per day from that total to elicit the appropriate rate of weight loss of 1 to 2 lb (~0.5 to 0.9 kg) per week.

Now although this losing and gaining thing seems like simple math (i.e.,

"If I go down 500 calories I drop a pound, so if I eat 500 calories I gain a pound."), it often doesn't work out that way. Remember that whole subconscious activity and metabolic regulation thing that we were talking about? That concept means that you may have to eat more or less than you expect to get the rate of weight loss or gain you desire.

Additionally, we don't only lose body fat during a diet. In fact, muscle loss and potentially muscle gain while dieting can confound the numbers (more on this to come). Point being, these recommendations are just good starting places to set up the diet, but from there you will have to adjust.

About Cardio Use for Fat Loss

Also, the caloric deficit doesn't have to come entirely from the diet, and you probably guessed that adding some cardiovascular work to expend more energy rather than restricting your energy intake alone, could also be useful.

A simple way to estimate energy expenditure during cardio requires you to determine a rating of perceived exertion (RPE) during exercise. This can be simply done by considering how hard it feels on a scale from 1 to 10 (note, this is a different form of RPE from the repetitions in reserve based RPE scale discussed in the Training Pyramid). If you also track the time spent performing the cardio, and if you know your body weight, you can estimate caloric expenditure with reasonable accuracy. You burn approximately ~0.2, ~0.45 and ~0.7 kcal per 10 minutes per pound of body weight doing light (RPE 2 to 4 out of 10), moderate (RPE 5 to 7 out of 10) and vigorous (RPE 8 to 10 out of 10) cardio respectively, above what you would normally be burning doing everyday light activity in that same time period [8].

RPE 1–2	Very light effort. You can talk with ease.
RPE 3–4	Light effort. You can talk with almost no difficulty.
RPE 5	Moderately light effort. You can talk comfortably with minor difficulty.
RPE 6	Moderate effort. You can talk with minor difficulty.
RPE 7	Moderately high effort. Talking is difficult.
RPE 8	High effort. Talking is very difficult.
RPE 9	Very high effort. Talking is maximally difficult.
RPE 10	Maximal effort. Talking is impossible.

Cardio type, height, weight, and other variables affect these values, but these are decent values to use for estimation purposes. So for example, a 200 lb male performing moderate intensity cardio would burn an additional 90 kcal in 10 minutes (0.45 x 200) over and above what they burn doing normal day-to-day light activity for the same time period. In an hour, they would burn 540 kcal over what they would have burned had they been performing light everyday activity.

Below is a chart displaying the number of calories burned during 10 minutes of cardio activity at 3 different levels of intensity for individuals at 3 different body weights:

Type of Cardio	120 lbs (54 kg)	160 lbs (73 kg)	200 lbs (90 kg)
Light	24 kcals/10min	32 kcals/10min	40 kcals/10min
Moderate	54 kcals/10min	74 kcals/10min	90 kcals/10min
Vigorous	84 kcals/10min	112 kcals/10min	140 kcals/10min

Now if this hypothetical 200 lb (90 kg) male really enjoyed food he might think, "Hold on, if I did an hour of moderate intensity cardio a day, that would put me slightly over a 3500 kcal deficit per week and I would be able to lose a pound weekly which is at a rate of ~0.5%. That's what you prescribe and I wouldn't have to restrict my food!" Well, he wouldn't be wrong, but 7 hours of moderate-intensity cardio per week can cause problems for someone interested in muscle and strength.

Doing cardiovascular exercise at moderate intensities is essentially endurance training. The adaptations and the work required to produce endurance adaptations can interfere with the training and adaptations required to generate muscular strength, hypertrophy, and power [9]. Not to say that interference will prevent someone from getting bigger, stronger, or more powerful, but if excessive cardio is performed it can slow down the process of building muscle, strength, or power in a dose-dependent manner.

Glycogen depletion and the molecular signaling that comes from endurance training may play a role in interference [10]. Additionally, interference might also be related to the extent of the impact and the contribution of eccentric actions from the modality of cardio, considering that cycling appears to interfere less with resistance training adaptations than incline walking [11]. Eccentric actions are essentially when your muscle lengthens under muscular control, often performed when guiding a load into place or decelerating a load; like what your bicep is doing when you set down a coffee mug. In endurance training, this is how your body brakes and controls your inertia and movement. High impact forces can create joint strain, and a high volume of high force eccentric actions can create a lot of muscle soreness. So, you can deplete the muscle of its energy and also go into training with sore joints and muscles if cardio training is excessive.

However, low-intensity cardio (if it doesn't have an impact component, like cycling, or the elliptical) would be below the threshold of producing overload and therefore wouldn't be an issue. For someone in decent shape who is lifting weights, casual cardio is not an adaptive stress, so it won't cause endurance adaptations in the body. Thus, interference is not an issue with low-intensity cardio. However, the calorie burn is much

lower when doing low-intensity cardio compared to higher intensities, and thus, you have to do a lot of it for it to add up.

The final option is high-intensity cardio. High-intensity cardio is very taxing, and unlike lower-intensity cardio cannot be done continuously for very long unless you are a well-trained anaerobic athlete. This is one of the reasons you often hear people talk about high-intensity interval training or HIIT. HIIT is when you do a burst of maximal-intensity cardio, followed by a rest period and then repeat. Similar metabolic adaptations can come from either HIIT or lower-intensity cardio performed for longer periods, but in less total time [12]. Also, the risk of interference seems to be reduced when HIIT is utilized because the high-intensity nature of the cardio is more similar to resistance training [13]. Lastly, the higher the intensity, the greater the increase in metabolic rate in the short time period afterward. High-intensity exercise provides a short-term, small, but significant increase in metabolic rate [14] while low-intensity does not.

So does that mean HIIT is a home run and that our 200 lb (90 kg) male who loves to eat can do a bunch of HIIT and some low-intensity cardio and keep all his food? Well, unfortunately, some of the same issues that come with moderate-intensity cardio come with high-intensity cardio. If there is a significant eccentric component or a high level of impact, it can cause problems. In fact, sprinters suffer more than twice the number of hamstring injuries that long-distance runners suffer on average, despite running only a fraction of the distance or time [15]. While a larger risk of injury (with certain modalities) and a greater need for recovery are the only risks of HIIT, these are significant risks. It's hard to make the argument that you are avoiding interference and retaining more muscle by avoiding moderate-intensity cardio and doing high-intensity cardio when you have a hamstring tear.

Okay, so then what is appropriate for a cardio prescription?

Because of interference, cardio should not be the primary vehicle for fat loss, regardless of whether you perform low or high-intensity cardio. The majority of fat loss should come from the diet. Secondly, resistance training performance is the most critical aspect of muscle maintenance.

The diet supports the training as best as possible while creating fat loss and the training supports muscle retention. Don't put this paradigm at risk. Remember you are a strength athlete or a bodybuilder, not an endurance athlete. As a rule of thumb, your total cardio for the week should take no more than half the time you spend lifting weights. So if you spend 90 minutes 4 times per week lifting weights (6 hours), that means you should do no more than 3 total hours of cardio per week. As an aside, smaller women may find that they reach a point where food cannot be realistically further reduced to continue losing weight; in these cases, it may sometimes be needed to max out the amount of cardio performed or even to go slightly above this amount.

Choose cardio that is easy on the joints (low impact) and easy on the muscles in subsequent days (won't make you sore). Rowing, cycling, swimming, elliptical trainers or even lightweight barbell or kettlebell complexes could all be used. Cap the number of HIIT sessions at one to two sessions per week that last no more than 30 minutes. Do no more than an hour per week in total of moderate-intensity cardio as this intensity causes the most interference. For the rest of your cardio, keep it at a low intensity. Also, choose modalities you like. When the goal is just to expend calories the modality is not that important, why not enjoy it?

So what might this look like?

In the example of lifting 6 hours per week and doing 3 hours of cardio, you could perform two 30 minute HIIT sessions, 1 hour of moderate-intensity cardio, and 1 hour of low-intensity cardio as one way of doing the absolute maximum amount that should be performed.

Deciding Appropriate Rates of Weight Gain

For someone who is aiming to put on muscle mass and strength, I'm going to give you some different figures depending on your training experience.

Realistic and effective rates of weight loss are very different from weight gain; anyone who is a natural lifter and has been at it for 3 to 5 years or longer will tell you that watching muscle grow is like watching paint dry, while fat loss can happen relatively quickly in comparison.

Even for a lifter who has been in the gym for a year and a half, you can massively change your physique in a 24-week contest prep or cutting phase by dropping body fat. However, it might take 24 months to make a visual difference in a physique on the same level during a gaining phase.

Now I'd like to clarify, when we discuss gaining muscle throughout this guide, I don't recommend just eating everything in sight and gaining massive amounts of weight through a classic 'bulk' phase as previously identified in the old-school bodybuilding community. That continual addition of body fat will eventually result in a lower strength to body weight ratio for someone who would like to get stronger, and it will make dieting much more difficult and prolonged for someone who would like to eventually cut down for the bodybuilding stage. In fact, a 12-week study comparing rates of weight gain in resistance-trained athletes found that the group that consumed a small surplus gained the same amount of muscle and strength, but only one fifth the body fat as the group that consumed an additional 600 calories [16].

Now that doesn't mean there is never a time to gain relatively quickly, it just depends on how much 'gaining capacity' you have. This is determined by how long you've been lifting weights and how much of your muscular potential you've realized up to this current point. So to establish rates of weight gain, we will differentiate between beginner, intermediate, and advanced lifters with gaining goals. As a note, there's a great deal of individual variability in how much muscle people can gain. So, there will be people who will do better outside of the range of recommendations, but the following recommendations will work for a good majority of individuals.

On the next page is a chart referring to the recommended rate of weight gain per month:

EXPERIENCE LEVEL:	DEFINITION	RATE OF MONTHLY WEIGHT GAIN
Beginner	Able to progress most training loads in the gym on a week to week basis	1 to 1.5% of body weight
Intermediate	Able to progress most training loads in the gym on a month to month basis	0.5 to 1% of body weight
Advanced	Progress is evident only when viewed over multiple months or a year	Up to 0.5% of body weight

Now, remember that if you go faster than this, the weight you are putting on will probably be proportionately more body fat. It is very easy for excess (some is unavoidable) fat mass to come right along with muscle gain if you are not careful, which is something we do not want

For a beginner example, a male who weighs ~180 lb (~82 kg) would be looking to gain ~2–3 lb (~0.9–1.3 kg) per month, while a female weighing ~130 lb (~59 kg) would be looking to gain ~1–2 lb (~0.4–0.9 kg) per month.

For intermediates, this will slow down a little bit because you are closer to your genetic potential of muscle mass, and now we're talking somewhere between 1–2 lb (~0.4–0.9 kg) a month for our 180 lb (82 kg) male example, or ~.5–1 lb (~0.2–0.4 kg) a month for our 130 lb (59 kg) female example.

At the advanced level, we're primarily going to be looking for progressive overload and recovery in the gym. A very slight surplus is all that is needed, and at most a rate of weight gain of 0.5% of body weight per month should be targeted, with the understanding that this may still require periodic mini cuts to keep body fat in check.

So why aren't we primarily focused on seeing a change in weight at the advanced level?

If you look at any top-level professional, natural bodybuilder, maybe

Brian Whitacre, Alberto Nunez, Jeff Alberts, Patricia Beckman, or any one of these competitors in the advanced levels of their careers, their stage weight might only go up or down 1 or 2 lb (~0.5–0.9 kg) from competition to competition.

Yes, body weight increases will come over time, but it's going to be the amount that an intermediate trainee gains in 1 to 2 months over the course of 3 to 4 years. This is why looking at it on a monthly basis just doesn't make sense for the advanced lifter. If substantial increases in stage weight do occur in these athletes, typically it's a case of better muscle maintenance while dieting versus muscle gain in the offseason. So at this level what you want to focus on is making sure that you're recovering from your training and that you're making progressive increases in the gym. This is indicated by either adding more reps or more load over time.

These advanced individuals also know that they're past those introductory phases where strength improvements are occurring quickly, primarily due to neuromuscular adaptations or making improvements in form. Advanced lifters can be relatively certain that increases in reps or load are at least partially because they are making some subtle changes structurally. Therefore, advanced lifters need to focus on their gym progress and not trying to drive scale weight up too quickly, or else they'll just end up accruing body fat. In fact, if you are a lifter past the intermediate stage, you don't necessarily need to see the scale going up on a regular basis to ensure you are making progress (more on this to come).

So how would we implement these guidelines into our diet?

Again, remember from earlier that roughly 500 calories per day is estimated to put on about a pound (~0.5 kg) of fat per week. But, what about the caloric value of muscle? This is where it gets interesting (and confusing).

A pound (~0.5 kg) of hydrated muscle is actually only about a third protein, the rest being minerals and water. So, there are only ~800 calories in a pound (~0.5 kg) of muscle [1]. However, while fat can be very easily stored at almost no metabolic cost to the body, this is not true for muscle mass. Muscle mass is much more metabolically costly

to synthesize than body fat.

Also, the reality is that even when doing things right, for lifters who are not overweight, and not novices, they're going to be putting on both fat and muscle in most cases when gaining weight. Combining this fact and the metabolic cost of creating muscle tissue, the "3500 calorie rule" actually holds up decently well for setting up your diet for weight gain as well as weight loss [17]. This is not to say that a pound (~0.5 kg) of muscle mass has 3500 calories in it, but rather, that you may have to increase your calories more than expected to gain muscle because of the energetic cost of synthesizing this muscle. Essentially, the process of building muscle increases caloric expenditure and this, along with NEAT, may be why in some cases weight gain is much less than expected after a caloric increase [18].

Metabolic Magic?

Interestingly enough though, because of the difference in the energy value of fat and muscle (and glycogen for that matter), in some cases strange things can happen. For example, gaining a small amount of weight in a deficit, losing small amounts of fat in a surplus, or even gaining small amounts of fat in a deficit are all technically possible because of the differences in the water and energy contents of different tissues of the body.

To illustrate how these scenarios are possible, let's take the example shown in a study of overweight elderly men who had experienced a significant amount of age-related muscle atrophy who began a resistance training program and a protein supplementation regimen [19].

One of the groups in this study gained 1.3 lb (0.6 kg) of body weight on average after 16 weeks. To get to this change in weight, they lost 2.4 lb (1.1 kg) of fat mass, while gaining 3.7 lb (1.7 kg) of muscle mass on average. So, they must have been in a surplus because of the gain in body weight right? Believe it or not, they were actually in a deficit of about ~65 kcals per day!

How is this possible and how can I know that? Well, the amount of

energy your body liberates from 1 lb (~0.5 kg) of pure body fat by burning it to "replace" an energy deficit is ~4270 kcals. Likewise, if you are in a surplus of ~4270 kcals and you generate no lean body mass and only fat, that will result in the gain of 1 lb (~0.5 kg) of pure body fat. I know you're wondering, "Why isn't the value 3500 kcals?" Well in this case, that is because 3500 kcals is the value of 1 lb (~0.5 kg) of adipose tissue, which is comprised mostly of pure fat, but also contains water and some minerals. When tracking body weight changes at home, the "3500 calorie rule" is a good estimation tool, but lab measurements track changes in pure body fat rather than adipose tissue, and a pound of pure body fat therefore, has a higher energy content.

Changes in lean mass, however, carry a much smaller energy value. When using a body composition measuring device such as a DXA scanner, lean mass changes include their respective water contents (and in a 2-compartment model, measuring only fat mass and fat-free mass, water is considered fat-free mass). As I previously mentioned, muscle mass is in large part water, and on top of that, protein (which is what muscle is made of) has less than half the energy per gram than fat does (~4 kcals/g vs ~9 kcals/g, more on this to come next level). Thus, to gain a pound (~0.5 kg) of muscle requires ~830 kcals to be "deposited" in the body (only ~$^1/_5$ the energy content of pure body fat).

So what that means is that despite gaining 1.3 lb (0.6 kg) of total weight, the subjects were in a net deficit of 7300 kcals over the course of the study as it requires a surplus of only ~3100 kcals to build 3.7 lb (1.7 kg) of muscle while a loss of 2.4 lb (1.1 kg) of fat meant a ~10,400 kcals energy deficit was "replaced" by burning body fat (10,400 kcals -3100 kcals = -7300 kcals). Meaning over the 16 weeks (112 days) of being observed, the participants gained weight while being in a ~65 kcals daily deficit (-7300 kcals divided by 112 days is 65 kcals/day)!

Granted, this is an extreme example. Overweight individuals can lose fat at a rapid pace because there is more of it to mobilize [5], people who are untrained make rapid gains in lean mass [20], and age-related muscle atrophy is essentially detraining; and detrained lifters make rapid progress when performing resistance training until they get back to baseline [21]. Thus, in rare situations like this, it is in fact possible to

gain weight in a deficit because there are fewer calories in the same weight of muscle tissue (due to the water content and energy density) compared to fat tissue. Thus, the total weight of hydrated muscle gained can be greater than the weight of body fat lost, and because the energy value of the total lost fat is greater than the muscle gained, weight gain can actually occur in a deficit.

For similar reasons, a second group in the same study [19] actually lost a small amount of fat ~0.2 lb (0.1 kg) while in a very small caloric surplus, and concurrently gained ~4.2 lb (1.9 kg) of muscle (and water).

Like this odd scenario of losing fat in a surplus, other odd scenarios like gaining fat on a deficit are also potentially possible. For example, if someone well trained ceased training altogether, was bedridden due to injury, and started eating a low-protein diet in a slight deficit, conceivably over time they could gain a small amount of fat while making up for the deficit primarily by metabolizing large amounts of lost lean mass for energy. It would not be unrealistic in this scenario for a lifter to lose say 13 lb (~6 kg) of muscle and gain 2 lb (~0.9 kg) of fat over a 16 week period. If this occurred, the hypothetical individual would have actually been in a small deficit on a day to day basis despite the slight gain in body fat.

So why am I telling you this? What purpose does this serve besides confusing you?

The main point is that while you should use body weight changes as surrogate values to help you adjust your diet, don't get so hung up on the numbers mathematically — the "3500 calorie rule" is actually a huge simplification. Don't get me wrong, it's an important and useful simplification, but you should understand its limitations.

You might also be wondering when this would ever apply to you (since you likely are not an overweight and sedentary sarcopenic 65-year-old who is lifting weights for the first time). Well, there are some instances where this "metabolic magic" might actually affect you. For example, if during a diet break you visually get leaner while gaining weight, you might be gaining more weight from regained glycogen and muscle tissue (and the gut weight of more food) than the small amount of weight that you are losing from body fat. In this case, you would likely actually

be gaining weight while still being in a slight deficit. This scenario could also occur while slowly increasing calories after a cutting phase.

It's also important to point out that these 'body recomp' changes, where slight deficits or surpluses produce changes in both muscle mass and fat mass simultaneously, happen slowly. Even in the example I used of overweight elderly men training for the first time, the changes occurred over a four-month time period. It's not as though large amounts of muscle can be gained while large amounts of fat are lost in a few short weeks, especially in well-trained individuals. This is why dedicated periods of purposeful fat loss and muscle gain are recommended.

However, advanced drug-free individuals simply can't gain large amounts of muscle mass in short periods of time. Therefore, the knowledge that the body can slowly gain muscle over long periods of time even without enforced calorie surpluses should give advanced lifters confidence in a slower lean gaining approach.

Practical Differences Between Weight Loss and Weight Gain

So, what it all boils down to is that the real difference between weight loss and weight gain is simply that the rate of weight gain should be slower to avoid gaining excessive body fat.

Thus, to enter a muscle building phase you establish a caloric increase per the relationship between your target rate of weight gain based on your training age and its relationship with the "3500 calorie rule". Now you don't need to enforce this caloric increase every day. Calories can vary between days, but this needs to be your average caloric increase from maintenance on a day to day basis over time.

On the next page are the intakes for a 180 lb (82 kg) male and a 130 lb (59 kg) female respectively at each training age, calculated by multiplying 3500 by the target rate of gain per month, divided by 30 to show the daily average increase required:

Experience Level:	Calories Above Maintenance at 180 lbs (82 kg)	Calories Above Maintenance at 130 lbs (59 kg)
Beginner	1–1.5%/month = ~200–300 kcals/day	1–1.5%/month = ~150–225 kcals/day
Intermediate	0.5–1%/month = ~100–200 kcals/day	0.5–1%/month = ~75–150 kcals/day
Advanced	Very slight increase up to 100 kcals/day	Very slight increase up to 75 kcals/day

And lastly, just to be clear on how we would be tracking these changes, let's use an intermediate 180 lb (82 kg) male as an example. If you have a goal of gaining 1 to 2 lb (0.4 to 0.9 kg) per month, this simply means that we would divide that by 4 to get a weekly target.

So a beginner at 180 lb (82 kg) trying to gain up to ~3 lb (~1.3 kg) per month, might aim to gain ~¾ of pound (~0.3 kg) per week, the intermediate might be about half a pound (~0.2 kg) per week, and advanced will basically be maintenance or slightly higher. Again, this is why it makes sense to look at 2–3 week periods to assess progress because these are small changes when looking at it week to week.

As previously discussed in the Mindset and Materials portion of this guide, the weekly averages of daily weigh-ins (at least three weigh-ins per week) assessed over 2–3 week periods will be your most helpful tool to know whether your nutrition is helping you progress towards your goals or not. If you are not gaining weight or losing weight at the targeted pace, you can adjust your intake based on the "3500 calorie rule" to reach your target (or modify your energy intake subjectively based on hunger and satiety cues). Having this first level under control is honestly about 70 to 80% of the battle when it comes to getting your diet in check. The subsequent levels make up the rest...but before we get to them, I want to leave you with the very important concept of "energy availability".

Energy Availability

The term 'energy availability' refers to whether or not you have adequate energy to maintain not only the energy demands of exercise or sport but also of normal physiological function.

You can be at energy balance, maintaining a stable body mass, but be in a state of 'relative energy deficiency' where reproductive and metabolic function are downregulated to maintain energy balance. This often occurs in physique competitors and weight-class restricted strength athletes in the process of dieting or if they attempt to maintain too lean of a physique. Metabolic adaptation occurs in response to dieting, and some of the adaptive reduction in energy expenditure includes down-regulation of 'non-essential' physiological functions, which can persist post-diet if an adequate amount of body fat isn't regained. Prolonged, low energy availability can have long-term negative health consequences [22].

Essentially, energy availability in sport refers to the "leftover" caloric intake for an athlete after training is subtracted for physiological function. This calculated value is expressed relative to lean mass. As an example, a 10% body fat, 100 kg (220 lb) athlete (90 kg or 198 lb of lean mass) consuming 3000 kcal and expending 400 kcal on average in training (2600 kcal "leftover") is said to have an energy availability of 28.9 kcal/kg (2600 kcal divided by 90 kg), or 13.1 kcal/lb (2600 kcal divided by 198 lb). More on the math in a bit, but for now let's talk concepts.

The original studies on energy availability showed that when energy intake was maintained while exercise energy expenditure was increased, metabolic and reproductive function were negatively affected. Subsequently, when energy intake was raised, the negative effects were reversed [23]. In reading this, it may just seem like energy availability is another term for energy balance. You might be thinking, "I already know an energy deficit can cause downregulation of reproductive and metabolic hormones." That's correct; an energy deficit does result in decreased production of metabolic and sex hormones in both men and women, but what is critical to understand is this *can occur at energy balance (caloric maintenance, where weight is maintained) as well.*

For example, in a 2017 Finnish study on female physique competitors, not all women had regained their menstrual cycle despite regaining body weight at 3–4 months post-competition [24]. A more extreme example is the case study of a 26–27 year-old, drug-free figure competitor whose menstrual cycle did not return until 71 weeks after competition, despite a regain of her body weight a year prior [25]. But this is not isolated to women, and indeed signs and symptoms of low energy availability have been observed in male, drug-free bodybuilders as well [26].

A lean individual will often be in a state of low energy availability when in a caloric deficit, but the state of being at energy balance while exhibiting these signs and symptoms is known as 'relative energy deficiency' [22].

Athletes who remain in a state of low energy availability can experience negative effects on performance; negative effects on the endocrine, cardiovascular, immune, metabolic, reproductive, and gastrointestinal systems; the loss of menstrual function; and a reduction in bone health in women specifically.

While these detrimental effects don't always coincide with disordered eating or a negative body image, they often do. The behaviors and self-regulation necessary to maintain low body fat and energy intake can lead to psychological stress due to the push and pull of the opposing desires to both maintain and relinquish control, as personal and athletic goals come into conflict with biologically driven desires. Low energy availability, menstrual dysfunction, and bone loss are known as The Female Athlete Triad, and the broader dysfunctions that can occur as a result of low energy availability (in men or women in sport) are collectively termed Relative Energy Deficiency in Sport or RED-S [22].

The takeaway is that even if you don't expend a ton of calories in training if you maintain a leaner physique than your body "wants" (which often requires a lower energy intake than your body needs to maintain full functionality), there can be health and performance consequences.

But how do you know if you have low energy availability? Let's get back to the math for a second to partially answer this question.

A large body of work addresses the concept of an energy availability threshold of 30 kcal/kg in women (~13.6 kcal/lb) — although low energy availability can occur in both sexes. When energy availability drops below this point, signs and symptoms of metabolic and reproductive (in women) downregulation have been observed.

However, a hard-line cut off at 30 kcal/kg is scientifically problematic. Conceptually, there is no reason the body "sees" energy expended from exercise any differently than non-exercise activity. The original research establishing the 30 kcal/kg threshold was done in a homogeneous, sedentary group of women, so the threshold likely applies in many cases, but in those with higher (or perhaps lower) non-exercise activity levels, it doesn't.

For many women, symptoms of low energy availability may or may not occur to various levels of severity within the range of 30-45 kcal/kg (or perhaps lower). And in men, it seems the "threshold" is speculated to be closer to 20-25 kcal/kg as observed among dieting bodybuilders [26]. Meaning, the male in the example I gave at the start of this section at 28.9 kcal/kg might fair far better in terms of the severity of hormonal and metabolic downregulation compared to a female at the same relative energy availability. An equivalent example would be a 154 lb (70 kg) woman at 18% body fat (57.4 kg or 126.5 lb of lean mass) consuming 2100 kcal and expending 440 kcal (1660 kcal "leftover") on average in training; she would also have an energy availability of 28.9 kcal/kg (1660 kcal divided by 57.4 kg) or 13.1 kcal/lb (1660 kcal divided by 126.5 lb) like the male, but would have a higher probability of experiencing hormonal and metabolic downregulation compared to him.

For all of these reasons, it might be more appropriate to assess not only the mathematical relationship, but more importantly, the signs and symptoms associated with low energy availability [27].

So yes, you probably want to try to stay above 30 kcal/kg/LBM (~13.6 kcal/lb/LBM) in women and ~25 kcal/kg/LBM (~11.4 kcal/lb/LBM) in men, but I think paying attention to signs of symptoms of low energy availability is more important. If maintaining a certain level of leanness or body mass — and subsequently a restricted energy intake — results in:

- the loss of menses or an irregular menstrual cycle;
- persistent food focus;
- more frequent illness;
- poorer mood state;
- an inability to increase performance;
- loss of libido; or
- metabolic or reproductive hormone panels outside of the reference ranges [22],

increase your calories and consider that it may prove more optimal in the long run to maintain a higher body mass (we'll discuss this more in the Recovery Diet section).

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LEVEL 2

MACRONUTRIENTS AND FIBER

With your caloric goal figured out, the next step is to figure out where those calories come from. Calories are primarily delivered in the form of proteins, carbohydrates, and fats, which are called macronutrients, or 'macros'.

Yes, to be technical, alcohol is a fourth calorie provider. However, we're going to assume that this is not a regular staple in your diet, especially when your lifestyle is heavily aimed towards fitness goals. With that said, alcohol consumption in moderation is absolutely fine, and thus we'll discuss its measurement and tracking later in this book, but just not in this chapter.

In this section, we will go over the function of the macronutrients and then establish macronutrient intakes that are appropriate for most athletes in various conditions. Also, we will introduce some alternative guidelines for those who may fall outside of the norm, and then discuss how to identify where you fall within the spectrum of all of these values. To close it out, we will go over fiber intake recommendations for health and nutrient absorption.

How to Prescribe Macronutrient Guidelines

Macronutrients are often prescribed either based on body weight or based on a percentage of calories. Both of these methods have their pros and cons.

Macronutrient prescriptions based on grams per pound (or grams per kilogram) are relative to your body mass, which for the most part makes sense. Typically the larger you are, the greater your energy requirements will be. However, this method does not give respect to how much of a 'caloric budget' you might have. If you happen to have a relatively low or high energy expenditure for your body mass and you determine all three macros based purely on your body weight, you could very well eat so much or so little that you'd be inadvertently gaining weight or losing weight faster or slower than is appropriate, subverting the goals of Level 1.

This is the main benefit of using 'percentage of calories' to dictate

macronutrient intake; a percentage is always scaled to how many calories you are consuming. If you followed the guidelines in Level 1, your caloric intake will be based on the appropriate rate of weight gain, weight loss, or maintenance that you calculated.

So, there is value in using both methods. Macronutrients scaled to body weight take into account your mass, which is especially important to consider in the case of protein. Protein is not primarily used as a source of energy (compared to fat and carbohydrate), but rather to build and repair tissues. For this reason, depending on the macronutrient in question, I prefer to use a mix of these two methods.

As I stated, protein's primary function is to build and repair the structure of our tissues. At most (depending on what we are doing), 10% of our energy might come directly from amino acids (the building blocks of protein). Additionally, the liver can convert protein that is not used for structural purposes to glucose, ketones, and other metabolic substrates which are the body's main sources of energy. That said, even combining the amount of protein that is used directly for energy with the amount that the liver converts to glucose, ketones or other substrates, the role of protein as an energy source pales in comparison to that of carbohydrate and fat [1].

Due to these functions, I calculate protein relative to body weight, with fats and carbohydrates based on a percentage of calories. This allows protein to be scaled to your body mass as its role is primarily structural, while carbohydrate and fat are scaled to your total energy allotment since their primary role is to provide energy.

The other information we need to know is that there are ~9 calories per gram of fat, and then ~4 calories per gram for both carbohydrate and protein. Those values, combined with our daily calories from Level 1 of The Pyramid, will help us assign our macronutrient intakes.

	Protein	Carbohydrate	Fat
Calculation Method	Gram per pound of body weight	Percentage of total calories	Percentage of total calories
Calories per Gram	~4 calories	~4 calories	~9 calories

As with each level of this guide, we will go over these calculations for those who are dieting, and those who are gaining.

Setting Macros for a Fat Loss Phase

Although the recommended macronutrient ranges that are acceptable for dieting and gaining are going to be similar, there are some subtle and important differences. When in a cutting phase of any kind, you're going to have to "rob Peter to pay Paul", so to speak — you'll be forcing yourself to either not get enough carbs, protein, or fat simply because you don't have enough calories in your budget. Therefore, we need to be a bit more cognizant of how our macros are set up during a dieting phase to protect against potential lean body mass losses, and also to improve adherence and maintain gym performance.

However, if you've already screwed up Level 1, you will inevitably have already screwed up your macronutrient distribution as well. For example, if you have ignored the advice from Level 1 and decided to try to lose 1.5–2.0% of your body weight per week, you have to eat fewer calories and thus, you have fewer calories to distribute among your macros.

You may be thinking, "That's alright, I can just eat a high protein diet to offset this!" but you would be forgetting that protein doesn't fuel your training, and lifting weights is the primary weapon you have against lean body mass losses.

Therefore, someone who is eating a lower protein intake than I would recommend, but who is dieting and losing 0.5 to 1% of their body weight per week, is likely going to maintain more muscle mass than someone

eating as much protein as I recommend while losing 1.5 to 2% of their body weight per week. So, remember that the rank of importance of each level continues to matter. Additionally, protein can only do so much to protect against losses of lean body mass while dieting.

Setting Protein Intake

As I mentioned earlier, protein contributes a small amount to energy expenditure.

During a diet, this amount increases for several reasons. First, greater levels of activity increase protein requirements [2] and activity goes up when cardio is performed in addition to weight training during a diet. Additionally, protein is used more for fuel because less fat and carbs are available due to caloric restriction [3]. Finally, with less dietary carbohydrate and fat available, more glycogen and body fat are utilized; as their stores decrease, this forces the body to rely more on protein as an energy source [4].

Both dietary and body proteins can be used for energy in the face of this energy shortfall. Thus, to protect against body protein losses, the full-body utilization of protein becomes more efficient [5]. However, this increase in efficiency often does not prevent losses of muscle mass, especially in lean individuals, even when weight training [6].

Fundamentally, whether or not you gain lean tissue is determined by the combined factors of muscle protein breakdown and muscle protein synthesis (the creation of new muscle proteins).

If breakdown surpasses synthesis, a loss of lean tissue occurs (and vice versa). A common theory is that during periods of energy deficit, muscle protein breakdown increases, outpacing synthesis, resulting in the often-observed losses in lean body mass. However, published data points out that the primary culprit causing a negative protein turnover ratio may not necessarily be the increase in breakdown rates, but rather a decrease in muscle protein synthesis [7]. However, a wrinkle is that this may only be the case in overweight individuals, while lean individuals may see a significant increase in muscle protein breakdown, as well [8, 9]. This is likely true, as there is a fair amount of data showing that the leaner you

are, the more likely you are to lose lean mass when dieting [10].

The question then becomes: Can a higher protein intake than what would be effective at energy maintenance overcome the suppression of muscle protein synthesis and/or suppress muscle protein breakdown when dieting, resulting in a better retention of lean mass?

While the general consensus in the literature is "yes" [6, 11-14], there are theoretical arguments both for and against the possibility that higher protein is beneficial while dieting.

Regarding overcoming the suppression of muscle protein synthesis, we don't know if the ceiling for muscle protein synthesis rates are simply lower during an energy deficit and additional dietary protein simply cannot overcome this fact, or if it just takes more protein in a deficit to stimulate muscle protein synthesis to the same degree that can occur in a surplus. If the latter is true, indeed there is an argument for higher protein intakes in an energy deficit.

Likewise, on the protein breakdown side of the equation, there is the possibility that additional dietary protein can offset the increase in protein breakdown, subsequently preserving lean tissue. However, there is also the possibility that since increasing protein intake concomitantly increases the use of protein for fuel [1], an increase in intakes could result in no net change in muscle protein breakdown rates. At this stage, we don't have the data to confidently know how it all plays out. However, to be safe, most protein researchers currently advise consuming higher protein in the range of 0.7 to 1.2 g/lb (1.6–2.7 g/kg) while dieting to offset body protein losses to help preserve muscle mass [6, 11–14].

However, this hypothesis has not been comprehensively tested and proven. At this stage, there are studies clearly showing the superiority of higher protein intakes for lean mass preservation in non-overweight resistance-trained populations when comparing:

- 0.72 g/lb (1.6 g/kg) to 0.36 g/lb (0.8 g/kg) for 1 week [15]
- 1.05 g/lb (2.3 g/kg) to 0.45 g/lb (1 g/kg) for 2 weeks [16]
- and 1.09 g/lb (2.4 g/kg) to 0.55 g/lb (1.2 g/kg) for 3 weeks [17].

However, these comparisons of moderate-versus-low or high-versus-low protein intakes don't actually confirm the hypothesis that high protein intakes are more beneficial than moderate intakes while dieting. To date, only three studies have directly compared moderate intakes to high intakes during an enforced caloric deficit.

- In 2013 my colleagues and I found that while body composition after dieting was not found to be different while consuming 1.27 g/lb (2.8 g/kg) compared to 0.72 g/lb (1.6 g/kg) after 2 weeks, the higher protein group did report lower levels of fatigue, athlete related life stress and diet dissatisfaction [18].
- Additionally, researchers performing a study that was published around the same time found that while body composition after dieting was not found to be different while consuming 1.09 g/lb (2.4 g/kg) compared to 0.72 g/lb (1.6 g/kg) for 3 weeks, acute markers of protein synthesis were more elevated in the higher protein group [19].
- In another study, researchers reported that after 8 weeks of energy restriction a pre and post workout whey-supplemented group maintained more muscle mass and gained more strength than a pre and post workout carbohydrate-supplemented group, which gained more muscular endurance. On average the whey-supplemented group consumed ~1.3 g/lb (~2.9-3.0 g/kg) of protein per week, and the carb-supplemented group consumed ~1.2 g/lb (~2.6 g/kg) [20].

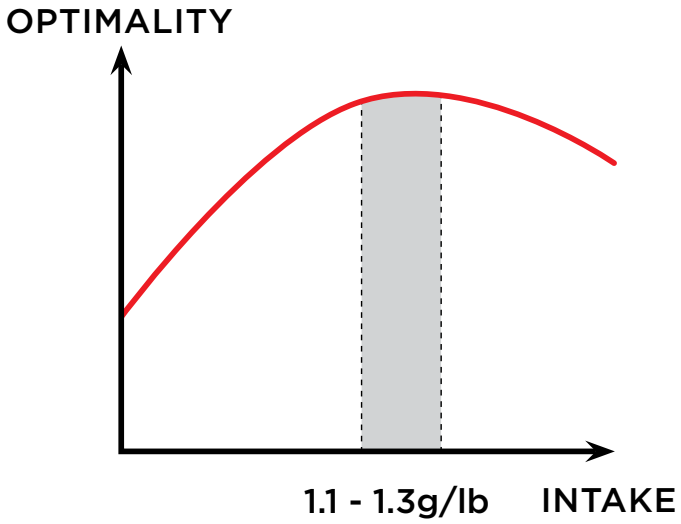
Unfortunately, none of these studies are perfectly equipped to answer the question at hand.

In our study, we used a well-trained anthropometrist to track changes in skin folds, and while this has adequate precision for tracking actual skinfold thickness changes (measuring body fat), estimations of lean body mass changes have a high degree of error. Also, the second study listed was not on resistance-trained participants, and the training they performed was not progressive resistance training, so the results can only be extrapolated so far.

Finally, the last study assessed well-trained lifters performing realistic training for 8 weeks and used a reliable method of assessing body

composition (hydrostatic weighing), but it did have one confounding variable. In this study, not only was a high protein intake compared to a moderately high intake, but also nutrient timing differed between groups. The whey supplemented group consumed the additional protein around training, which could have influenced the outcomes, and more importantly, you would think both 3 and 2.6 g/kg of protein would be plenty, which indicates timing may have been the causative factor.

So while it is difficult to say with absolute certainty that a higher protein intake will preserve more lean body mass during a diet, researchers have acknowledged that intakes as high 1.1–1.3 g/lb (2.5–3 g/kg) would not be harmful or counterproductive [21], and that there is evidence that protein intakes in this range (actually higher) may be more satiating as they tend to reduce energy intake [22, 23] and may positively affect mood state compared to lower intakes [18].



To conclude, based on the above evidence and my experience as a coach, what probably makes the most sense for protein intake while you're dieting is somewhere between 1.0 to 1.2 grams per pound (2.2–2.6 g/kg) of body weight.

Now you might be thinking, "Eric, since protein largely impacts lean body mass, shouldn't we set protein based on lean, not total body mass?" To answer your question, I think that's not a bad idea at all, in fact in one of my publications I provided guidelines based on lean

body mass [6]. However, it's very difficult to accurately gauge body composition outside of sports science facilities, so to keep things simple the recommendations are for total body mass.

The only exception to this guideline is for those with obesity. If a large proportion of your body mass is adipose tissue, this can result in an inappropriately high protein intake using the above calculation. However, Andy came up with a nice workaround where you simply use your height in centimeters as a gram target for daily protein. Try it out, it typically provides an appropriate value (it really only doesn't work if you are far below or far above average height, say 5'2" or under or 6'4" and over): for example, I'm ~184 cm tall and have ~80 kg of lean mass, so 185 g of protein is ~1.1 g/lb of lean body mass for me. This value is actually in the range I recommended in my publication where I used lean body mass as a guideline [6].

Setting Carbohydrate & Fat Intake

Once protein is set, the next step is to calculate carbohydrate and fat intake.

Now carbohydrates are not considered to be 'essential' in nutritional science terms. In dietetics parlance, whether something is essential or not is defined by whether or not your body can synthesize it on its own. Fortunately, your body can maintain blood glucose levels even if you don't consume dietary carbohydrates (hell, it can do that for weeks even if you consume nothing). But, the real question is, will carbohydrates help you maintain performance and subsequently muscle mass while dieting?

Lifting weights is the number one thing you can do to prevent lean body mass losses during a diet. Number two would be your rate of weight loss, and number three would be your macronutrient intake that we're figuring out right now. If there is one thing that this Nutrition Pyramid tends to under-represent is how important your training is to your muscle and strength goals. (If you haven't purchased it already, I would highly advise getting my companion book on training.) If I were to sketch that as a pyramid (because what else would I sketch?), it would be as follows...

That said, while dietary carbs are important for performance, they aren't technically 'essential' for life and function. Therefore, I always like to set fat first.

While dieting, as a strength athlete or physique competitor, it makes sense in most cases to lower fat a little more than you would typically in the off-season. This allows for a higher carbohydrate intake which is beneficial because if carbs are too low during energy restriction, in some cases, it can sabotage your training [15, 24–26]. This would then in turn, degrade your ability to retain lean body mass.

So with fat intake, I recommend 15–25% of calories while you are dieting for most people, and then the remaining calories are assigned as carbs. Yes, 15% is lower than ideal in most cases, but that's why diets don't last forever.

However, some people do seem to do fine on lower-carb, higher-fat diets while dieting (although for strength athletes and bodybuilders I normally advise against full-blown ketogenic diets, more on those later) so in these individuals who have a track record to prove the efficacy of a lower-carb approach, an intake as high as 40% is appropriate.

Additionally, we'll discuss a physiological minimum based on body weight in a moment. But in general, keeping fat a touch lower while dieting allows you to consume more carbohydrate and it's important to retain enough carbohydrate so you can sustain your training, and in turn, so you can sustain your muscle mass. I will go over an example of these calculations after we discuss the appropriate values for non-dieting individuals.

Minimum Recommended Carbohydrate and Fat Intake

Finally, it should be noted that some minimum intakes should be established for carbs and fat since they are your primary energy sources, and in the case of fat, it is an essential nutrient.

Dieting requires caloric restriction, and caloric restriction requires macronutrient restriction, but for those with a very low energy expenditure, it is possible that by using the guidelines in this book you may end up inappropriately low in your intake of fat or carbohydrate. To prevent this, use the minimum intakes of 0.25 g/lb (~0.5 g/kg) for dietary fat, and 0.5 g/lb (~1 g/kg) for dietary carbohydrate. Also, in some cases you may find to maintain these minimums, you have to accept a slower rate of weight loss than you might like. If you are targeting a loss rate of 1% of your body weight per week, but to achieve it you would have to take your fat or carbohydrate below these thresholds, the best course of action is to simply accept a rate of weight loss closer to 0.5% per week.

In some rare cases, individuals end up with a very low total energy expenditure and they might even have to accept a rate of weight loss in the range of 0.3–0.4% of body weight per week to avoid going below the carbohydrate and fat minimums I've outlined in this book. In general, I think it's a good idea to just accept a slower rate of body weight loss than it is to take your fats or carbs below 0.5 and 1 g/kg, respectively, as this gives you the best shot at maximal muscle mass retention.

Setting Macros for a Gaining Phase

Athletes who are attempting to add muscle and strength over time don't have the same macronutrient needs as dieters. Since they are in an energy surplus or at the very least at maintenance, and likely have higher body fat and glycogen levels than a dieter, the rationale we previously discussed for having as high of a protein intake no longer applies.

In the most up to date and comprehensive meta-analysis on the effect of protein on muscle and strength gains in individuals not in an energy deficit, the beneficial effects of protein plateaued between ~0.7–1.0 g/lb (1.6–2.2 g/kg) [27]. In fact, only in a few instances is there a trend in the

research for higher protein intakes than 0.7–0.8 g/lb to show benefits for muscle gain [28–30] and resistance training performance [30–33]. However, these statistical trends are inconsistent and sometimes confounded by differences in nutrient timing. For that reason, a protein intake of 0.7 to 1.0 g/lb (1.6–2.2 g/kg) of body weight will likely maximize any potential benefit of a high protein diet.

For those who struggle to gain weight due to getting too satiated, a high protein intake can be problematic. In these cases, I would advise using the lower end of the range (0.7 g/lb) to induce less satiety. On the other end of the spectrum, if you gain weight too quickly due to hunger, you could go as high as 1.5 g/lb (3.3 g/kg) to try to increase satiety and slightly increase expenditure. Protein has a high "TEF" or thermic effect of food; which is simply the energy cost of metabolizing food. At such high dietary protein levels, a large amount will be converted into other energy substrates, which elevates your total energy output.

Now the range of 0.7–1.0 g/lb may prompt some of you to freak out. In the bodybuilding community, 1 g/lb is often seen as the absolute minimum protein intake. Before you dismiss me as an egghead with no in-the-trenches experience, keep in mind that I'm a bodybuilder who has achieved reasonable success in natural bodybuilding (and I used to eat 2 g/lb per day in my pre-science days, but I'm bigger now). I coach bodybuilders who have competed at the highest level in natural bodybuilding, I've conducted research on bodybuilders and dietary protein, and I've provided you with plenty of references to support these numbers. So please try not to throw your protein shake at the screen as you read this.

Think of it this way, you've got the calories to support you when gaining. Part of the reason why dieting theoretically requires more protein is because more protein is used for energy when you're leaner and restricting calories [4]. These conditions are not present during a surplus, so therefore you simply don't need as much protein and you'll benefit more from eating higher amounts of carbohydrate and fat.

Speaking of carbohydrate and fat, since a gaining phase gives us more calories to play with, and we don't have to worry about our carbohydrate

intake being too low to sustain our training, we can have a higher percentage of our calories coming from fat. For most people I recommend 20–30% of total calories, but if you prefer higher fat intakes and lower carbs or have good data to show this works better for you, you can go up to 40% (more on this later). Also, once again, the rest can be assigned as carbohydrate. With that said, I typically recommend just focusing on calories and protein as variations in your fat to carbohydrate ratio really don't make much difference when not dieting.

The table below will help to sum up our cutting and gaining scenarios for subsequent calculations.

Macronutrient Recommendations	Protein	Fat	Carbohydrate
Cutting	1.0–1.2 g/lb (2.2–2.6 g/kg) of body weight	15–25% of total calories per day min 0.25 g/lb (~0.5 g/kg)*	Remaining calories to meet daily intake min 0.5 g/lb (~1 g/kg)
Gaining	0.7–1.0 g/lb (1.6–2.2 g/kg) of body weight	20–30% of total calories per day min 0.25 g/lb (~0.5 g/kg)*	Remaining calories to meet daily intake min 0.5 g/lb (~1 g/kg)#

**As high as 40% OK with prior data showing benefit or strong personal preference*
#Can simply focus on calories and protein in gaining phases

Example Gaining Calculations

Let's stick with our 200 lb (~90 kg) male from the last example and take a fairly average energy balance for someone of this size. At this body weight (recalling Level 1), this individual will probably need somewhere between 2600 and 4400 calories to maintain their current weight.

To keep things nice and even for our calculations, let's go with 3000 calories per day as an intake that would elicit no changes in body weight. If we would like to take this person into a lean gaining phase as an intermediate lifter, we could add 200 calories per day to create a slight surplus (refer to the recommendations made at the end of the calorie setting chapter). Our goal intake for this individual is now 3200 calories per day.

Calculating Protein Intake

Let's start with 1 gram of protein per pound (2.2 g/kg) of body weight. As he weighs 200 lb, we set daily protein intake at 200 grams.

We need to calculate the daily calorie intake from protein so that we can find our fat and carbohydrate figures, so let's do that first:

Daily caloric intake from protein = grams of protein x calories per gram

= 200 x 4

= 800 kcal

Calculating Fat Intake

We will then set fat at 25% of his total calories for the day, which is halfway between our 20-30% recommendation. Here's how we calculate that:

Daily caloric intake from fat = daily caloric intake x (fat intake percentage ÷ 100)

= 3200 x 0.25

= 800 kcal

Daily fat intake target = calories from fat ÷ calories per gram

= 800 ÷ 9

= 88.89 g

Calculating Carbohydrate Intake

Lastly, carbohydrate intake will simply be based on the remaining calories that have not already been used by protein or fat. Here's how we calculate that:

Caloric intake from carbohydrate = daily caloric intake - protein calories - fat calories

= 3200 - 800 - 800

= 1600 kcal

Daily carbohydrate intake target = calories from carbohydrate ÷ calories per gram

= 1600 ÷ 4

= 400 g

To sum it up, this 200 lb (~90 kg) athlete in a lean gaining phase could set up a daily macronutrient intake goal of 200 grams of protein, 90 grams of fat, and 400 grams of carbohydrate. Or, he could just have the goal of 200 grams of protein, and 3200 calories per day, and not worry about the exact ratio of carbohydrate and fat while in a surplus.

Example Cutting Calculations

Now if this same 200 lb individual is dieting, these numbers will be slightly different because he needs to drop his daily calories down enough to lose 0.5 to 1.0% of body weight per week.

With the same maintenance value of 3000 calories, and using the '3500 calorie rule' of losing approximately a pound per week (~0.5 kg), let's bring him 500 calories down from his day to day intake and then add some cardio expenditure on top of that (which we won't show here).

Calculating Protein Intake

He's now consuming 2500 calories, and we'll bump that protein up a little bit. Let's say around 1.1-1.2 grams per pound (2.5 g/kg).

Daily protein intake target = body weight x protein setting in grams per pound

= 200 x 1.1

= 220 g

Again, we need to calculate the daily calorie intake from protein so that we can find our fat and carbohydrate figures. To make the subsequent calculations a little easier, I'll use 225 g of protein so that we get a nice, round calorie number.

Daily caloric intake from protein = grams of protein x calories per gram

= 225 x 4

= 900 kcal

Calculating Fat Intake

We will then set fat at 20% of his total calories for the day, which is halfway between our 15-25% recommendation.

Daily caloric intake from fat

= daily caloric intake x (fat intake percentage ÷ 100)

= 2500 x 0.20

= 500 kcal

Daily fat intake target

= calories from fat ÷ calories per gram

= 500 ÷ 9

= 55.56 g

Calculating Carbohydrate Intake

Lastly, carbohydrate intake is the remaining calories that have not already been used by protein or fat.

Caloric intake from carbohydrate

= daily caloric intake - protein calories - fat calories

= 2500 - 900 - 500

= 1100 kcal

Daily carbohydrate intake target

= calories from carbohydrate ÷ calories per gram

= 1100 ÷ 4

= 275 g

To sum it up, this 200 lb (~90 kg) athlete at the beginning of a fat loss

phase could set up a daily macronutrient intake goal of 225 grams of protein, 55 grams of fat, and 275 grams of carbohydrate.

This is enough carbs to satisfy training, enough fat to not lose his mind and maintain some resemblance of a normal diet, and enough protein to protect against lean body mass losses — a very sound, well-constructed starting point.

Other things might come into play like refeeds or diet breaks, but this will serve as the basic caloric and macronutrient set up. We will talk about those topics, along with how to "hit" these numbers, later on in this guide.

Who Should Use These Recommendations?

These numbers are not going to be perfect for everybody. In fact, for some they could get in the way of progress.

I probably have 10–15% of my clients on percentages of fat that are higher than 30%. I also have another maybe 5% who are actually on borderline ketogenic diets, meaning that they're consuming a daily average carbohydrate intake somewhere around 80–120 grams or lower per day, which might even be while they're not dieting. But like I said, this is not the majority; at most it represents 20% of the folks I work with. This means that maybe 2 out of 10 people shouldn't have their carbs as high as the earlier calculations would estimate. These people happen to do better with a high-fat, low-carb approach instead.

So, how do you figure out if that's you?

Although there are a few physiological indicators that can help us guess what type of diet would best-suit you, you're probably going to have to test this out based on some self-trial methods that I will discuss in the next section. But the above calculations will most likely result in effective macronutrient distributions for the majority of folks who are exercising, not overweight, and who are still young through middle-aged.

Now, it is well known that exercise and maintaining a healthy body weight improves your ability to metabolize carbohydrate, but why is age a factor?

Well, most older people who struggle with higher carbohydrate diets do so because they have lost muscle mass and gained fat mass as time has passed, resulting in insulin resistance. However, even for the folks who have picked up fitness later in life or who are still committed to their resistance training, some independent effects of aging do negatively impact the body's ability to handle carbohydrate [34].

Also, protein doesn't continue to give the same anabolic response that it used to as you age [35]. So although your fat and protein might need to increase over the years, just remember that this occurs alongside an overall reduction in energy expenditure [36]. This means you won't have as many calories to play with overall, which is why you don't want to go so low on carbohydrates that you become ketogenic unless you find that actually works well for you.

So again, I will say that the recommendations I made are a great place to start for 80% of people who are not overweight, lifting weights regularly, and who have not yet started the final third of their life span (arbitrary number here, but let's say 60 years old). So, if you are in the first ~$^2/_3$ of your lifespan, not overweight, and regularly lifting weights, the recommended ranges will more than likely "work" well for you. For everyone else, I wish I could make a guide that would give you the perfect macronutrient ratio along with a unicorn to ride across the magic dietary rainbow, but the reality is that nutrition is just more individual than that, and you'll have to bear with me on that limitation.

But How Do I Know if a Higher-fat, Lower-carb or Ketogenic Diet Is Right for Me?

Although it is not very typical among recreational and competitive bodybuilders and strength athletes to fall into this category, I think it is important to address how to tell if you are someone who would do better with a higher fat-to-carbohydrate ratio.

Now when I say "high fat", I typically am referring to a fat percentage at or above 35% of total calories [37] as opposed to the aforementioned 15-30% recommendation (depending on whether you are dieting or gaining). In turn, keeping calories and protein the same, this higher fat

intake leads to a generally lower carbohydrate diet compared to my earlier recommendations. And when I say "lower carbohydrate diet", I'm referring to an intake that may approach as low as 0.5-1.5 g/lb (~1-3 g/kg) of body weight.

I am not necessarily referring to a ketogenic diet, which is extremely low in carbs, sometimes defined as 50 g or lower [38]. Ketogenic or 'keto' diets necessitate high-fat intakes to maintain calorie balance, often at or above 60% of total calories. Keto diets have become quite trendy and popular as of late. Largely fueled by the idea that eating more dietary fat helps you to burn more fat as fuel, keeping you leaner along with the idea that you can only lose fat by keeping insulin low; however, these concepts aren't quite accurate. Sure, you shift your body's fuel usage more towards burning fat on a keto diet and insulin levels are lower, but since you are also consuming more fat, it doesn't result in greater fat loss, and high insulin levels don't predict body fat loss in a deficit [39].

However, this isn't to say keto diets are useless, but rather have pros and cons. In the literature relevant to sport, exercise, and body composition, they are a mixed bag of positive, negative, and neutral effects [40-51]:

- There is an initial 1–4 week period of fatigue, irritability, and decreased performance when adopting a low-carb diet that subsides after adaptation [40,50].
- In real-world settings, those who adopt low-carb diets typically increase their protein intake substantially, which can improve body recomposition, and increase satiety [49, 50].
- There is also an initial drop in hunger and increase in satiety *independent of protein intake* which lasts 1–4 weeks in most people and often results in a spontaneous reduction in calories and initial fat loss [40, 42, 47].
- Low-carb diets on average are equally effective to moderate or high-carb diets for fat loss and muscle retention if protein is high [45].
- However, we don't have data on individuals getting very lean (such as bodybuilders), but observationally, higher placing bodybuilders typically consume higher carbohydrates relative to those who place

lower [51].

- On average, low-carb diets don't seem to affect muscular performance after initial adaptation if training volume is low [40, 43, 48-50].
- However, some individuals do better on lower-carb diets for both body composition and performance, while others do worse [40].
- Lower carbohydrate diets might impede performance during high-volume resistance training [44, 46].
- Very low-carb diets may inhibit lean mass gains [41, 43, 46, 48].

As you can see, in general, for healthy, athletic individuals performing resistance training, the potential pros are typically not worth the cons of adopting a low-carb diet. However, there may be a time and a place for a high-fat, low-carb diet, and most [52-56] (but not all [57]) research indicates that when there is a time and place, the utility for low carb diets exist among people who are insulin resistant.

So, how do you know if you fall into this camp and could benefit from that type of diet?

Well first off, let me state that the vast majority of people reading this book don't fit the bill. Insulin resistance is typically only common among sedentary individuals with obesity (and even then it's not everyone) and it is often a temporary state, as insulin sensitivity improves with a healthier diet and exercise. With that said, there are some instances where exercising, non-obese individuals can be insulin resistant, which might indicate a higher-fat, lower-carb approach would be better.

Insulin resistance is typically increased with age [34], a family history of diabetes [58, 59], the presence of a condition in women called polycystic ovarian syndrome (PCOS) [60], or oligomenorrhea [61], which is represented by a menstrual cycle that occurs less frequently, specifically taking longer than 35 days to recur. While these first two factors can sometimes be affected by body weight and exercise, women with PCOS or oligomenorrhea typically have higher androgen levels (male sex hormones) than most women which predisposes them to be insulin

resistant to some degree [61], regardless of activity or body-fat levels.

Additionally, it is not at all uncommon for women with higher androgen counts to be disproportionately represented in athletic populations. This is even more so true in strength and power sports, which tend to have more women with higher androgen levels even compared to other sports [62]. But, don't despair if you need to modify your diet due to potential insulin resistance if you are a woman with PCOS or oligomenorrhea. The upside is that you likely have a higher than normal androgen count, which may mean you potentially perform better on average than other athletes [63]. To further allay any fears, take heart that there is pretty convincing evidence that a higher-fat, higher-protein, lower-carbohydrate diet can be very effective for producing fat loss among those with insulin resistance [52-56, 64-66].

Now, what if you are a male who does not respond well to carbohydrates or a female who does not have a diagnosis of PCOS or oligomenorrhea but still doesn't do well on a high-carbohydrate diet? It's not uncommon at all for people to believe this is the case, but not many people have objective data to base this feeling on. So, how can you test if a higher-fat diet truly would be better for you?

In an ideal world, you could simply go get some blood tests done to determine your insulin sensitivity, but that is not a typical option for many people. And even then, if a doctor finds you to be insulin resistant, the typical recommendations are to lose some weight, do some resistance training, and get active. Well, if you are reading this text you are probably already taking care of all of those things. So if you get that diagnosis, you're left with no solution according to the doctor.

So beyond going to the lab, I think an even better way to test your response to a higher-fat, lower-carbohydrate diet would be to run some off-season testing and data collection on yourself. I would recommend taking about a month to consume a 40% fat diet, with the same protein and calories that you have normally been consuming. This would simply be changing the carb-to-fat ratio and nothing more.

Throughout this month, write down and record a 1 to 10 rating on mood, energy, and training quality each day. Mood and energy are

pretty straightforward to define, but I'd like to clarify that gym quality is different than gym performance. We are not looking at your program, volume, or poundage of weights lifted (you can and should track this as well, but only if you keep your training approach broadly the same so you can compare like-to-like). Rather, this is more about how you perceive your overall effort and mental state during the day's training. After a month of tracking mood, energy, and gym quality, take an average score of those ratings.

When that month is complete, repeat the process for another month while consuming a 20% fat diet and keeping calories and protein the same. But you aren't done yet! If you really want to bring the scientific method into your assessment, I would recommend running this trial a second time, making this whole process a 4-month commitment. If the outcome is repeatable, you can be much more sure it wasn't some other factor outside of your diet that influenced your scores. At the conclusion, you'll be able to see if your ratings were higher for one diet or the other both times, and you'll have your answer.

This might seem like a big hassle to find out whether you do better on a higher-fat or higher-carb diet, but in the off-season, it's definitely worth it. Also, what's stopping you? Keeping your energy surplus size, protein intake and training the same (while of course still trying to progress) for four months is not unreasonable. So do it, learn more about yourself! If you see a big difference in these ratings from your 40% fat months and your 20% fat months, you might be able to conclude that a higher-fat diet is something for you to stick to in the long-term. Also, put it in perspective, if you plan on lifting weights and trying to improve your body composition for the rest of your life while you're able (which if you're reading this book I hope you are), then four months is just a drop in the bucket!

Fiber

The last topic we'll cover here in Level 2 is fiber intake, which is important for gut health and nutrient absorption. It can also effectively decrease your energy intake because not all fiber has a calorie value, yet it "counts" as a carbohydrate and may increase satiety [67].

In the US the current recommendations for fiber intake are 14 g/1000 kcals which on average comes to 25 g/day for women and 38 g/day for men (not all nutritional authorities in all countries have the same recommendations; an intake as low as 10 g/1000 kcals is recommended in some countries and is likely adequate). However, it's also important to make sure there is not an excessively high intake of fiber.

As a decent maximum for both sexes, I'd advise not going above 20% of your total carbohydrate intake on any given day (so a 400 g carb intake would cap at 80 g, a 200 g carb intake at 40 g). Now it might surprise some people, especially some old school bodybuilder types, that we even have a maximum fiber intake at all. But, if you only eat oats and "clean foods" and fiber goes well above these recommended values, it can actually be detrimental to your GI health and your ability to absorb some nutrients [68], while also potentially giving you a very bloated look (and feeling) if taken to the extreme.

There is also the question, "Should I count fiber towards my carbohydrate total?"

Traditional nutrition often teaches that fiber is not digestible by humans, but in fact, some fiber, while not digestible in the small intestine, is fermented in the colon and that byproduct provides energy. However, determining which fibers provide calories and exactly how many is quite difficult [69]. Because of this, my basic recommendation is to simply count your fiber as carbohydrate and to make sure you fall between the minimum and maximum ranges I've provided here. Even if this doesn't accurately reflect the energy intake from carbohydrate, it doesn't really matter because consistency is what is important if you are tracking.

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LEVEL 3

MICRONUTRIENTS AND WATER

Just to set the stage a little bit, macro means big and micro means small. Thus, you need macronutrients in much greater amounts compared to micronutrients.

So far we have only discussed the macros which have been presented in the amounts of full grams. In contrast, when we talk about micronutrients, we are talking about quantities that are very small, from milligrams on down. The occasional time a micronutrient is required in gram level amounts, it is needed in amounts of maybe a couple of grams at most.

That said, these nutrients that we only need in tiny amounts can make a big difference in general health, gym performance, hunger levels, mental state, and overall ability to put on muscle if we happen to have deficiencies in them. This section will go over the types of micronutrients and how to use your food choices to fulfill their daily requirements. We will then finish Level 3 with fluid intake recommendations and how to tell if you are consuming enough to keep yourself hydrated and functioning properly.

Identifying Our "Micros"

There are two broad categories of micronutrients in nutrition. We have our minerals, which are inorganic, and then we have our vitamins, which are organic. I'm not going to go through a full-blown nutrition lesson here on every single micronutrient and all of their individual purposes, but feel free to do a simple Google search to find all of that information on your own time if interested.

However, for completeness I am going to go over what they are and the different categories because I think that will give you some perspective on why you can't (or why you *shouldn't*, in my opinion) just stop at your macronutrient intake without any consideration of other nutrients. Once we cover the categories, we'll talk about how to apply that awareness into your diet and make sure all of your nutritional bases are covered.

Minerals

So to start, minerals are inorganic compounds, you probably have seen some of them in the periodic table. There are macrominerals, those

that our body needs in greater abundance, and trace minerals which we need in smaller amounts.

Macrominerals include calcium, phosphorus, potassium, sulfur, sodium, chlorine and magnesium. Those of you with a nutrition or chemistry background might notice that a lot of those are the electrolytes, which tie into our fluid intake and balance.

The trace minerals, which serve important functions in human physiology even though they are not required in large abundance, are elements such as iron, copper, cobalt, zinc, molybdenum, iodine, and selenium. There are others, but those are some of the more prominent ones.

Vitamins

Vitamins, our organic micronutrients, also come in two different types: fat-soluble and water-soluble. These category names refer to the way that these different vitamins can be absorbed into the body.

Fat-soluble vitamins are absorbed with the assistance of fat via the small intestines and tend to stick around in our bodies much longer than their water-soluble counterparts. Water-soluble vitamins are quickly excreted through our sweat and urine, which is why we typically need to consume them more often.

The fat-soluble vitamins are A, D, E and K, easily remembered with the acronym “ADEK”. Once you have memorized ADEK, then you just need to remember that all the rest of the vitamins are water-soluble. The water-soluble vitamins consist of the 8 different forms of vitamin B and also vitamin C. Once again, memorizing the chemical name for each, its function, and what occurs if you are deficient or consuming excessive doses is not important in the context of your goals and therefore not appropriate for inclusion in this guide. However, what I do think is important for our discussion are the differences between fat-soluble and water-soluble vitamins and how their absorption nature will affect how often we need to ingest them.

Because we drink and urinate all day long, we have a large amount of water processing through our body constantly. Thus, water-soluble

vitamins need to be replenished on a regular day-to-day basis. So it is harder to overdose on a water-soluble vitamin because you can urinate and get rid of the excess. However, it is easier to be deficient in a water-soluble vitamin since we have such a high turnover rate.

The opposite is true for fat-soluble vitamins. It is easier to overdose because they stay in our body longer, and thus, they are also harder to get rid of. And likewise, it is more unlikely that you will be deficient unless it's just a consistency issue. It takes longer for a deficiency to manifest in the fat-soluble vitamins.

So that is the big picture background information that is good to know moving forward. Next, you need to know how to ensure your diet is set up so that you consistently consume an appropriate intake of micronutrients.

Implementing The "Inclusive" vs. " Exclusive" Mindset

You'll recall from Level 1 that your dietary mindset and outlook are the key ingredients to creating a nutrition plan that will help you progress toward any of your size or strength goals. You want to make sure you include foods high in micronutrients rather than trying to exclude foods that aren't high in them.

This "inclusive vs exclusive" mindset is especially important while dieting.

When you are eating less food, you will also be eating fewer micronutrients. Many popular diets, even ones that sound like they have adequate variety and inclusion of various micronutrient-dense foods, are actually micronutrient deficient [1].

The traditional approach to dieting of focusing on "clean" foods and avoiding "dirty" foods popularized by bodybuilders, which supposedly increases the micronutrient density of a diet, can often, in fact, be so restrictive as to leave out key nutrients and result in micronutrient deficiencies [2-6].

Deficiency Considerations When Dieting

The five deficiencies most consistently reported by dieting bodybuilders from surveys in the 1980s and 1990s were vitamin D, calcium, zinc, magnesium, and iron [7]. Sometimes, these deficiencies can have significant impacts related to the body composition goals of the individual. We'll cover some examples here.

Zinc deficiencies can result in a downregulation of thyroid to the point where energy expenditure is substantially reduced. In one case study, one subject increased their resting metabolic rate (RMR) by 194 kcals after four months of supplementing with zinc, and the other subject increased RMR by a whopping 527 kcals after supplementing with zinc for two months [8]. This is a real-life example of the potential consequences of being "exclusive" in your approach to food source selection versus "inclusive" like we are recommending.

COMMONLY REPORTED MICRONUTRIENT DEFICIENCIES BY BODYBUILDERS CIRCA 1989-1994
Vitamin D
Calcium
Zinc
Magnesium
Iron

Another example of when a micronutrient deficiency can negatively affect your progress is iron, which is an especially common deficiency in female athletes (even more so when energy restricted). In one study on a group of female volleyball players who were supplemented with iron, it was found that during strength testing the iron-supplemented group displayed greater total strength across a range of barbell lifts compared to the control group that did not receive iron supplementation [9].

Clearly, in some cases correcting a deficiency during dieting can be incredibly important for success.

Calcium is another common deficiency and also is required in relatively large amounts. Consuming dairy can fix this issue; and low-fat, low-carb,

high-protein Greek yogurts can be fit into diets that are low in calories, fat, or carbs, and are a great way to prevent deficiency. However, for those who don't have access to this type of Greek yogurt in their location, or have a specific reason that precludes dairy consumption, calcium supplementation may be something to consider.

- **Zinc deficiencies can negatively impact your metabolism.**
- **Iron deficiencies can negatively impact strength.**
- **Calcium deficiencies can negatively impact bone health.**

Deficiencies can have a significant impact on health, performance, and potentially diet success if unchecked. A diet with good variety can cover these bases, but as calories and macronutrients get lower, it will be harder and harder to prevent micronutrient deficiencies. I would advise maintaining dairy and red meat (any meat that is dark or reddish, as it has a higher myoglobin and subsequently iron content) consumption (lean, with the fat trimmed, can fit into almost any diet), and getting regular outside sun exposure (not through windows [10]) while dieting. Doing so should help you avoid calcium, zinc, magnesium, iron, and vitamin D deficiencies. For those who don't eat meat, or red meat specifically, or dairy, later on in this book we'll cover supplementation which may be something to consider in your case, especially when dieting.

As a final note on dieting and micronutrients, focusing on having a good variety of foods (as I discussed in the Mindset and Materials section) and an inclusive mindset while striving to achieve an appropriate spread of macronutrients can make an impact on your micronutrient profile. In a 2018 study of physique competitors who followed a strict, meal plan approach compared to those who followed macronutrient based diets without food restriction, the macronutrient-based female dieters had greater intakes of protein, sodium, vitamin E, vitamin K, and vitamin C [11].

Deficiency Considerations When in a Gaining Phase

When you are not dieting, you'll find it much easier to prevent these deficiencies. However, you may find that you aren't as hungry, and

fruits and vegetables that are high in fiber, high in water and most importantly, high in micronutrients, are easy to forget about and are overlooked because of their lower calorie content. So, I would recommend consciously ensuring that you consume adequate fruits and vegetables.

The reason I am focusing on these particular food sources is because typically, the average lifter when gaining is all set in terms of having adequate amounts of the micronutrients that come from meats, dairy, and starchy carbs. But the typical place where a muscle-conscious individual's diet lacks, especially when hunger is low, is in the fruit and vegetable department.

Simple Fruit And Vegetable Consumption Recommendations

Your mother was right, fruits and vegetables are strongly related to health, and ideally, you should be consuming five or more servings per day of fruits and vegetables, as intakes at this level are associated with reductions in all-cause mortality [12, 13].

A simple way to help you get there is to consume at least one serving (roughly one cup or medium size piece of fruit) of fruits and vegetables per 1000 calories that you ingest per day while gaining (as you don't want to suppress hunger too much) and at least one serving per 500 calories while dieting (to help improve satiety), rounding up.

For example, if you are a larger male in the offseason consuming 3000 calories per day, you should aim to eat at least 3 servings of fruit and 3 servings of fibrous vegetables per day.

If you are a small female or lightweight male who is eating 1200 to 2000 calories per day while dieting, you'd aim to consume at least 4 servings of fruits and veggies each. However, this might be difficult to fit into your diet without going over your carbohydrate target. In this case, look around the supermarket to see what has the lowest calories per serving size. You'll find that something like berries would be a better choice than a banana for your situation.

On the flip side of that, a very large or extremely active individual who

regularly consumes 4000 or 5000 calories per day might have a tough time getting that many calories down if he or she has to eat 5 servings of fruits and veggies daily. In this case, getting 4, 3 or even just 2 servings would suffice in order to prevent excessive bloat or fullness that could get in the way of eating adequate offseason calories.

A good bare minimum intake is two servings of fruits and vegetables each day to prevent excessive fullness while still ensuring adequate intake; remember the order of priority, you don't want Level 3 of The Pyramid to interfere with Level 1!

Aside from extremely low or high-calorie diets, I still think that one serving of fruits and one serving of vegetables per every 500-1000 calories is a very good basic guideline to follow. One of the benefits from implementing this set up is that when you're dieting, these foods tend to be higher in fiber and higher in satiety [14] which will help you with diet adherence and consistency.

Produce in general tends to be very low-calorie, so you'll find that increasing your intake of these particular foods can help you feel like you're eating more despite being in a caloric deficit.

FOOD CLASS	RECOMMENDATION	NOTES
Fruits	1 serving/1000 kcal in surplus, 1 serving/500 kcal in deficit	Round up. May not be possible if on a very low-carbohydrate diet
Fibrous Vegetables	1 serving/1000 kcal in surplus, 1 serving/500 kcal in deficit	Round up. May reduce servings when gaining if hampering caloric intake

This is exactly why when your food sources are poorly set up (i.e. eating a lot of foods that are not very rich in micronutrients), you can technically "hit your macros" with a lot of highly energy-dense foods but still feel hungry and empty.

So in summary, make sure you have adequate food variety (especially when dieting), such that you have 2–3 options for protein, vegetables, fruit, fat, and carbohydrate each, and make sure that you consume enough fruits and vegetables. If you do this, in addition to having well set-up macros, you will probably make progress towards your goals while getting sufficient micronutrients. However, don't think that maximal variety is ideal, it is not. Indeed, structure and consistency and "automating" your diet so you have less decisions to make on a regular basis can be very helpful for long-term success. Finally, when we get to the supplementation section of this guide, we'll discuss some other ways to ensure you don't risk a deficiency while dieting.

Fluid Intake

Just like in Level 1 of The Pyramid for determining maintenance calories, there are a couple of different options for setting an appropriate amount of fluid intake for your body. The first method will involve calculations based off of your body weight, and the second method is more qualitative in nature based on your individual needs.

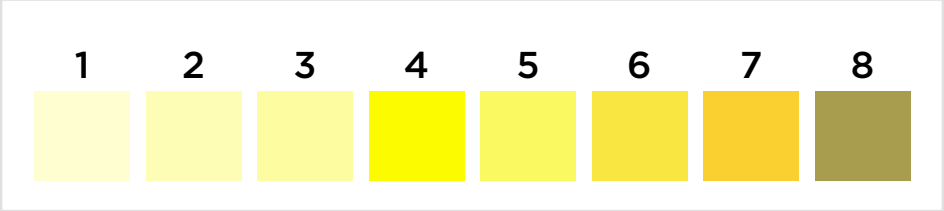
But first off, what liquids should contribute to our measurement of intake?

In this case, include all of your fluids except for alcohol. Yes, even things we see as "dehydrating" like coffee, actually do more to contribute to your fluid intake than detract from it [15]. So all fluids, including coffee, diet soda, milk, juice, tea, flavored waters, and any drink (besides alcohol) will count towards this intake. Don't count alcohol because it is, in fact, dehydrating [16], and makes you urinate more fluid out than you take in.

So how much fluid should you consume?

The current recommendations for fluid intake are 3.7 liters per day for most men (~125 oz) and 2 .7 liters per day for most women (~91 oz); however, these recommendations are not for athletes nor are they scaled to body mass. Thus, shoot for $^{2}/_{3}$ of your body weight in pounds, in fluid ounces. So that means if you're 210 lb, this equates to roughly 140 fluid ounces of liquid per day. For those using the metric system, an equivalent rule of thumb is to consume one liter of fluids for every 23 kg of your body weight.

Another, arguably better method to ensure you are adequately hydrated, is drinking according to thirst and autoregulating your fluid intake by visually assessing the color of your urinations. See the scientifically-validated chart below that can be used to assess your current hydration status [17].



If your urine color falls within 1–3 you are well hydrated, but if it is 7 or higher you are dehydrated and should consume fluid. However, be aware that the acute effect of some vitamins and multivitamins on urine color can throw this assessment off.

The reason that I tend to favor this method is that at the same body weight, two people can have a very different hydration status. For example, consider one person who has a much higher sweat rate and habitually drinks a lot of fluids, and thus urinates more. This person would have a very high water turnover, while someone else may not. Additionally, other things like quantity and type of training, the type and amount of cardio you're doing, and the climate you live in are all going to impact your hydration status.

As an example, let's discuss two extremely different individuals. One is a 200 lb (~90 kg) inactive sweater (doesn't sweat a lot) living in Alaska who does low-volume weight training 3 times a week in an air-conditioned gym. The other is also a 200 lb (~90 kg) guy who lives in the Middle East, is a profuse sweater, weight trains 6 times a week, does cardio 3 times a week, and has only sporadic access to air conditioning. It's quite logical to guess that they are going to need massively different fluid intakes to maintain hydration despite having the same body weight.

Ensuring you are adequately hydrated is vital because even a 2% decrease in body weight from fluid losses can cause decreases in aerobic performance and as little as a 3% decrease in body weight from fluid loss can negatively impact strength [18].

So to recap, a good place to initially set your fluid intake is per the body weight-based fluid recommendations shown below. While consuming this amount, assess how this intake level impacts thirst and the color of your urinations. If you are thirsty despite following the guidelines, or your urine is too dark, then you can further customize your fluid intake to your individual rates by aiming for having all clear urinations (after your first in the morning and being aware of the potential impact of vitamin supplements).

FLUID INTAKE GUIDELINES	
Body Weight - Imperial	2/3 of your body weight (lbs) in fluid ounces
Body Weight - Metric	1 L of fluids for every 23 kg of your body weight
Qualitative	By thirst, and color within 1–3 range

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LEVEL 4

NUTRIENT TIMING AND FREQUENCY

Now that we have covered overall caloric intake (Level 1), where those calories come from (Levels 2), and the micronutrients the foods we eat contain (Level 3), let's talk about how to distribute those calories over different periods of time. We will do this on both a broad and acute scale, diving into the timeline of the whole diet, over the course of a week, over the course of the day, and in relation to training.

Like all chapters thus far, these recommendations will be presented for both those dieting and gaining, as there are subtle differences between the two.

Diet Periodization (Diet Breaks)

Just like having high-volume, high-intensity, and recovery blocks in your training program can help you achieve your goals more efficiently, we can arrange our diet to have higher-calorie periods and lower-calorie periods to achieve our goals more effectively as well. The first method we'll discuss is a basic diet break [1].

The concept of a diet break is essentially just getting your oil changed before your car breaks down. Meaning, instead of dieting until you lose your mind and binge-eat, you simply implement a planned break to avoid the potential negative side effects that can come with a prolonged caloric deficit. Psychologically, this puts you in control of the process versus you breaking down as a consequence of the diet.

The original research on diet breaks found that this intentional "disruption" of weight control in fact, did not disrupt weight loss. Those who implemented diet breaks were able to lose weight just as effectively as those who did not [1]. Additionally, time spent in a deficit can slowly but steadily reduce energy expenditure, thus making further weight loss more difficult as food has to be further reduced and energy expenditure increased. While much of this is unavoidable and simply a result of losing weight and thus, burning fewer calories because you are moving less mass, a large component of this reduction in energy expenditure is what is coined 'adaptive thermogenesis' [2] or what is known commonly as metabolic adaptation.

For those looking to get lean, this can be a headache. One study found that those who had recently lost 10% of their body weight or more had a total daily energy expenditure of 18% less on average than those at the same body weight who had not dieted [3]. Now, this value of 18% is just the average value. Using the statistics presented in this study and extrapolating them to show the spread for 95% of the people studied, we'd get a range of 8-28%. What this means, is that some people near the end of their diet will be expending just over 90% of the calories that would be predicted by their body weight and activity, thus being only slightly affected by metabolic adaptation. On the other end of the spectrum, some would be nearly down to two-thirds of the energy expenditure that would be expected [3]. As you can imagine, for some people metabolic slowdown can significantly frustrate their weight loss efforts.

Fortunately, at least part of this adaptive component of energy expenditure reduction can be reversed by increasing calories [4]. In fact, a 2018 study found that men with obesity who dieted for two weeks, then ate at maintenance for two weeks, lost more body fat and maintained their metabolic rate to a greater degree than a group that dieted straight for the same amount of time without breaks [5]. While we don't have research in athletes (yet), it would make sense that diet breaks could also help to improve training quality and muscle mass retention by reducing fatigue and replenishing glycogen. But most importantly, a diet break allows you to take a mental time out, get your head right, and catch a breath of fresh air before you dive back under and go through another stint of your deficit.

Who Should Use a Diet Break?

I recommend this for people who are dieting for three months or longer and who have the time to implement this strategy without missing some sort of hard deadline. So unless you are behind schedule in terms of conditioning, a diet break can be awesome for contest prep athletes and I would highly recommend it.

Since it has shown to be so effective for all of the reasons listed in the previous section, I actually make it a point to plan for this in advance whenever possible and to tell the client about it, as later down the line

it is met with less resistance.

Typically, I would advise implementing a week-long diet break every 4–8 weeks based on our anecdotal observations at 3DMJ. A good example of how you might set this up would be to take someone who has planned a 24-week contest preparation diet. In this scenario, you might plan out two to three diet breaks, more or less evenly spread over the time frame. So for example, they might take week 8, 16, and then 24 (which would also be 'peak week', so it would marry up with 'carb loading') as diet breaks (hopefully it's quite obvious that this dietary practice would not be necessary for someone in a lean-gaining phase).

I also think autoregulated diet breaks have value. Specifically, I like to implement them when a fat loss stall occurs (no progress for 2–3 weeks) such that instead of a cut in calories or an addition of cardio, a diet break is implemented. You might be surprised how often fat loss continues after returning to the calories you were previously stalled on after a diet break.

How Do You Implement a Diet Break?

Essentially the goal is to get out of a calorie deficit and get close to maintenance. As a ballpark figure on how to do this, in most cases I recommend a 300–600 calorie increase to any days that are caloric-deficit days (depending on what maintenance was, body size, and how aggressive the diet is at the moment), concurrently with a drop of any cardio to about 50% of normal.

The goal here is to eat as much as you can without gaining weight, or with only gaining minimal weight, as this weight will be predominantly water and glycogen. Diet breaks, in general, should last for 1 to 2 weeks. An easy way to implement a diet break is to just make all days refeed days, as refeed days should be at roughly maintenance calories (don't worry we'll cover refeeds in a bit).

Now an extremely important point is that diet breaks when implemented without tracking, just intentionally stepping away from your diet and eating "normally", seem to not interfere with weight loss [1], and likely give you a mental break (as you don't have to worry about tracking

and weighing). However, to actually gain a *fat loss advantage*, you need to purposefully keep tracking your food and essentially treat the diet break the same way as any other week you are dieting, just with your calories and macros set to maintenance [5].

An intermediary approach that gives you a bit of the best of both worlds is to shift from tracking macros while dieting, to just tracking protein and calories during the diet break, preventing you eating in a compensatory surplus, but also giving you a bit more freedom and flexibility with food choices relative to your dieting weeks.

What Might Happen During These Diet Breaks?

You could potentially gain, maintain or lose weight on a diet break. If you put on a little bit of weight, that's ok because you'll lose it right back once the break is over, and the weight gain very likely will only be the return of lost muscle tissue, glycogen, water, and the weight of food anyway (see "Metabolic Magic?" from Level 1).

Starting (if you were stalled) or continuing to lose weight is also not uncommon, believe it or not. This is most likely due to cortisol (a hormone that rises with stress and results in water retention) decreasing and water weight being lost, less likely due to energy expenditure increasing to the point where you are still in a deficit despite increasing calories and decreasing cardio, or possibly a combination of these two factors.

Lastly, you might more or less maintain weight yet simply feel and look better, be able to train harder, and get mentally and physically revitalized. This could be due to you being in a very small deficit or surplus, regaining lost lean mass and glycogen, while still losing fat or letting go of water retention.

Regardless of whether you gain, lose or maintain weight, any of these three outcomes are fine, absolutely normal, and most importantly, worth it.

I would highly recommend including diet breaks for anyone in an extended cutting phase. Doing so may land you on stage, or at the end of your cut, eating more food, doing less cardio, leaner and retaining more muscle mass and sanity than if you hadn't implemented breaks.

Single-Day Refeeds

On a slightly smaller scale, let's get into the manipulation of caloric and macronutrient spread across the week that might prove useful for strength and physique athletes. Some of these techniques are referred to as refeeds, or they may be referred to as 'carb cycling', 'calorie cycling' or 'macro cycling'. Regardless of the term, each means that you are distributing calories, and potentially macronutrients, in specific ways across days of the week in hopes of favorable outcomes.

What we will discuss is arguably the most common iteration, the periodic (often once per week) use of a 24-hour refeed where calories are brought to maintenance primarily via an increase in carbohydrate.

While this has not yet been specifically studied (although we'll discuss some studies on 48-hour refeeds shortly), this strategy shares similarities with diet breaks in that one of its purposes is to attempt to reverse metabolic adaptation [6]. Logically, you'd expect the increase in energy expenditure from 24 hours spent at or slightly above maintenance to be small compared to what would be expected after a week-long or multi-week diet break. However, there may still be psychological and physiological benefits to 24-hour refeeds that make them worth implementing. The key is to ensure it is under your control, does not turn into a binge, and is a calculated increase to approximately maintenance calories via an increase predominantly in carbohydrate for the purposes of replenishing glycogen and theoretically increasing leptin to a greater degree (which may help to reduce metabolic adaptations). In addition to potential psychological benefits, this strategy theoretically could help with glycogen replenishment, energy levels, and thus potentially performance and muscle mass retention over the course of a diet.

There is very little data on refeeds, but what exists is interesting. Speaking to the psychological benefits, dieters reported in a survey that a weekly setup of 1300 kcals 6 days per week with one day at 2700 kcals (weekly total of 10500 kcals) was preferable to a setup of 1500 kcals on all 7 days (also 10500 weekly kcals) [7]. Also, there are carbohydrate loading strategies that achieve supramaximal levels of muscle glycogen in a single day [8].

Despite these potential benefits, it is worth noting that a single-day refeed may not result in many of the outcomes most people hope to accomplish with refeeds. Specifically, to achieve full glycogen replenishment may require the consumption of ~10 g/kg (~4.5 g/lb) in a single day [8] — 800 g of carbohydrate if you weigh 80 kg (176 lb). This level of intake would likely result in a caloric intake above and beyond maintenance, which is not necessary and as I'll explain in a moment, might be better spread over more days.

Likewise, in women, it was shown that the hormonal adaptations due to dieting indicative of menstrual cycle disruption were not effectively reversed by a single day spent far above maintenance calories [9]. Rather, in another study a 48-hour period at roughly maintenance calories did begin reversing these hormonal adaptations [10]. Thus, it seems that not only is the magnitude of calories consumed during a refeed important, but the length of time spent out of a deficit as well. Therefore, for physiological and practicality reasons, a multi-day refeed may prove more advantageous.

However, this does not mean that 24-hour refeeds are completely without merit. Even if not effective for reversing metabolic and hormonal adaptations to dieting, spending a day out of a deficit is one less day that these adaptations are mounting and a refeed can act to reduce the cumulative effect of days spent dieting to some degree. Remember, just as it takes multiple days of refeeding to effectively reverse these adaptations, it takes multiple days of dieting for these adaptations to occur in the first place, and a refeed is a day of not dieting.

Who Should Use Single-Day Refeeds?

I would recommend the use of 24-hour refeeds for individuals higher in body fat when beginning a diet. Metabolic adaptations are less of a concern when eating higher calories, doing less cardio, and when higher in body fat. Therefore, the issue of 24-hour refeeds not effectively reversing metabolic adaptation is not a concern when starting out. Additionally, the benefits of having a psychological break may improve adherence, and even partial glycogen replenishment may aid performance and lean mass retention. Single-day refeeds can also

be useful for 'mini cuts' (these are brief, aggressive cuts to reduce body fat in the offseason, more detail to come in the Recovery Diet section) as they are not long enough to cause many issues in the first place.

So How Do You Implement a Single-Day Refeed?

The easiest way would be to raise calories to your calculated maintenance (as discussed in Level 1) for one day a week. Remember, that by doing so, this means you need to reduce your calories a bit more on the 6 dieting days to maintain the same weekly rate of weight loss.

For example, if you want to lose 1.5 lb (~0.7 kg) per week, you need to produce a 5250 kcal deficit per week (3500 x 1.5). If you are dieting on 7 days, this is 750 calories per day (5250 ÷ 7) that needs to be reduced. However, if you are dieting on 6 days and refeeding on 1, you need to reduce your 6 dieting days by 875 calories (5250 ÷ 6) to reach the same weekly deficit. If you're not tracking macros, adjusting calories is all you have to do. If you are tracking macros, keep your protein and fat the same as your low days, and then drive your carbs up until you hit maintenance calories on your refeed.

What if You Are in a Gaining Phase?

You probably won't benefit from cycling your macros or calories when not attempting to lose body fat. Although this method is unlikely to aid you in maximizing your physical results, it could possibly be used to improve your consistency if that's an issue.

Some people have an easy time following a diet Monday through Friday, but on the weekends they have a really tough time not going over their macro target. If this describes your situation, just drop your calories on the weekdays a little bit and increase your targets for Saturday and Sunday to match your normal habits. You may find that doing this allows you to be more consistent with your weekly energy balance. Just don't go too crazy with caloric restriction on Monday through Friday, I would recommend going no more than 10% below maintenance calories.

Even a small reduction on 5 weekdays allows for a rather large increase on weekends. For example, if you were targeting a 200 kcal surplus

per day during a gaining phase, and you simply ate at maintenance on Monday through Friday, this would allow you an additional 1000 kcals to consume on Saturday and Sunday on top of those days already being 200 kcals over maintenance!

As an aside, for those who want to use internal hunger and satiety cues to avoid the potential pitfalls of tracking, remember that many people normally eat more on weekends and less on weekdays without tracking, and don't gain weight as their satiety and hunger cues balance out their intakes. They eat more on weekends, and naturally experience less hunger on the early days of the following week, and eat less. You can certainly just let this happen, keeping a running tally of protein in your head, checking the scale only a couple times per month to make sure you gain at an appropriate rate (more on strategies like this later in the book).

Multi-Day Refeeds and Carb Cycling

As I said, single-day refeeds can prove to be useful for some reasons but aren't the most effective tool for staving off metabolic and hormonal adaptation. As you get leaner, deeper into your diet, and experience your body pushing back harder and harder, the potential utility of multi-day refeeds, or more frequent 24-hour refeeds, increases.

Unlike weekly 24-hour refeeds, there is some research specifically on and relating to multi-day refeeds. There is preliminary research on 48-hour refeeds, some research on alternate-day fasting (e.g. every other day is a dieting day, and every other day is at maintenance), and also some research on '5 and 2 setups', where only 2 days per week are dieting days and the other 5 days are at or near maintenance.

While on the whole, alternate-day fasting and '5 and 2' studies have shown equal utility to daily energy restriction without clear indication of superiority [11, 12], the occasional study has reported greater fat loss in a group using a 5 and 2 setup [13] and there was a 2011 review that concluded alternate-day fasting was superior for lean mass retention [14]. More convincing, however, is the 2018 published data where 5 days of dieting with two days of back-to-back refeeding preserved

lean mass and resting energy expenditure more than a daily energy-restricted diet with a matched weekly deficit over 7 weeks in resistance-trained athletes [15,16]. Overall, it seems that multi-day refeeds have the potential for preventing metabolic adaptation to a degree, and can also result in a superior body composition at the end of your diet than if you had just dieted straight through.

Who Should Use Multi-Day Refeeds?

Although speculative, it makes theoretical sense to implement multi-day refeeds when leaner. Once you are below ~12% body fat if you are a male or ~20% body fat if you are a female, it might be a good idea to consider implementing multi-day refeeds. This is the point in a diet in which "the body fighting back" becomes increasingly more of an issue and proactive strategies for combating these problems are beneficial. With that said, for ease of implementation we often just start contest prep diets with 48-hour refeeds and keep them in all the way through.

So How Do You Implement Multi-Day Refeeds?

The easiest method is to simply have two refeed days in a row each week. You would implement this in the same exact way I explained for single day refeeds, except instead of spreading your deficit over six days, you would spread it over five. Another way to implement multi-day refeeds is to have three days spread across the week as desired that are at maintenance. Once again, you would have only four days to spread the deficit over if you were to use this approach. However, the only direct data we have on refeeds shows a benefit using two days in a row, so if you do have three refeed days in a week, it might be best to have one day "floating" mid-week, and then two days back-to-back.

Are There Other Ways to Implement Refeeds?

There are for sure, and I'm not suggesting that two refeeds in a row, or three refeeds spread out over the week are the only or best ways to do it. Rather, these are just simple straightforward ways to do it. We don't have enough information to say what is optimal for most people, and even if we did, there would surely be a lot of individual variation.

The general conclusions we can make from the available research is that there is a strong rationale for refeeding the leaner you get, and that time is a component not just total energy or carbohydrate, as 2018 data shows a 48-hour refeed preserves more lean mass and energy expenditure compared to continuous restriction.

What About Having Higher Calorie Intakes on Training Days and Lower Intakes on 'Off' Days?

If you get to the point in a diet where you are lean enough (~12% body fat or lower for men, 20% or lower for women) to start implementing multiple refeed days per week, there will be a larger disparity between your low days and high days. Using the same example as before but with three weekly refeeds, if the goal is to lose 1.5 lb (~0.7 kg) per week (requiring a 5250 kcal deficit per week), your low days would be ~1300 kcal lower than your refeeds. This is a large deficit and could potentially impact training.

To offset this potential effect, it's not a bad idea to think about strategically placing your refeeds relative to your training days. However, placing them on the same day only makes sense if you train in the evening. Complete glycogen (your stored carbohydrate) resynthesis after exercise can take up to 24 hours [17]. So if you train in the morning or afternoon, you may not be getting the full benefits of a refeed if it is done on the same day that you train. So, if you are implementing three weekly refeeds, place them the day before your three highest-volume training days if you train in the afternoon or morning, or, place them on the same day if you train in the evening.

The premise of altering caloric intake on training versus non-training days is likely unnecessary outside of the circumstances described above where you have a large energy disparity between low and refeed days and a high number of refeeds per week. The reason it is unnecessary is that the difference in caloric expenditure on a training day versus an off day is quite small. Even a 90-minute, full-body, resistance training routine with multiple sets of 10 reps with final sets taken to failure burns 200-400 kcal on average depending on body size [18]. Meanwhile, if you hadn't gone to the gym and for that same hour and a half you sat on

the couch you would have burned 100-150 calories. If instead, you were doing light everyday activity, like grocery shopping in this period, you would have burned twice as much. So really, on a training day you are burning at most, a couple hundred calories more than on an off day. Thus, the premise that you have substantially different energy requirements on training versus non-training days is flawed.

Likewise, I would point out that adaptation from training does not occur only on the day of training; rather, adaptation is a continual process. So, while I don't have any evidence to cite, I would be concerned that lowering calories on days following training could hamper recovery and adaptation. Thus, I would avoid setting calories too low on off days as well. While some have argued for this approach to limit fat gain in the offseason, it could also potentially limit muscle gain if it interfered with recovery. However, this would only be a concern with a large disparity in calorie intakes; worrying about the impact of small variations in energy intake (100-300 kcal or ~10% differences) on resistance training performance or body composition is a waste of your mental energy and time.

Meal Frequency

This simply refers to how many times you consume nutrients in a day. That might be the old-school recommendation of seven to eight meals per day from an IFBB professional bodybuilder, or that might be two to three meals per day in a certain window from someone in the intermittent fasting crowd. Generally, I'd say we should end up somewhere in the middle of those two extremes.

Now there is a decent amount of research on pretty much everything from one meal a day all the way up to 14 meals per day, and surprisingly limited investigation of the more moderate frequencies of four to five meals per day [19]. But collectively, the data suggests if you are eating in the range of a relatively normal number of meals, say three to six, this doesn't make a huge difference as far as the actual outcome of body composition [19, 20]. What we can say though is that some blips on the radar start to come up when you get on the extreme ends of very low or very high meal frequencies.

When you start touching the low end (two meals or less) or the high end (more than six meals a day), you can potentially start running into issues with adherence.

Less than three meals and you tend to go long periods of time without food and that can affect your hunger and ability to maintain consistency. You'll also eat very large meals that can sometimes cause you to develop unhealthy relationships with food where you train yourself to consume an enormous amount of calories at each sitting. Likewise, you can run into the opposite problem eating more than six meals a day. Having tiny meals every hour or two that don't satisfy you can leave you constantly focused on food. Either end of the spectrum can exacerbate hunger control [21, 22].

So, my conservative recommendation that combines practical experience, theory, and the limited studies we have [19-26], is to consume somewhere between three to six meals per day in most cases. But that said, if you have previously found success with slightly more or fewer meals than this, that's not necessarily a bad thing.

If you do fine on two meals per day or seven meals per day, feel free to stick with it. There are plenty of competitive bodybuilders who have found a great deal of success following very high meal frequencies (six to eight meals per day), and likewise there are many folks who have followed an intermittent fasting approach to eating who have had personal or competitive success eating two meals per day (usually involving skipping breakfast) with only whey protein or BCAA prior to training - buy the whey (see what I did there?), save yourself some money and just use protein powder instead of BCAA if you decide to train 'fasted'. (More to come on this next chapter.)

In fact, when variations in meal frequency from two to seven meals per day are studied, no significant differences in energy expenditure are found [27, 28]. However, inconsistent meal timing across the week, as opposed to maintaining a consistent meal frequency, can decrease energy expenditure (to a small degree) [29] and insulin sensitivity [24]. So, if you are satiated by your current meal frequency setup, it is not socially stressful or inconvenient, and it works for you, don't think you have to change it.

Really, it's just a good idea to have a consistent structure to your diet. Regular meal times, and habits (like having a protein serving, a fruit serving, and a veg serving at each meal) can go a long way towards consistency, adherence, reducing decision fatigue, and getting results.

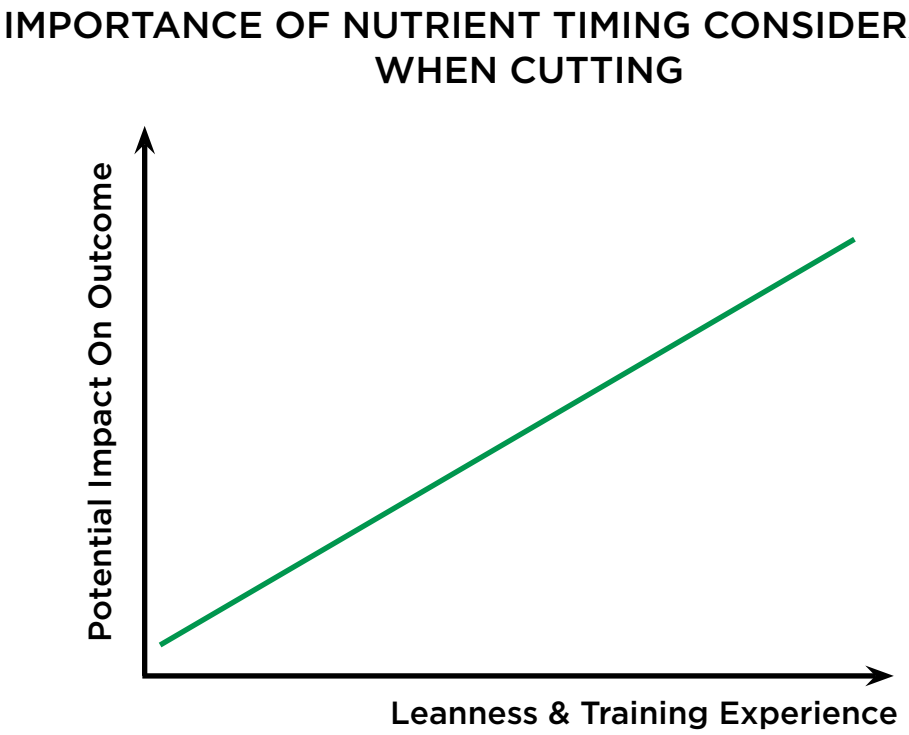
Believe it or not, I have a handful of clients who use an intermittent fasting approach as it helps them with adherence and satiety, as does Andy with many of his clients. I also have some who eat a lot of meals per day. The commonality between both is consistent structure. So a high or low-meal frequency is not black and white, and it is definitely not a deal breaker or maker in terms of your success. Rather, just recognize that most people will probably do well eating in the range of three to six meals per day, but not everyone.

Finally, for those of you who are larger individuals in a gaining phase with a high caloric intake, you might have trouble consuming the high number of calories that you need with a more moderate meal frequency. In your case, it might be better for you to aim for six or even seven meals daily. Hunger is not going to be an issue that needs to be controlled. If anything, being too full can become an issue, so if you need to increase meal frequency to reduce meal size so you can get in 5000 calories, go for it.

Peri-Workout Nutrition

This simply refers to the food you ingest before, during, and after your training, and it has been quite a controversial topic in our industry and the source of much confusion.

Before you go down the rabbit hole of peri-workout nutrition timing, please get this in your head:



We all know people that have the minutiae of nutrient timing on perfect lockdown before they have gotten their foundation steps in place. You see them scratching their heads six months down the line, looking no different now than they did before.

So, if you're a novice trainee (or coach them) you'll do well to focus on the bigger picture components of your training and nutrition plan before getting yourself wrapped up in the following details.

Got it? Good, then let's get into it!

There are plenty of arguments for eating carbohydrates immediately post-workout to maximize glycogen replenishment. There are also

arguments to do this to spike insulin post workout for improved anabolism and growth. You can also find studies that recommend consuming carbohydrates pre-workout to enhance performance, and studies that suggest ingesting protein either pre or post-workout to speed up the build and repair process.

As you can tell, there are quite a few theories and statements but many of them are non-specific to people interested in muscle and strength gains. So, let's go through all the different information and discuss what is relevant to the goals of muscle and strength gain and retention.

Post-Workout Carbs

The primary argument for this is glycogen replenishment. However, in 90% of cases, bodybuilders and strength athletes don't need to worry about significant glycogen depletion. We're not doing multiple exhaustive bouts of glycogen depleting training for the same muscle group, and simply put, you will get full glycogen replenishment within a 24-hour period, even on a moderate-carbohydrate diet. This also means you don't need to worry about the magnitude or speed that a given carbohydrate source raises blood glucose (reflected by its glycemic index, or "GI").

If you were to do a reasonably high volume of training for a specific muscle group, let's say 9 to 12 sets for a body part, you might deplete those muscles by as much as 40% of their glycogen levels [19]. After this, most wouldn't train those muscles again for two to maybe seven days depending on your training program. So you can see that glycogen resynthesis won't be an issue, because you will definitely replenish that body part's glycogen in the interim days before you train the muscle group a second time.

And for the second theory on consuming post-workout carbs for generating an insulin spike, protein actually spikes insulin on its own and to the same level as carbohydrate if consumed in an appropriate amount. More importantly, if you take all the studies that look at changes in muscle mass and strength between groups having either post-workout protein and carbohydrate or having that same protein and carbohydrate at some time not near training, only a minority of them

show a superiority of post-workout consumption while the majority don't show a difference [30].

Therefore, post-workout carbohydrate intake is not quite as important as once thought in the context of someone just doing resistance training. That said, if you are doing cardio, especially anaerobic cardio like high-intensity interval training combined with resistance training in the same day, there may be a role.

Pre-Workout Carbs

For pre-workout nutrition, the effects of consuming carbohydrate are mixed in the literature with some research suggesting carbohydrates have a role in aiding performance and others showing no benefit [31–38].

In practice, I have found that individual response is equally mixed. Some people seem to get a benefit by consuming differing amounts of carbohydrate pre-workout for certain types of training and others do not. It tends to be very individual, so feel free to experiment, but consider you can take it too far and cause problems.

If you eat too much too soon or near to your workout you may experience gastrointestinal discomfort or mild reactive hypoglycemia (low blood sugar) during training. If you don't eat for a very long period of time, especially if you miss a meal that you are used to having, you might get a little fatigued early, especially if you're doing a long workout.

Finally, whether you are dieting or not may play a role as well. A 2017 study found that a group of lifters who consumed 28 g of carbohydrate prior to and after training, compared to a group that consumed 28 g of *protein* prior to and after training, had improved muscular endurance after 8 weeks of dieting [39]. That said, it's impossible to know whether simply having 56 g of carbohydrate per training-day that the other group did not, was the cause of this difference in performance, or whether it was just the *timing* of the carbohydrate. However, it may be a safe decision to simply ensure some amount of carbohydrate is consumed 1–2 hours pre-workout in an easily digestible form while dieting.

Peri-Workout Protein

When it comes to protein consumption, there is a decent argument that you should be consuming protein within some reasonable time frame around your training. However, what you've probably heard — that you should consume protein immediately post workout — is not as critical as we once believed.

Remember, it takes multiple hours to digest and absorb most protein sources. So if you're eating three to six meals per day, chances are you're going to be digesting protein and have amino acids circulating in your body almost constantly. You're going to have the substrate to start the repair process available nearly at all times throughout the day.

An aside on protein digestion: Bodybuilders and sports nutritionists often focus way too much on protein timing, distribution, and the speed of amino acid delivery because the research is dominated by acute whey protein studies done in a fasted state, which vastly increases digestion and absorption rates compared to normal eating. When you're shifting around proteins from various sources, especially in the context of a caloric surplus where you are eating a lot of food, digestion is occurring more slowly than you realize.

I don't just mean the speed of slow versus fast proteins; I mean the interactions with fiber, fats, liquids, carbohydrates, and the overall effect on digestion, absorption, and the delivery of amino acids to muscle. There is a veritable conga line of food, even just a meal or two into the day, backed up far enough that changes in amino acid release into the bloodstream, and the subsequent delivery to muscles, becomes much more steady than you might think. This reality makes many of the micro-manipulations of protein timing pointless. For example, consuming just 26 g of protein from lean steak (and most steaks are nearly twice this mind you) results in a sustained elevation in muscle protein synthesis that lasts at least six hours (perhaps longer, as this was the entire time period studied) (40) when eaten alone...if you add vegetables and a starch to that, you may have a release of amino acids into the bloodstream that persists for 10 hours!

So while the research does suggest that having protein around training versus not having protein around training may be of benefit [30], your normal eating pattern often ensures that protein is available to start the repair process anyway. Thus, in many cases, you won't need to intentionally change your meal schedule or add a protein supplement to your diet to take advantage of a theoretical "anabolic window" (unless you train fasted). In fact, a meta-analysis found that once you controlled for protein intake, the timing of protein within one hour of training had, at best, a very small effect on hypertrophy [41].

Far and away, consuming an appropriate amount of protein on a day-to-day basis rather than timing it specifically in relation to training has the largest effect on influencing resistance training adaptation. However, a small effect is still an effect and from a pragmatic standpoint, it is not at all difficult to consume some of your protein within 1–2 hours pre and post workout, and for this reason it has been recommended to consume 0.18 to 0.23 g/lb of body weight of protein (0.4 to 0.5 g/kg) 1–2 hours prior to and after performing resistance training to maximize muscular adaptations [19, 30].

Considerations When Cutting

Now that we've covered all the theories, to make a safe recommendation that is appropriate for dieting individuals, I would recommend eating a normal sized meal containing both carbohydrate and protein 1 to 2 hours before you train, and again 1 to 2 hours after you train.

This meal should contain roughly 0.2 g per pound (0.4 to 0.5 g/kg) of protein, and should have roughly 10–20% of your daily carbohydrate intake (and 10–15% of your daily fat intake to slow digestion if you experience reactive hypoglycemia) depending on individual tolerance. This will ensure if you have to perform cardio and weight training on the same day that you will be able to perform as well as possible in both sessions, and will also hopefully prevent excessive fatigue when your food levels get low.

As an example, let's say you are a 155 lb (~70 kg) lifter dropping a weight class and you have a late morning lifting session from 10–11:30 am, and an evening cardio session to complete later that day. If you are

eating 200 g of carbs and 50 g of fat, you would have ~30 g of your daily protein and 20–40 g of carbs (and ~5–8 g of fat if you experience reactive hypoglycemia) between 8–9am and then again between 11:30 am and 1:30 pm (essentially, breakfast and lunch covers your bases).

Considerations When Gaining

When you're gaining, you have a much bigger buffer in terms of glycogen storage, available food, and you aren't likely to be as fatigued from training. So, none of this matters as much. I would say that if you train no longer than 2.5 hours after having at least one meal containing protein in your body, and then eat another of your meals containing protein within 2 hours post-training, you'll be all set. If anything, in some cases you may find because your food volume is so high, that you don't want to consume as large of a proportion of your food pre-training as you would while dieting to prevent gastrointestinal distress.

Considerations for Extremely Active Athletes

Now there may be unique instances where you are doing two or more continuous hours of training. If you're doing interval training right after your leg day, or if you are doing a really high-volume program and alternating between sets of push and pull, or if you're not a strength or physique athlete but do a lot of weight training right after your sport-specific training, the timing of nutrition becomes more important. In these cases, it's not a bad idea to consider pre, post and maybe even intra-workout liquid nutrition to aid performance.

In these cases, I would recommend consuming a drink that contains 8 to 15 grams of protein and 30–60 grams of carbohydrate mixed between pre- and intra-workout if gym time reaches or exceeds 2 hours of continuous, hard training [30]. That would be something like half a scoop of whey in Gatorade or something similar.

This is your typical endurance or team sport training intra-workout recommendation, but remember it's really only needed if you're doing two hours plus of continuous hard training. Not one hour and 45 minutes of just weights with most of that being rest periods.

I know some of you are thinking, "Yeah, I lift for two hours or longer quite frequently." Even then these recommendations don't apply, because I literally mean more than two hours of continuous training with minimal rest, which to be honest, if you are doing as a bodybuilder or a powerlifter...you probably shouldn't be.

SUMMARY OF NUTRIENT TIMING RECOMMENDATIONS				
	DIET BREAKS	**REFEEDS**	**MEAL FREQUENCY**	**PERI-WORKOUT**
GAINING	N/A	N/A	3–6/day, more if needed to reach daily kcal goal	0.18–0.23 g/lb of protein (0.4–0.5 g/kg) 1–2 hrs pre and post workout
CUTTING	~1–2 wk diet break per 4–8 wks of dieting	Increasing from 1 to 2–3 refeeds/wk as you get leaner w/2 days back to back	3–6/day, greater or fewer meals if more satiating	10–20% carb intake pre, 0.18–0.23 g/lb of protein (0.4–0.5 g/kg) 1–2 hrs pre and post workout

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LEVEL 5

SUPPLEMENTATION

Dietary supplements are substances produced with the intentions of providing nutrients to your body that it would not otherwise get from your current diet. Sometimes they are ingested to achieve a recommended healthy baseline of certain nutrients, and other times they are used to reach higher levels of certain nutrients that could not be normally attained by most diets to provide additional benefits.

These substances are often derived from components of typical food sources that you already consume or are made from naturally occurring plant products. They are specifically manufactured with the goals of benefiting your health, performance, or recovery through various mechanisms.

Supplements are the least important part of The Pyramid and are not necessary for success, barring that you do not have some type of nutritional deficiency or condition that requires them. In fact, in the grand scheme of things, the vast majority of supplements on the market don't do anything except burn a hole in your wallet. That said, some are based on sound science and are therefore worth discussing as they can provide a small benefit. And because there are so many ineffective or unnecessary supplements on the market, we also need to discuss how to differentiate between the useful ones and the not so useful ones. Once we've learned how to evaluate them, I will present a list of supplements for your education, broken into categories based on the quality of evidence, and relevance to strength and physique goals.

Note the wording there, I am not an RD, I am not recommending anything, just educating you on the options for your consideration.

So to start, let's dive into the three factors that must absolutely be considered when analyzing any nutritional supplement: quality, validity, and effectiveness.

Protecting Yourself and Ensuring Quality

When I say 'quality', I am referring to whether or not the ingredient claims on the label are actually true. Does the bottle actually contain what the label says it does? And how can we be sure of this? Now before I actually get into ways to ensure quality, let me explain why this

is such an important aspect of supplementation to consider.

The majority of products in the bodybuilding industry are propped up by sexy marketing and athletes paid to endorse them. At best, there is usually a bit of pseudoscience mixed in. At worst, a surprising number of products simply don't contain the quality or the amount of the active ingredients that their labels claim [1–3] and some actually have ingredients in them that should not be there at all or that are either unsafe, illegal, banned, or all of the above [4–6].

If you are a recreational lifter, it is not outside the realm of possibility that if you aren't well informed and careful, you could end up taking something for the purpose of making you healthier, which is actually harmful.

If you are a competitive natural athlete in an organization that expects you to be drug-free and regularly drug tests you, not only could your health be negatively affected, but you could in fact inadvertently end your career if you were to unknowingly consume a contaminated supplement [7].

Let's talk about how you can protect yourself and ensure that what you think you are taking is what you are actually taking.

Laboratory Analysis

One of the ways to check the quality is to make sure the product has been run through a lab analysis. This information, which is sometimes on the product label and most often on the company's website, will include some type of report showing that a third-party lab analysis found the contents of the bottle to be in line with the claims made by the product creator. Basically, some other lab verifies that what the supplement company claims is in their product, is actually in it, and nothing else.

Unfortunately, this is an incredibly rare practice in the supplement industry. Yet despite how rarely this is done, I still would recommend sticking to supplements that have been validated by an external lab analysis (especially if you are a drug-tested athlete).

Believe it or not, there are actually some supplement companies

that send lab reports to their customers with their orders, while rare, this is a mark of a quality company. More commonly, you might see supplements that are labeled as "Certified Drug Free", "Certified for Sport" or "Informed Choice" (and I'm sure there are more), which means they've paid for a third party to test their products and sometimes inspect their facilities to ensure they are safe and contain only what they are supposed to. Two common examples of organizations you may see with stamps on bottles are the U.S. Pharmacopeial Convention (USP), and NSF International (NSF).

Similarly, the use of licensed ingredients from reliable suppliers can help ensure the quality of a product. For example, CreaPure is a company that produces and has a stake interest in being a high-grade supplier of creatine monohydrate. CarnoSyn does the same for beta-alanine. Other supplement companies will often license the use of CreaPure or CarnoSyn in the supplements they sell because of the ensured quality. So for example, if you find some product that combines a few compounds into a pre-workout supplement, one of them being CreaPure, you can ensure that at least the quality of the creatine monohydrate will be satisfactory.

Proprietary Blends

I would also recommend *not* getting products with so-called 'proprietary blends'. A proprietary blend is where a company trademarks a combination of substances that they mix together and then gives that mixture a name of their choosing. They are required to list the ingredients, but not the dosages. For example, a label might say it includes 30 grams of a "muscle blend" and lists all the ingredients, but doesn't tell you the individual amount of each ingredient.

This is basically a way to say, "Look, this is our special sauce, we don't want people to reproduce it, and so we're not going to tell you exactly what's in it." Too often this becomes a way to disguise the fact that the individual ingredients are too underdosed to be effective, and to get you to focus on the fact that it has a lot of ingredients so you think, "Well then, it must work!" The use of this practice to fool consumers is why I recommend avoiding proprietary blends altogether.

So in my opinion, before purchasing a supplement, you should ensure

the majority of the above factors are in place to increase the likelihood that you are buying a product of high overall quality. If you can't ensure all of the above conditions are met, at least ensure some combination of these factors that you are comfortable with is met before wasting your time or money on false claims, lower dosages than expected, or even potentially tainted products.

Protein Powder Scams

Here's a good example of the industry's shenanigans combining both the factors above with one of the most commonly used supplements, protein powder.

If you are a bro or a sis, you probably like protein powder. It's a quick, convenient, and cost-effective way to hit your daily protein targets. Whey protein is not the cheapest, but it is popular due to the high BCAA content, particularly leucine, which is critical to the muscle building process.

Now, with consumers becoming wiser there is a rising demand for products that claim to have been lab tested, but this comes at a time of overall rising global demand (and thus prices). Consumers are sensitive to these price increases, and with a lack of general education about what they should be looking for on the packet, the incentives for companies to cut costs by cheating the system are all there, and many do.

I'm talking about the rise of the phenomenon known as 'protein spiking'.

The way it works is this:

- Some labs test for the nitrogen content of protein powder rather than the amounts of the individual amino acids — the building blocks of protein.
- Under normal circumstances, as every amino acid contains nitrogen, measuring the nitrogen content of a powder should indicate how much protein it contains.
- The first way manufacturers cheat the system is to dump cheap amino acids like glycine and taurine into the mix — amino acids are not all of equal value. This robs you of some of the ones that are

critical to the muscle building process.

- The second is to add other nitrogenous, but non-proteinogenic (protein creating) acids into the mix, such as creatine and beta-alanine — these are cheaper by the gram, and gives the manufacturer the benefit of being able to list these on the packet, knowing that consumers have enough general awareness of these to think they are good, but not be educated enough to realize that, in fact, they are just being robbed of the protein they should be getting.

Here are some red flags to look out for when choosing a whey powder:

1. The cost per pound/kilo of claimed protein content is considerably cheaper than average. Whey is a commodity traded on the open market. You can be ripped off and pay way too much (Andy has seen 11x market price protein from one "luxury brand" gym in Japan), but you won't ever find it significantly cheaper than everything else without there being something dodgy going on.

2. It has a proprietary blend (or doesn't list leucine content).

3. Leucine content, when listed, is lower than 2.7 g per 25 g of protein content (the BCAA content of whey is 25%, leucine should be 11%).

If your protein powder doesn't pass those checks, you're rolling the dice with the quality of what you're getting.

Lastly, for those who are vegan or lactose intolerant, a 70:30 mix of pea and rice protein closely mimics the amino acid profile of whey.

Supplement Validity and Effectiveness

Although I will group validity and effectiveness together in this discussion, they are not exactly the same thing. The question, "Is this supplement valid?" does not always tell you if it is effective for your specific goals. Really, the question boils down to, "Does this supplement benefit you?"

To determine if a supplement benefits you, you have to determine not only

if it has an effect, but also if it is an effect that is *relevant* to your goals, and if the effect is *significant* enough to have any measurable outcome.

We have to keep in mind that some supplements actually have an effect, but it's just so insignificant that it's not worthwhile to purchase. Other supplements have an effect, but the effects themselves are irrelevant to the goals of building muscle or strength. Luckily, there are a few great places on the internet that can help us with finding out this information.

In my opinion, Examine.com is probably the best website about supplements that exists in the world today. This site is a collection of human research on almost every nutritional supplement in existence. When you arrive at the site, you can do a simple search to bring up a full Wikipedia-type page on nearly every supplement available, and it includes information on usage, dosage, chemical compound structure, side effects, references, etc.

Another feature is what they've coined the 'Human Effect Matrix', which is a table based on the available human research on a supplement. It includes the studied effect or outcome, how the supplement impacts this outcome (increases or decreases it), the magnitude of the change, what percentage of the studies on this outcome share the same finding, and a ranking for the research quality. Essentially, you can use this website to help you make decisions about which supplements to purchase by answering questions like, "Does this increase or decrease a given variable?", "Is it a small, moderate or large effect?", and "How much agreement does there appear to be in the research?"

You could use this site to look up something like creatine monohydrate, versus tribulus terrestris; both of these substances are often recommended in bodybuilding communities. But what you'll find is that one of these has a whole lot of scientific backing (and you can tell exactly how and exactly why), while the other substance, not so much.

Another website I'd recommend is the Journal of the International Society of Sports Nutrition (JISSN). This is an open-access online journal that does a lot of sports nutrition research and has position stances on things like protein intake, HMB, creatine use in adolescents, nutrient timing, and many other pressing topics in the sports nutrition and supplement

industry. While the JISSN doesn't spoon feed you the info on a silver platter, being open-access it does allow those who want to dig deeper and learn the science and mechanisms behind the recommendations to really dive in and research the supplements in question.

In essence, between those two sites, Examine.com and JISSN.com, you'll be able to easily check up on the validity and effectiveness of any supplement, which will, in turn, help you realize whether or not it's worthwhile for you and your goals.

Be Cautious with New Supplements

As a final note before moving onto the recommended supplements, a word of caution on purchasing new supplements that are released with only minimal scientific support for their use.

New supplements come out all the time; most are not supported by any studies whatsoever. Less commonly, some supplements that come out are supported poorly by an animal study, short-term study, or an in vitro study that doesn't directly measure fat loss, muscle gain or performance, but measures an outcome that is related to fat loss, muscle gain or performance. Even more rarely, a new supplement will come out that actually does have a scientific study that supports its effectiveness directly.

This is what I recommend:

- In the first case where a supplement has no supporting evidence, simply ignore it.
- In the second example where the evidence is shaky at best, I still would not take it. You can keep an eye on the supplement, but don't get your hopes up. If it really was effective they would have cited studies that demonstrated its effects in an unambiguous way to show its effectiveness.
- In the final case where a new supplement comes out with direct scientific support, my advice is still to wait until multiple groups of researchers have confirmed the findings of the first group to ensure that the findings are legit.

Researcher bias, small sample sizes, and dare I say it, financial influence from the industry, can all potentially influence study outcomes. The smart thing to do would be to wait until there is a preponderance of evidence supporting the use of a supplement before you decide to take it.

Think I'm being overly cautious? Let me give you a specific example.

Do you remember D-Aspartic acid? A study came out in 2009 that found it increased testosterone production in men to a rather impressive degree [8]. Immediately, supplement companies jumped on the bandwagon and started selling this commercially as a muscle builder, libido enhancer, and performance enhancer (despite the fact that the study did not measure changes in muscle mass, performance, or libido). Over and over I cautioned for people to wait until further studies had been performed before taking the supplement, considering this was the one and only human trial. Many ignored me, and then to their surprise (certainly not to my surprise) a study came out in 2013 that found D-Aspartic acid not only failed to increase testosterone levels but most importantly it had no effect on body composition or strength [9]. Once again, another supplement proves to just be a waste of money right? Wrong. A 2015 study came out that actually found D-Aspartic acid decreased testosterone levels in resistance-trained men [10]! So not only did this compound end up being a waste of money, it was found to potentially be counterproductive to the goals of those taking it.

Even the most effective supplements that have been tried and tested time and time again for decades that can help you reach your goals, make only a very small impact. Likely, the impact they will make might not even be discernible to you. So, don't get caught up in marketing hype of some new dodgy supplement and think that by waiting a year or two until more research comes out that you'd be missing out on potential gains by not taking it. In fact, jumping on a bandwagon too early could be much worse of an idea. Remember, 1000s of supplements have come out over the years, and 99.9% of them have disappeared because they proved useless. Assuming that a new supplement is the "next big thing" without sufficient proof is illogical and is just buying into marketing hype.

As a final reason to be a "late adopter", consider that supplement companies often fund researchers to test their products. There is nothing inherently wrong with this, and in general researchers are interested in the truth, get oversight from ethics committees, are third parties, and funding doesn't go directly to them, but rather towards the research itself. However, there are researchers with conflicts of interest who have financial stakes in companies, who do fraudulent research. While this is disturbing, it is rare. What is unfortunately common, is that when supplement companies fund research, they sometimes include in the contract a clause that states they have the right to decide whether or not the data is published. In my opinion, these contracts should never be signed. But sometimes they are, and you better believe the results don't get published when they are null. This practice skews supplement research as more positive (including statistically false positives) studies are published, while null findings are repressed. Moral of the story, be a late adopter when it comes to supplements.

Supplement List

Keeping in mind how adamant I am regarding the combined quality, validity, and effectiveness of any substance, I'd like to present a compiled list of the few supplements that have adequate research showing they might be useful for those interested in gaining muscle and strength (and also some supplements that people often take that probably aren't doing anything).

Now there's always subjectivity in deciding whether supplements are worth considering or not, and as with all of my advice, feel free to disagree with it based on your own judgement. Additionally, it is quite likely that this list will prove to be outdated in a few years as more research comes out.

That said, what follows are three supplement lists:

1. The A-list of supplements with an impeccable research record that are relevant to almost all lifters.
2. The B-list of supplements that either are only worth considering in certain circumstances, or have a mixed but *overall* positive research record (just know, this could change as more data emerge).

3. The C-list of supplements that are not worth your time, despite their popularity or common use. (Furthermore, if a supplement you are considering is not mentioned, consider it to belong in this category.)

In each section, I'll first talk about supplements potentially beneficial to health; those potentially impacting performance will follow.

The A-list — Supplements with an Evidence Basis

Multivitamins

The common bodybuilding multivitamin is very high in water-soluble vitamins, and often some fat-soluble vitamins as well. Often, you'll see up to 4-digit percentages of the recommended daily allowance (RDA). Something like 4000% of certain vitamins is not that uncommon among some products.

This gross and unnecessary overdose is exactly why I don't really like massive bodybuilding vitamins that are either giant horse pills or a large packet of pills that you're supposed to take on a daily basis. If you've got the first 3 levels of The Pyramid under control and in order, you should honestly only need a regular one-a-day pill multivitamin that covers your bases and protects against deficiencies. You can also find many basic multivitamins that are geared toward common deficiencies for a certain population, like those specifically made for women or vegetarians with emphasis on calcium, magnesium, zinc, and iron.

Now that being said, in general, multivitamin use appears to be not harmful and may confer a small protective health benefit to long-term users [11]. Additionally, logic would tell you that when you are eating less food, you will also be eating fewer micronutrients and some studies of popular diets have found that they are actually micronutrient deficient [12]. Therefore, I would say that during a cut it's probably a good idea to create a nutritional "safety net" and have a daily multivitamin that's of high quality but that isn't overdosed. If you're in a lean-gaining phase, this is most likely not necessary, but might be helpful.

However, a multivitamin should not be seen as an excuse to eat a

micronutrient poor diet and for those who don't consume adequate micronutrients, a better solution than trying to make up for this with supplementation would be to work towards consuming a more balanced diet. Reason being, foods are much more complex compounds than simply having macro and micronutrients. Plant-based foods contain phytonutrients and animal-based foods contain zoonutrients; nutrients not classified as vitamins or minerals, but have beneficial effects for health. So guess what, your mother was right, eat your vegetables (and other whole foods), kids!

As a final note, I would highly recommend getting blood work done before consuming in any vitamin or mineral supplement to ensure you aren't potentially providing micronutrients in excess or neglecting an unknown deficiency.

Essential Fatty Acids — (EPA and DHA)

Of the essential fatty acids (EFAs), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), which typically come from fish oil supplementation, have been found to have a host of potential health benefits [13].

Fish oil has a long and impressive history, meta-analyses have reported fish oil supplementation reduces symptoms of depression [14], decreases the risk of cardiac death [15], decreases blood pressure [16], and decreases waist circumference [17]. However, examinations of fish oil as an ergogenic aid (performance enhancer) for resistance training or to augment hypertrophy are few and generally mixed [18-22].

If you don't eat fish or don't like taking fish oil, you can also get EPA and DHA from an algae supplement, which is what the fish eat that gives them the EPA and DHA that we are looking for.

Both while cutting or lean gaining, EPA and DHA (combined) supplementation is worth consideration based on the evidence. The range of 1–2 g of combined EPA and DHA covers the bases for achieving the vast majority of health benefits shown in research. This might require 3–6 g of actual fish oil (or algae oil if you don't eat fish) to reach these levels. Read the label of a supplement to determine the

EPA and DHA content per serving.

This intake range is also what has been shown, in the admittedly limited body of research, to potentially improve performance and body composition. While the data is neither strong nor conclusive with regards to omega-3 supplementation improving strength or body composition, it certainly is plausible that it could help, definitely won't hurt, and at the very least may lower your blood pressure, improve your cholesterol profile, improve your mood state, and lower your chances of heart attack.

However, taking more than the recommended range is not necessary, and could plausibly blunt inflammation to the point of being detrimental to skeletal muscle remodeling, so resist the temptation to megadose with it, thinking "more is better", folks!

To check the EPA and DHA amounts in a supplement, look at the back of your fish oil (or algae oil) container, add together the EPA and DHA, and look at the serving size. Perhaps the label says that there is 400 mg per serving of EPA and DHA when combined. This would mean that you need three servings to get 1.2 grams (there are 1000 mg per gram), and each serving might be two capsules.

Vitamin D3

Vitamin D is a fat-soluble vitamin. The most bioavailable and most commonly supplemented form of Vitamin D, called D3 (cholecalciferol), is normally synthesized in the skin upon exposure to sunlight. If sun exposure is lacking, which is becoming increasingly common in the modern world, dietary sources of Vitamin D become increasingly important for health (and performance).

Severe deficiency can cause osteoporosis and can be a contributing risk factor for cancer, hypertension, and a number of autoimmune diseases. Sources of foods containing significant amounts of Vitamin D include fatty fish and Vitamin D fortified products (cereals, dairy products, and orange juice being most common). Beef, pork, and eggs contain small amounts of Vitamin D (a relatively sparse list) [23].

Vitamin D insufficiency, frequently classified as having serum 25(OH)D levels (a metabolite of Vitamin D) below 75 nmol/L (30 ng/ml) [24], is surprisingly common in the world at large [23], and even more common among indoor athletes, who live in extremely hot climates (who spend time indoors to avoid the sun), and athletes who live in very overcast climates and don't get much sun [25, 26]. Taking a broad view of the literature, correcting a Vitamin D insufficiency may improve immune function and reduce your incidence of illness [27, 28], but research assessing the efficacy of Vitamin D as an ergogenic aid for resistance training is hit and miss [25, 29, 30, 31]

Before you consider supplementation, get a blood test to confirm you are actually below the 75 nmol/L cut-off and also get checked after you begin supplementation to determine your individual dosing. Vitamin D3 is the form best taken up by the body and recommendations for insufficient athletes are between 20-80 IU/kg of D3 (there are vegetarian forms of D3 these days, by the way) taken daily.

You could also just try to get some more sun, but unfortunately, sunlight through a window doesn't provide you vitamin D [32]. However, be aware that during winter months, depending on your climate, Vitamin D dosing strategies may need to change or in the summer, cease altogether.

Vitamin D science is still evolving. New findings regarding racial differences on the effects of Vitamin D insufficiency and new markers — such as 'free' 25(OH)D — that may be able to more accurately assess Vitamin D status are emerging [33]. So for now, only supplement with Vitamin D if you have had a blood test showing your 25(OH)D levels are below 75 nmol/L and don't think that the higher you can get your levels the better. Once you have corrected the insufficiency, there is no evidence to support improved health or performance by going higher, and it is possible that going too high could be harmful.

Now that our basic daily supplements are covered, let's dive into the performance supplements that made the A-list.

Creatine Monohydrate

Creatine is naturally produced in the human body from the amino acids

glycine, methionine, and arginine, and is used in the phosphocreatine energy system which helps power the first ~10 seconds of activity. Supplemental creatine thus aids your ability to perform strength and power based activities, and reliably results in increased strength, power, and muscle mass when used chronically.

Creatine monohydrate is the most tried and true, affordable, and effective of all the creatine variants [34]. It is the original, and many subsequent variants of creatine are either inferior [35], or cost more without giving any additional benefit [36]. So every time I refer to creatine, creatine monohydrate is the specific type that I am referring to.

Creatine is produced in the body and thus, is already present. We get it from animal products, mostly in meat, and it is more abundant in raw meat. When meat is cooked it degrades the creatine content [37], which is why it is difficult to get the performance-enhancing benefits without consuming this as a supplement.

To get creatine stores up to levels where they can benefit strength, power production, and ultimately your long-term ability to produce more muscle mass over time, an intake of 0.02 g/lb of body weight per day (0.04 g/kg/day) is what has been shown to be effective. (This is around 3-5 g per day for the average person.) It will take a couple weeks of ingesting this amount per day to reach supplemental creatine levels, but after that point, you can just maintain those levels by continuing to take the dose, like topping off your gas tank.

It's important to note that for long-term consumption, timing doesn't matter. It doesn't need to be taken with carbs, it doesn't need to be loaded, it doesn't need to be taken pre-workout, and it doesn't need to be taken post workout. All the benefits associated with creatine timing, whether it's taken with carbs, or if creatine is loaded in large amounts, are strictly related to the first couple weeks of consumption where the goal is to get to supplemental levels. It has nothing to do with long-term use and whether it takes you 5 days or 21 days to reach supplemental levels of creatine has a less than negligible effect on long-term gains. So, if you decide to supplement, you can just use the aforementioned daily dose to receive its benefits.

Loading creatine is actually a good idea if you start taking creatine while dieting, because it limits the time period of your weight going up (due to increased muscle cell hydration as water is stored with creatine), which can confound your weigh-ins (if taking them). When you do this, simply use your new body weight post-loading as your new baseline to measure changes from.

Caffeine

Caffeine is the workhorse that provides 90% of the acute effects most pre-workout supplements provide (some also have other ingredients with an evidence-basis, but those typically provide chronic effects). Indeed, for purely the acute stimulatory effects, you could just take caffeine and save yourself some cash, as most pre-workout supplements use low doses of lesser proven supplements piggybacked with caffeine. There are some pre-workout supplements that might be effective, but I'd stick to caffeine as there is a multitude of research behind its effectiveness for enhancing performance and suppressing tiredness, while other stimulants don't have nearly as much behind them.

Regarding the evidence-basis for caffeine, I'm going to break this down by discussing two different effects you might be trying to achieve: a suppression of tiredness or enhancement in performance. Then I'll address the use of caffeine in "fat burners", before concluding with a discussion on caffeine tolerance.

Caffeine is a stimulant, but the initial, cognitive stimulatory effects of caffeine fade with continued use. Fortunately, the suppression of tiredness remains even with continued use and does not appear to be affected by caffeine tolerance [38]. To suppress tiredness doses of 0.5–1.4 mg/lb/day (1–3 mg/kg/day) are appropriate. Also, caffeine can improve acute resistance-training performance, including strength and muscular endurance [39]. To get this effect, take 1.8–2.7 mg/lb (4–6 mg/kg) approximately 60 min before training.

It's also worth noting that caffeine is often included in so-called "fat burners" with the claim it can enhance fat loss, either through thermogenesis or appetite suppression, leading to a lower energy intake. While the performance and tiredness-suppression effects of

caffeine are very well proven, the claims that caffeine produces fat loss or reduces energy intake are inconsistent at best [40–46]. While the tiredness-suppressing effects of caffeine can be useful for dieters, it is not a dieting aid from a fat-loss perspective.

If your goal is performance enhancement, it might be wise to moderate your habitual, non-pre-workout caffeine intake both in magnitude (~1 mg/kg as a decent cap) and frequency (~2 x/week at most), as tolerance can inhibit the performance-enhancing effect of caffeine to some degree. Caffeine tolerance develops quickly with regular use. However, the pain-suppressing and local-muscle ergogenic effects of caffeine don't seem to diminish with tolerance [47, 48]; although the endurance training benefits do diminish in some [49, 50], but not all studies [51].

In aggregate, this means that caffeine tolerance will likely diminish the ergogenic benefits for endurance training, but caffeine still probably aids resistance training performance to some degree even in habitual caffeine consumers (but maybe not quite as much as it does for caffeine-naive consumers).

So given tolerance is a reality, if you feel great and you're ready to train, you might not need to take caffeine pre-workout at all. But if you are feeling down and are anticipating a terrible workout, then it might be a good day to maybe take some. It's a valuable strategy to keep your caffeine intake as low as possible in order to allow yourself the ability to get those stimulatory effects when it is truly needed. Also, think about the times where suppressing tiredness might be more beneficial than enhancing performance. If you are on an extended, rather aggressive diet, it may be more beneficial for overall performance to take a tiredness-suppression dose regularly to maintain performance on all days, even if it means a slightly diminished effect when you take caffeine pre-workout to aid your lifting.

Additionally, even though the above information is specific for achieving maximal effectiveness, if you do decide to supplement it may be wise to start with half of these dosages for either suppressing tiredness or enhancing performance because of individual response. If you are not used to stimulants, or if you take too much you may feel jittery and

unfocused, which can be an equally undesirable effect to feeling tired or low in energy. In general, it's wise to consider the minimum effective dose to get the effect desired. It's also a good idea to taper caffeine intake down towards the end of the day to avoid sleep disruption.

The B-list — Conditionally Effective or Mixed Evidence Supplements

Beta-Alanine

With all of the aforementioned "top tier" health and performance supplements taken care of, let's dive into the list which includes supplements like beta-alanine, which should only be considered situationally.

Beta-alanine can be thought of as the muscular endurance version of creatine monohydrate. If you think of creatine for power, strength, and hypertrophy, think of beta-alanine for longer anaerobic performances.

Beta-alanine is a precursor to carnosine. Carnosine is abundant in skeletal muscle tissue and is made up of the amino acids histidine and beta-alanine. While carnosine can't enter muscle cells to a significant extent, beta-alanine can, and is the rate-limiting step in carnosine synthesis. Beta-alanine serves to buffer acidity, regulating the pH levels in muscle, which can subsequently improve performances that are limited by metabolite build up. Thus, I consider beta-alanine as a conditionally beneficial supplement because it only has a small performance-enhancing effect when efforts reach a duration of ~0.5–10 minutes [52, 53].

So, for powerlifters, Olympic lifters, and anyone training primarily for strength, it doesn't serve a purpose. With the typical tempo that most people lift with, you'd need to be doing sets of 15–20 repetitions or higher to get a benefit from beta-alanine, or restricting your rest intervals so that you had incomplete recovery set to set. Thus, CrossFit competitors, and perhaps bodybuilders could benefit from taking beta-alanine, but only if they are doing a large volume of high-rep work. However, there is not a requisite rep range for hypertrophy training per se. Equal hypertrophy can be achieved with both 10RM and 3RM loads given equated volume; the advantage of moderate repetition ranges (8–12) is that it is easier

to accumulate volume compared to using heavier loads which requires more sets, long rest periods, takes longer, and may cause more joint stress than an equivalent volume of lower load training [54] — more on this in the training book for those interested.

Therefore, I would argue that only during phases of training where high reps (15–20+) are emphasized, if lifting is intermixed with other exhaustive exercise (such as in CrossFit) or potentially if you are regularly performing continuous efforts lasting 60 seconds or longer, beta-alanine might be worth considering. If that is the case, taking 3–4 g/day may result in a potential small benefit.

Citrulline-Malate

Citrulline-malate is a supplement that combines the non-essential amino acid citrulline and the Krebs cycle intermediate (meaning, it can help with energy production) malate.

Citrulline may aid performance by increasing blood flow to working muscles through an increase in nitric oxide (a vasodilator) [55], and by helping to clear ammonia (a marker of muscle fatigue) [56]. Additionally, malate augments energy production during exercise while reducing the rate at which lactic acid accumulates [57]. In combination, citrulline and malate, therefore, could assist with both energy production and waste removal during training.

Based on the mechanisms of action, you would expect citrulline-malate could have a role in aiding muscular endurance, inter-set recovery, and thus, the ability to perform volume in a training bout and over time. However, when assessing the available literature relevant to resistance training, the evidence is split down the middle for citrulline-malate showing a positive [58–62] or null effect [63–67]. While there are currently no meta-analyses published on citrulline-malate, one will likely be published in the future that may give a more definitive answer. Such an analysis, if published, will help us elucidate what dosages, time frames, and expectations we should have for citrulline-malate as an ergogenic aid (if any).

For what it's worth, I'm currently of the opinion (barely) that the

evidence slightly leans in favor of its efficacy, as one of the studies showing null effects is underdosed [65]. Also, I've seen no indication of any potential harmful effect on performance.

In studies which show an ergogenic effect of citrulline-malate, 8 g is consumed ~60 minutes prior to training.

The C-list — Supplements Without an Evidence Basis

Glutamine

Glutamine is the most abundant amino acid in the body, and is a non-essential, but sometimes conditionally-essential amino acid. Meaning, that in times when tissue breakdown is abnormally high, such as in clinical situations (disease states, following surgery, among burn victims, etc.), breakdown rates can outpace synthesis rates.

Indeed, in clinical scenarios glutamine delivered via injection in a hospital setting has been shown to help with reducing infections, speeding healing rates, reducing mortality rates, and reducing the length of hospital stays [68].

Glutamine is also a popular supplement in the bodybuilding and fitness community, as the effects observed in clinical literature (delivered via injection) are assumed to also somehow enhance hypertrophy or improve performance (when taken orally as a powder). However, to date, there is no evidence that supplementary glutamine improves body composition or performance [69, 70]. At best, there is a theoretical argument that glutamine could possibly aid in gastrointestinal health among physique competitors during contest preparation, although this is speculative at best [69].

Branched Chain Amino Acids (BCAAs)

Whether you are cutting or lean gaining, I would have to say that BCAAs probably aren't going to provide a benefit to you if your protein intake is already high enough. A high protein diet (such as recommended in this book) will provide you with ample amounts of BCAAs.

Despite this fact, BCAAs are one of the most frequently used supplements for bodybuilding [69]. However, what limited evidence exists that could be construed to support the use of BCAA is flawed in my opinion.

- One study on BCAAs showing they outperformed whey or carbohydrate supplements was never published as a journal article, only as a conference presentation that had not undergone full peer review [71].
- Additionally, the BCAA supplement consumed contained glutamine and citrulline-malate, confounding our ability to isolate the effects to BCAA.
- Finally, dietary controls weren't put in place to account for total daily protein intake (which is important since a high protein diet contains a high content of BCAAs).
- Outside of this poster presentation, a study on dieting lifters showed better fat loss, lean mass maintenance and strength gains between groups on identical diets, one supplementing with a carbohydrate powder and the other BCAAs [72]. However, in a letter to the editor of the publishing journal it was noted that there were significant data reporting errors and inappropriate statistical analyses used, which draw into question the veracity of the findings [73].
- Finally, both of these studies [71, 72] were funded by a company whose flagship product is a BCAA-based supplement — while this is certainly not proof of wrongdoing or shady research, it still is prudent to await reproduction of the findings from a second research group with more rigorous design and analysis.

Looking more broadly, a 2017 meta-analysis reported that BCAA reduced markers of muscle damage more than placebo [74]. However, the included studies simply compared BCAAs to a placebo (typically flavored water, nothing, or carbohydrate), not to protein. Critically, this tells you that BCAAs are better than nothing, but not better than protein for reducing exercise-induced muscle damage.

If we really stretch the definition of "evidence" we can look at a few other

papers that some might cite as supporting BCAA use. Specifically, a 2015 paper came out that found handball athletes had a reduction in fatigue while taking a combined arginine and BCAA supplement compared to placebo during a multi-day simulated competitive event [75]. However, it is unclear whether this effect can be isolated to BCAAs (rather than arginine or the two combined) and the fatigue-reducing effects may only manifest during multi-day efforts, considering a similar study on wrestlers found no effect during a single, protracted competitive effort [76].

In terms of body composition, an older study found a greater reduction in abdominal fat in dieting wrestlers who replaced the vast majority of their daily protein intake with BCAAs compared to another group of wrestlers who replaced the vast majority of their daily protein intake with soy protein [77]. However, neither condition was representative of a normal diet. The extreme intakes of both soy and BCAAs in this experiment make it difficult to draw meaningful conclusions from this study.

Finally, there is evidence that aerobic exercise performance can be improved when consuming isocaloric amounts of BCAAs compared to carbohydrate, but only when glycogen depleted [78]. When not glycogen depleted, BCAAs may reduce perceived exertion, but are not as effective at aiding performance as an isocaloric amount of carbohydrate [79]. However, cardio for strength and physique athletes is not about performance, it's about energy expenditure or maintaining a minimal amount of aerobic fitness, which certainly doesn't need any ergogenic aid.

So, the take-home here is that if you are consuming a diet adequate in carbohydrates, protein, and total calories, you are unlikely to get any benefit from supplemental BCAAs, especially if you are hoping they will improve resistance training performance. On the other hand, if you are performing cardio and have to do so fasted or while consuming a low-calorie or low-carbohydrate diet (which could potentially result in glycogen depletion), you might potentially benefit from BCAA supplementation *if you have endurance exercise performance goals.* However, this is a very narrow rationale for BCAA supplementation indeed...and even then, I would counter that it would be cheaper to simply take a scoop of whey protein prior to training, or better yet

if your goal is to improve aerobic endurance, don't train in a fasted, glycogen-depleted state.

Despite the label claims, there are calories in BCAAs. For regulatory reasons, in many countries isolated amino acids, such as BCAAs, can't be listed as having calories. Any difference in the energy content of whey vs BCAA is minimal, and both are quickly digested. If anything, you could make an argument that whey might be a better choice, as it has the entire spectrum of essential amino acids, which theoretically would provide better support for the build and repair of muscle [80].

Beta-hydroxy-beta-methylbutyrate (HMB)

A metabolite of leucine — β-hydroxy-β-methylbutyrate (HMB) — has been investigated for over two decades as an ergogenic aid for improving resistance training performance and increasing lean body mass via a reduction in muscle protein breakdown. Research on HMB is not new, as the first study on performance in humans was conducted in 1996 [81]. In it, the authors reported promising results for both resistance training performance and body composition changes in untrained individuals. As further studies came out on HMB over the next few years, positive data mounted. In fact, in a meta-analysis of studies conducted up to 2001 on the effects of dietary supplements on muscle and strength gain, it was concluded that among all the supplements assessed, only HMB and creatine produced significant changes [82]. However, as more research was conducted on trained individuals, the findings became less impressive. Indeed, a 2009 meta-analysis reported that while small positive effects for strength in untrained lifters supplementing with HMB were found, trained lifters gained no such benefits, and only trivial changes in body composition were found, regardless of training experience [83].

While research regarding the clinical uses for HMB in muscle-wasting conditions continued [84], sports performance research waned after this point. However, in 2011, Fuller and colleagues reported that a free-acid gel capsule form of HMB resulted in nearly two-fold greater plasma concentrations and a 25% improved clearance rate of HMB from plasma, compared to the traditional calcium salt form of HMB [85]. This spurred a resurgence of interest in HMB (in free-acid form) for performance and

body composition changes; however, the only investigations showing positive outcomes for free-acid HMB were funded by a company that sells free-acid HMB and have been called into serious question in three separate letters to the editor [86-88] — for transparency, I was among the 17 authors of one of these letters [87].

Specifically, in these letters to the editor, the veracity of the findings was questioned on the basis that,

1. The HMB group gained more muscle mass than is seen in studies on anabolic steroids, how this was incongruous with previously published data on HMB;
2. the lack of a plausible mechanism for these changes (simply being more bioavailable shouldn't take a supplement from doing nothing to being more effective than anabolic steroids);
3. statistically, there were implausibly consistent between-group changes;
4. there were surprisingly small gains in strength and muscle mass in the placebo group;
5. there were inconsistencies with the data collection procedures and recruitment that did not match the pre-registered protocols; and
6. the same control group was used across multiple studies yet was reported differently in each [86-88].

However, this doesn't mean that HMB is a useless compound. As I mentioned earlier, HMB has been shown to aid hypertrophy and body composition among untrained lifters as they experience high initial muscle damage from training. Additionally, in highly damaging training protocols (for example high-height drop jumps that produce eccentric overload) free-acid HMB has been shown to aid recovery [89]. However, if training is set up appropriately, after the initial months of training, levels of muscle damage should not be sufficient to warrant the use of HMB. Indeed, a 2018 meta-analysis found no effect of HMB on performance or body composition changes in trained individuals [90].

SUPPLEMENT	EFFECTIVE DOSE, CONDITIONS FOR USE, NOTES
The A List — Supplements with Evidence Basis	
Multivitamin	Low-dose multi may aid deficiencies if dieting, not normally needed if gaining. **Blood test and/or nutrition screen to assess deficiencies before use is ideal.*
EPA and DHA	1–2 g/day EPA + DHA advised by health organizations for benefits. *Unnecessary if eating fatty fish 2x/week+.
Vitamin D3	9–36 IU/lb (20–80 IU/kg): typical daily dose if 25(OH)D < 75 nmol/L (30 ng/ml) **If dark-skinned get "free" 25(OH)D levels checked if available.*
Creatine Monohydrate	Daily 0.02 g/lb (0.04 g/kg) dose to reach and sustain elevated creatine levels. **Non-monohydrate, loading, and carb co-ingestion unnecessary.*
Caffeine	Daily dose to suppress tiredness: 0.5–1.4 mg/lb (1–3 mg/kg). As ergogenic aid: 1.8–2.7 mg/lb (4–6 mg/kg) 1 hr pre-training. **Tolerance may mildly reduce ergogenic effects, limit use (2x/wk) to preserve.*
The B List — Conditionally Effective or Mixed Evidence Supplements	
Beta-Alanine	3–4 g/day can improve performance in 1 min+ efforts or when rest is restricted. **Unlikely to aid powerlifting, weightlifting or most bodybuilding training*
Citrulline-Malate	1 hr prior to lifting 8 g dose may aid work capacity or strength endurance. **Evidence mixed, preferably wait until meta-analysis confirms efficacy.*

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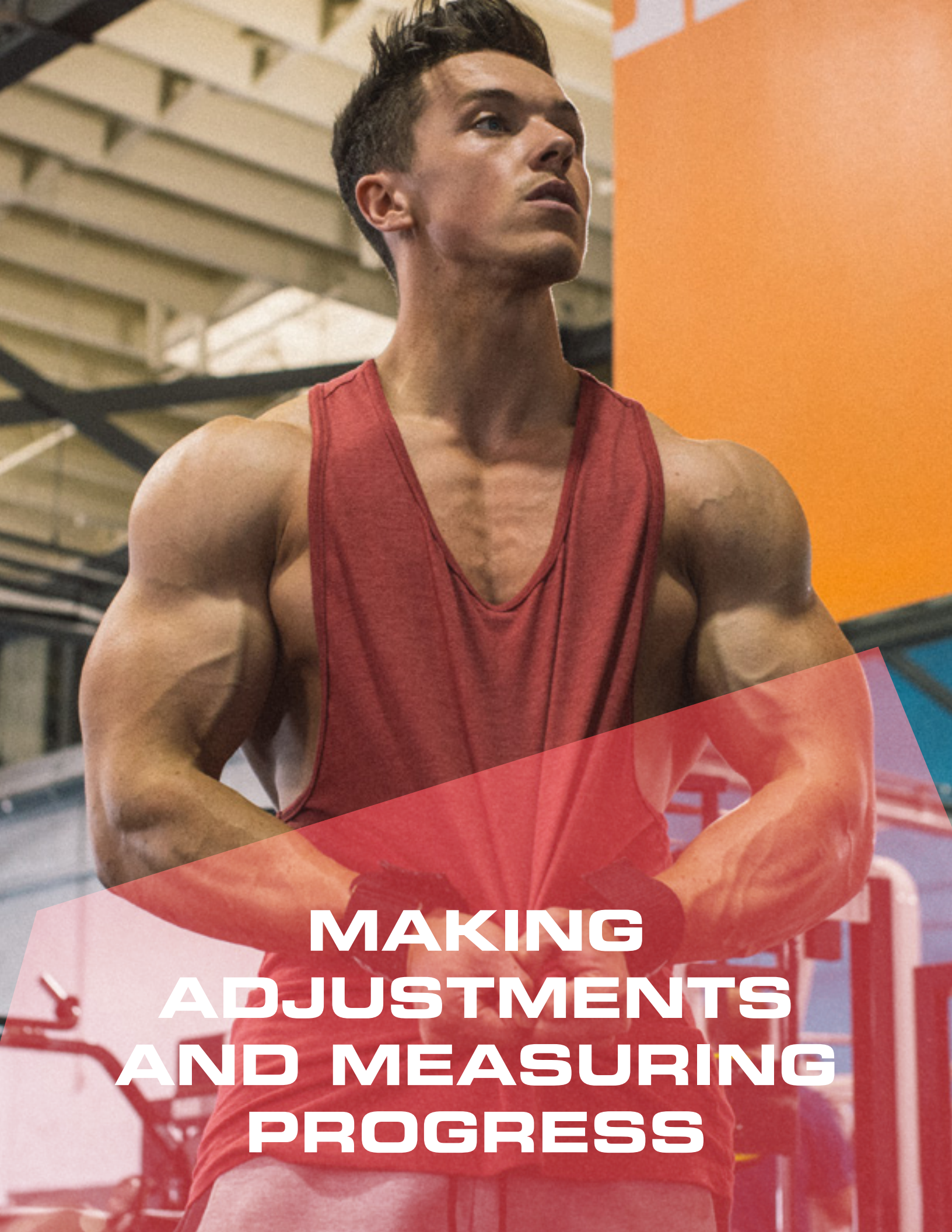


MAKING ADJUSTMENTS AND MEASURING PROGRESS

Up to this point, the primary focus of this book was to help you set up your nutrition based on your goals. However, equally important, and sometimes much more important than your nutrition setup, is learning how to make adjustments to your plan to ensure progress towards your goals, and how to measure progress in the first place.

In this chapter, I'll go through how to assess progress in the following ways:

1. With scale weight: appropriate for weight-class restricted athletes dieting to make weight, physique competitors in a gaining phase, physique competitors during most stages of contest prep, and for non-competitors who don't have a negative relationship with the scale.

2. With visual assessments: appropriate for physique competitors during various phases, but especially important during the final phases of prep, and appropriate for non-competitors in both internal-cue guided cuts (see Behavior and Lifestyle) and gaining phases.

3. With performance: appropriate for everyone at various phases, from non-competitors to physique athletes, to strength athletes. Depending on the goal there should be specific trends in either absolute or relative strength. When these trends don't occur, it's an indication a change is needed.

4. With body circumference measurements: appropriate for fat loss goals as an adjunct or a replacement to scale weight measurements. Useful if you have a negative relationship with the scale, showing progress where muscle gain and fat loss is simultaneously achieved, and also typically shows smaller changes more reliably.

But first, before we dive into these three methods, let me address the question you already have: "What about x, y, or z method of body fat testing?" Good question, glad you asked it. Let's dive into the pitfalls of body composition testing and why it's not logistically feasible nor helpful in 99% of client cases.

Issues with Body-Fat Testing

Assessing body fat is often considered necessary for body composition related goals because quite logically, body-fat testing can be used to assess if an intervention has been successful in the goal of body recomposition. However, there are a number of considerations that make these tests much more useless than you might realize. For one, many of the "gold standard" methods of body composition analysis such as DXA and, previously, underwater weighing, have substantial enough error rates that they lose utility at the individual level (they are great for studying groups of people though). When properly done, a DXA assessment can't typically get below a ± 2% error rate for repeated body fat percentage assessment within the same individual [1]. Thus, a measurement of 10% body fat is actually a measurement of 8–12% body fat...and that's the best-case scenario when the test is conducted by an experienced lab technician using research-grade equipment, standardized protocols, and if the person being assessed does everything in their power to replicate previous testing conditions.

Meaning, an athlete who solicits an assessment from a tester with limited experience using commercial grade equipment, who doesn't ensure that subsequent tests are performed at the same time of day, in a similar proximity to training (of a similar volume and intensity), under similar dietary conditions, with a similar hydration status, and at a similar phase of the menstrual cycle for females, could easily be looking at a ± 10% variation [2]!

So let's put this into context so you understand why getting a DXA scan regularly is at best not informative and at worst, potentially damaging as it can make you think progress is or isn't happening, when the opposite is true.

Interestingly enough, one of the most reliable forms of body-fat assessment is skinfold analysis by a trained anthropometrist. While you often hear that skinfold analysis is one of the least reliable forms of body fat assessment, this is only partially true. Skinfold assessment validity and reliability all depends on what you do with the skinfold assessment data. If you were to take the skinfold thickness values and plug them into an equation with other anthropometric values to estimate body-

fat percentage, you're looking at hugely variable and largely useless information.

For example, I have unpublished data from a study I conducted on 13 male lifters [3], and plugging the same baseline skinfold values of those lifters into three different equations results in an average body fat percentage of either ~10, ~15, or ~20% for the group. However, if you simply use the sum of skinfolds alone, it is actually highly reliable when assessed by a trained anthropometrist.

A skilled assessor should have an error rate of less than 5% on each skinfold measurement [4]. That means that if your sum of six skinfolds was 80 mm, if you were immediately reassessed by that same assessor, the second sum would be within 76–84 mm. This level of reliability allows an athlete to be assessed semi-frequently (say, monthly) to see if skinfolds changed more than 5% (or less, in the case of highly skilled assessors), which would indicate a true change.

Unfortunately, people often don't like this data because they can't conceptualize what a sum of skinfolds means in the same way they can a body-fat percentage, and it makes it harder to compare themselves to an actual or imagined norm. However, a body-fat percentage is largely useless information anyway (yes, you read that correctly). If you care about how you look, or if you are a physique competitor, you aren't going for a number; you're going for a look.

Likewise, if you are a performance athlete, you should focus on determining the "sweet spot" in terms of body fatness that allows you to be sustainably (key point) at your best both mentally and physically, as this will result in the best long-term (another key point) performance outcomes.

To know this, you need reliable data to correlate to your best performances over time, and body impedance, DXA, underwater weighing, and Bod Pod all fail the test on an individual level if you want to get tested with any regularity. In fact, the raw sum of skinfold values is by far the most reliable out of all methods. Unfortunately, finding highly trained (you'd want to find someone certified by an organization called "ISAK") assessors in your area is rare, costly, and these are insurmountable barriers to 9 out of 10 people in my experience as a

An aside on why regular DXA scans are a bad idea: Let's say you found a good DXA scan service, and you did your part to get scanned in similar conditions. I'll be generous and say you get the error rate down to ± 5% in this hypothetical. Now let's assume you are following the guidelines in this book, and you're losing ~0.75% of your body weight per week (middle of the 0.5–1% recommendation). If you are a 154 lb (70 kg) individual, you're losing 1.1 lb (0.5 kg) per week. If you start at 20% body fat, that's 30.8 lb (14 kg) of body fat. So each week, if you lose pure fat mass, you lower your body fat percentage ~0.3%. If you could wave a magic wand and lose only body fat, you'd lose 1.2% body fat every 4 weeks. Let's say that magic wand also gave you perfect knowledge of your body fat percentage at each time point; if so it would tell you this:

1. 4 weeks in: body fat 18.8%
2. 8 weeks in: body fat 17.6%
3. 12 weeks in: body fat 16.4%
4. 16 weeks in: body fat 15.2%

Now, here's what that DXA scanner might have reported with an error of ± 5%. To get this, I used the Google random number generator and just added "5" to either side of the above four values. Then, I did this four more times, generating numbers between 0–9 to get the decimals for each value since it only generates whole numbers. These are what I actually got:

1. 4 weeks in: DXA body fat 23.1% (actual 18.8%)
2. 8 weeks in: DXA body fat 17.4% (actual 17.6%)
3. 12 weeks in: DXA body fat 18.7% (actual 16.4%)
4. 16 weeks in: DXA body fat 10.8% (actual 15.2%)

As an athlete, at the start you'd think, "Damn, I got a little higher in body fat than I'd thought!" Then after the second weigh in you'd be stoked with your progress. After the third weigh in you'd be devastated and you would make an unnecessary adjustment. Meaning you wouldn't have even gotten the same outcome in week 16. But, let's just say you did, how would you have reacted? You'd think that whatever unnecessary change you made was not only necessary, but amazing! Possibly years later, you might still be incorporating this unnecessary and likely overly restrictive modification to your diet to "optimize it for your body", when in reality everything was fine the whole time.

coach. More importantly, you can get perfectly actionable data using the four methods of assessment I mentioned at the start of this chapter.

Assessing Scale Weight Change

As I've already mentioned in Mindset and Materials, and as I'll bring up again in the Behavior and Lifestyle chapter, for some there is an emotional cost to self-weighing. It can become the barometer for whether the day is good or bad. However, if you are a weight-class restricted strength athlete or a physique competitor in the early stages of prep, it is also a necessary and valuable tool that you will have to find peace with. For others though, different methods for assessing progress (listed in this chapter and discussed in Behavior and Lifestyle) should be considered.

Understanding what the scale can and can't tell you is part of that process of finding peace. For one, remember back to Level 1. In order for you to truly see a change in fat mass of a pound in a single day would require a deficit or a surplus of ~3500 kcal. So unless you ate 5000-7000 kcal, or ate nothing and went on a run, you can be almost certain that the day to day up and down fluctuations in your body weight, which often meet or exceed a pound, are due to changes in water weight and food bulk in the gut.

While this might provide peace of mind, it also presents a challenge given you want accurate data and to not be chasing water-ghosts and making unnecessary diet changes.

The key to effectively using the scale is to weigh-in at least three times per week (and if only three times per week, once on a weekend day), and to follow these guidelines when doing so:

1. Weigh yourself immediately upon waking, after going to the toilet (if you need to).

2. Place your body weight scale on a flat, hard surface (not a rug or carpet), then weigh yourself nude.

3. Record this weigh-in in an Excel spreadsheet or simply write it down.

4. Remind yourself that it doesn't matter at all what you weighed today, this is just data you are going to observe over time.

This will provide more consistent weigh-ins, but that's just part of the "noise elimination". What we really need, is to see how scale weight changes over time. The first step is to average a minimum of three weigh-ins for the week (*daily* weigh-ins help to cut down the noise even further, are easier to remember and become habitual, so this is what I would recommend; if you don't weigh daily, set a reminder for days you do weigh-in or you'll forget, which can screw up your data). Then, you'll repeat this in subsequent weeks, and make comparisons.

For most people, I recommend looking at at least two weeks of weigh-ins before making any adjustments during a fat loss phase (e.g. not just comparing this week's average to last week, but looking at the last two weeks averages and the current week's). However, *your first week on a fat loss diet should pretty much be ignored.* In week one you'll lose disproportionately more water weight, glycogen, and see a drop in scale weight just from the reduction in total food bulk. (The same is true for those transitioning to a gaining phase.) Then, you can start to track two weeks of weigh-ins. This is typically enough time to see if you are indeed trending at the appropriate rate of body weight loss (0.5–1%/wk). However, this is not enough time for everyone.

If you are a woman who notices more erratic, or simply consistently higher weigh-ins due to menstrual-cycle related water retention, you'll need to add another week to the assessment to truly make sure you are looking at a long enough timescale to assess trends.

Likewise, when gaining and tracking body weight, you'll need a similar amount of time regardless of your sex to see the relatively smaller changes (0.5–1.5% body weight gains per month). See below at how I often set up Excel spreadsheets to provide an average of the last week's weigh-ins and then show the change compared to the following week.

7 DAY AVERAGES	Date	Weight
	5-Nov	139.4
	6-Nov	139.2
	7-Nov	139.2
	8-Nov	139.2
	9-Nov	138.6
	10-Nov	139.2
139.4	11-Nov	141.2
	12-Nov	141.2
	13-Nov	142
	14-Nov	142.6
	15-Nov	143.2
	16-Nov	143.2
	17-Nov	143.2
142.6	18-Nov	143.2
weight change = 3.2	19-Nov	143
	20-Nov	142

In the above table, the only relevant information are the averages in the left column. Again, review multiple weeks of data to see if you are on average reaching the weekly weight loss, or monthly weight gain, targets on *average* over time.

So, now you know how to accurately track and how much time to track before making adjustments. But what adjustments do you make?

First, let's talk about your *potential* initial adjustment before we address weight gain or loss stalls. As I mentioned in Level 1, ideally you track a couple weeks and use a kcal value based on real data to start your plan. However, I know many of you will not do this and will want to jump right in. As I mentioned in Level 1, that's not ideal, but that's okay so long as you know there is a good chance you'll need to adjust your diet shortly after beginning. Many people over or underestimate their activity multiplier when setting up their kcals and end up being quite far off from

an appropriate intake for their goals. However, an easy way to tell if you were way off, is what happens in the first-week. While above I said the first week of data should be ignored, I meant largely that you should ignore the amount of weight gain or loss, as it's not representative of true tissue changes. However, if you put yourself into an appropriate surplus or deficit there should be a change in weight in *the direction* you are attempting to go. Meaning, the added food bulk, sodium, glycogen storage and subsequent increase in body water when starting a gaining phase, should result in an increase in body weight when looking at your first week data. Likewise, the reduced food bulk, sodium, glycogen storage and subsequent decrease in body water when starting a fat loss phase, should result in a decrease in body weight when looking at your first-week data. If that didn't happen, you can bet you either over or underestimated your activity multiplier, and you'll need to make a significant adjustment. So if weight doesn't go up when starting a gaining phase, or down when starting a fat loss phase, recalculate your calories with an increased or decreased activity multiplier of 0.2, respectively. For example, if you set up your gaining diet with a 1.5 multiplier and your average weight didn't increase in week one, go to 1.7. For a fat loss phase do the opposite, if you didn't lose weight, go down 0.2 to 1.3.

On the other hand, if your diet was set up properly and your target rate of weight gain or loss was being achieved and you hit a stall, you'd make a smaller change to steer you back on course. An easy recommendation is to increase or decrease calories by 100–200 kcal (100–150 kcal if you have an intake under 3000 kcal, 150–200 kcal if your intake is over 3000 kcal) when you fall outside of the target rate of weight loss or gain, subtracting/adding from/to carbs and/or fat. (As a side note, miscounting calories is incredibly common, and often the cause of stalls; so as a reminder, make sure you carefully read Mindset & Materials and Behavior and Lifestyle to get a good handle on how to be accurate, and consistent.)

So for example, if you set up your diet per the Pyramid levels at 2200 kcal and you started to stall, and you went from losing 0.7% to 0.4% of your body weight as you looked back on the last few weeks, you would simply decrease your calories by 100–150 kcal. This can be as simple as reducing your carb intake by 20 g and your fat intake by 5 g (for a total calorie reduction of 125 kcal).

Here's a handy table showing you how to create small calorie intake changes with a mix of carbs and fats:

~100 kcal change	~150 kcal change	~200 kcal change
15 g carbs, 5 g fat	25 g carbs, 5 g fat	25 g carbs 10 g fat
10 g fat	5 g carbs, 15 g fat	5 g carbs, 20 g fat
25 g carbs	40 g carbs	50 g carbs

Feel free to reduce carbs or fat, or both, whichever you prefer, but be careful to not go below the daily minimums of 0.25 g/lb (~0.5 g/kg) for dietary fat, and 0.5 g/lb (~1 g/kg) for dietary carbohydrate.

Lastly, note that we're purposefully rounding to the nearest 5 g. There is no need to be more precise. The same advice holds for those of you who coach: don't make less than 5 g macro changes, it gives clients the impression they should be that precise and that < 5 g changes matter, which encourages unnecessary neuroticism.

What about cardio? That's option two, but if you recall from Level 1, you don't want your total time doing cardio to exceed half your time spent resistance training. So, you can choose this option a few times, but then it no longer is an option. In this case, a decent rule of thumb is to add a 40 min LISS session, or a 20 min HIIT session per week (only do a max of 1–2 HIIT sessions per week and remember the guidelines for low impact modalities).

Visual Assessments

Visual assessments are also helpful tools as they directly address what both physique athletes and non-competitors (often) care about. However, they are subjective and they are qualitative, so it's very difficult to know how much of a change and when a change should occur based on visual assessments. For the most part, I recommend these be taken

as an adjunct to other assessment measurements as they indicate the quality of the weight loss (i.e. body composition changes), while the scale only measures the quantity. If you are looking less and less muscular week to week, even though weight loss is going at the right rate, that might be an indication something should change.

Visual assessments for physique competitors become increasingly important as prep progresses. For example, a bodybuilder at the tail end of prep who only has 2 lb (0.9 kg) left to lose, but four weeks to lose it in, may not be able to discern if a plateau has occurred at all if only looking at scale weight (as the fluctuations may mask the loss, and there is not enough time to observe changes). You'll have to rely on visual assessments. Fortunately, when someone only has this amount of fat left to lose, small changes become much more obvious visually on a week to week basis.

So how do you get good quality visual assessments? First, don't look in the mirror and go off memory. Actually take a short video of you going through repeated poses, or take pictures. Make sure the light source is facing you, and the camera is between you and the light source. So for example, you face a ceiling light, and your significant other is between you and the ceiling light taking your picture. This will provide an honest view of your physique. Also, be consistent, each time you take pictures do it in the same lighting.

Unfortunately, the higher in body fat you are, the less obvious visual changes will be. On the flip side, the leaner you are, the more obvious they will be. So visual assessments are really only useful for informing changes when you are reasonably lean. Similar to the recommendations for adjustments based on scale weight, if you are reasonably lean and dieting, assess visual progress over 2–3 weeks. If you don't see improvements in leanness visually, make a reduction in calories in the way we previously described, or add cardio.

On the other hand, if you are gaining weight (remember muscle gain is a much slower process than fat loss), or not very lean, visual assessments really aren't that helpful for making adjustments. Consider this, if you are 80 kg at 30% body fat at the start of a diet, you have 24 kg of fat

on your body. If you lose 1% of your body weight, and it's fat, that's 0.8 kg of body fat which is only 3.3% of your *total fat mass*. However, 30 weeks into your diet when you are down to 64 kg at 13% body fat, and have 8 kg of fat on your body, losing 0.64 kg (1% of body weight) is 8% of your total fat. Visually seeing the former change is much more difficult than spotting the latter. Therefore, visual changes are not that useful until you get pretty lean.

When you diet, even when you lose some muscle, you tend to look more muscular as you get leaner. But when gaining it's the opposite. Even doing everything right when gaining weight, your body fat is going up a bit; meaning you could be getting more muscular but actually looking worse. Also, the more advanced you become, the harder it becomes to visually spot muscle gain over any reasonable time period as the gains become smaller and smaller. It can take many months or even a year before visual changes become apparent in those with some training experience under their belt. Thus, visual assessments are not really an appropriate tool for making adjustments while gaining.

With all that said, they can be used to assess progress if you are willing to assess over much longer periods of time, and if you want to use a more qualitative, "recomp" approach to physique improvement. This is useful for those newer to lifting, who are non-competitors with a lot of muscular progress yet to come. (Body circumference measurements can also play a crucial role here, which we'll cover at the end of this chapter.) In the Behavior and Lifestyle section, I'll discuss how a visually-informed diet or recomp might progress in this scenario.

With all that said, one of the most useful assessments of muscular improvement is an indirect one: assessing your gym performances.

Performance Assessments

Many people say you can't gain strength while cutting, but that's false. In initial diet stages, especially if you aren't lean to start, you can definitely gain strength. However, there is a certain time point in a diet — if you are pushing to get lean enough — where you will struggle just to maintain, let alone gain, strength. Likewise, if you are gaining weight you should

be able to meet the progressions appropriate for your experience level if your training is appropriate and your surplus is sufficient (see The Muscle and Strength Training Pyramid). If your nutrition is in order, but you aren't able to lift heavier or do more volume while in a surplus, it's probably worth re-assessing your training strategy.

The point being, if you are doing things right, and progressively overloading your muscles, adaptations should occur. While strength is not simply a product of muscle size (in fact muscle size is just one of many contributors to strength), with continued improvements in strength and strength-endurance capacity (ability to perform more total work with challenging loads), a trained lifter with stable technique can be pretty sure that some muscular changes are occurring. Thus, seeing progress in the weight room is a primary variable of interest (even if you have aesthetic goals), as you advance in training age since muscle mass gains become increasingly less visually apparent.

When I monitor a physique athlete, I want to see a rate of weight loss a little closer to 1% versus 0.5% per week, strength gain, and a gradual (but not readily apparent) improvement in appearance in the first third of prep.

In the second third of prep, I still look for weight loss, but closer to 0.5% versus 1% per week, I push to maintain strength and volume capacity, and I begin to look more at visual changes.

Finally, in the last leg of prep I look primarily at visual changes, and just hope to mitigate losses in gym performance as much as possible (at least until we start eating up — a concept we'll discuss in the Peaking chapter), with the scale being secondary to how the athlete looks week to week.

For the strength athlete who is going up a weight class or in the fat loss phase of making weight weeks prior to competing, I pay even more attention to performance. Specifically for those changing a weight class, I pay attention to how their *relative strength* (IPF, Wilks, Sinclair score, etc.) changes as their weight goes up or down. For an in-depth discussion of this, check out Peaking for Competition, but more or less, if weight loss is going the way you want, but performance is tanking for a powerlifter (or weightlifter), you should probably slow weight loss down to closer to 0.5% per week vs 1% by making calorie increases

until they are losing slower.

In addition to the scale, visual, and performance-based assessments of progress to subsequently inform adjustments, you can also self-assess body circumferences if you know how to do it properly.

Body Circumference Assessments

Why Bother Measuring at All?

When it comes to goal setting, it is imperative that the outcome is measurable if we are to gauge success, correct our course of action if we fall short of our targets, and stay motivated to keep executing the actions we need to take to achieve them. This is true of all things in life, physique change is no exception.

For those newer to lifting, who are non-competitors with a lot of muscular progress yet to come, body circumference measurements are an invaluable tool to assess progress. This is because scale weight changes alone will not tell us what portion is muscle versus fat mass change.

Progress with lifting leaves clues that muscle growth has taken place, but it does not give a concrete measure like a tape can.

Non-overweight (or underweight) 'skinny-fat' people (again, not a fan of the term, but just to help you understand what I mean), who I recommend neither enter a purposeful gain nor cut phase (see 'Should I Gain or Should I Cut' in Level 1) may experience little change in scale weight, despite simultaneous muscle growth and fat loss happening. When you consider that visually, the changes can be hard to discern in the short term, tracking changes in stomach measurements provides a tangible 'proof of progress' which can give a much needed motivational boost.

Non-advanced overweight trainees can also expect significant muscle gain while dieting. However, as the rate of fat loss will outpace muscle gain, this can be hard to measure also when using scale weight alone. In this case, the fact that the chest/back and limb measurements have been 'unusually well maintained' (though the circumference will usually drop overall, as fat is lost in all areas of the body) gives us clues that

muscle growth has happened.

Also, for those at the tail end of a cut, it can be hard to visually see changes in the lower abdominal fat, especially lower back fat.

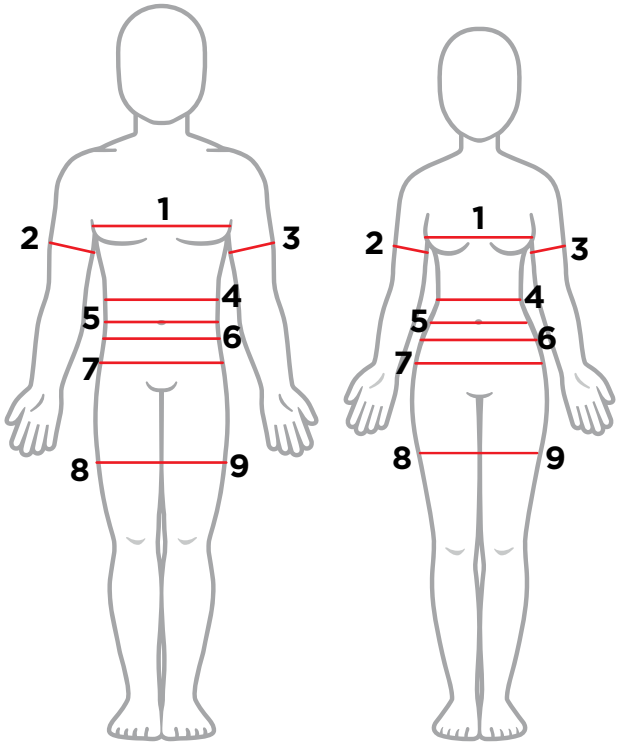
Lastly, body circumference measurements can provide a tangible figure to assess individual body part growth season to season, assuming that body-fat levels are approximately the same when drawing the comparison.

How to Measure

I recommend that you measure in nine places: the limbs, chest (which covers your back), hips, and three places on your abdomen (stomach). Practice until you can get nearly the same reading three times in a row at each site. The reason I recommend three stomach measurement sites is because fat loss tends to happen from the top down.

WHERE TO TAKE BODY CIRCUMFERENCE MEASUREMENTS

1 - Chest
2/3 - Arms
4 - 2" Above Navel
5 - Navel
6 - 2" Below Navel
7 - Hips
8/9 - Thighs



- Measure once per week on the same day, to the nearest millimeter (0.1 cm). Log this with your weekly weighing averages.
- Take measurements yourself. Don't make the mistake of getting your

significant other, friend, or mother to do them as there will be times when they can't, and then you won't have consistent measurements.

- Be consistent with the way you take the measurements. I find that the easiest way to do so is the following:
  - Stomach: Tense it like you're about to be punched. Don't suck in or push your belly out. Instead of measuring "2 inches" above or below the navel, just use three finger widths.
  - Legs: Stand straight, tense them. Measure at the thickest point.
  - Arms: Curl your arms like you're showing off your biceps and measure the thickest point.
  - Chest/back: Take a big breath in, tense your chest and lats. Have the tape at the nipple line (this may not be appropriate for all women depending on your shape, under the armpit can work too). This can take a little practice to be consistent with as the tape can get stuck at an angle behind your back.
  - The pressure with which you tighten the tape will alter the readings, so I would recommend you get a tape with a self-tightening mechanism like the one pictured below. These tapes, regardless of brand, have a tendency to break easily at the end where you insert it back into the handle, so be gentle with them.

TAPE MEASURE WITH A SELF-TIGHTENING MECHANISM

How to Interpret Your Measurement Data

As I like to remind my clients, you should be looking for the minimum confirmation that you're progressing as planned, not any single point in the data that suggests you aren't. The data points we take will all fluctuate, so be careful to not get too excited (or upset) by any fast changes.

Here are some guidelines:

- As with scale weight changes, it is not uncommon for some weeks to show little difference in the measurements, so be sure to look at the trends over time.
- A 2–2.5 cm drop in stomach measurements in at least two of the measurement sites roughly correlates to a 4 lb decrease in fat mass. This will not be the case for all people at all times so don't overly focus on it.
- When at around 15% body fat (23% for women) or lower, stomach fat comes off the upper abs first, so you'll see the mid and upper-stomach measurements drop before the lower ones. When bulking the reverse will happen.
- For many, but not all women, the last bullet point may not apply as often more body fat is stored in the legs. Thus, watching drops in thigh circumference can be as useful for showing progress as stomach measurement drops can be for men.
- At the tail end of your cut, you may notice little (if any) change in the upper two stomach measurements, nor any visual change of the abs, yet the lower measurement will decrease. This is indicative of lower back fat being burned off, which can be hard to objectively gauge visually.
- Don't forget that you store fat on your chest, back, and limbs. So, if these measurements decrease when you are cutting, it doesn't necessarily indicate muscle loss.
- Conversely, all your measurements will increase when bulking and unfortunately, this will not all be muscle gain, there will be some fat.
- Maintenance of the chest and limb measurements while stomach

measurements are declining, is almost certainly indicative of muscle gain.

- If your weight suddenly increases (which it will on occasion), even though logically you know this can't be fat, you can often use the stomach measurements to reassure you. The stomach measurements will show less comparatively because the rise in weight will be due to glycogen and water changes, which are spread throughout the whole body (mostly the muscle tissue) rather than localized to stomach fat.

So, what kind of difference can this make?

The new trainee without much muscle but with a higher than average body fat who experienced no weight change in the last 6 weeks, may experience their pants getting a little looser while their lifts go up. However, without measurement data, they have nothing tangible to 'hold on to' and they may be concerned whether they are actually making any real progress.

However, if they were to look at body circumference data, they may see that their stomach measurements are down by 3.0 cm in all places which would be unmistakable proof of progress. While they wouldn't be able to pin certain numbers on it, using the rough heuristic discussed, they will have an idea that they've lost around 5 lb of fat and gained 5 lb of muscle. The difference in motivation and confidence this can give someone could be critical.

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PEAKING FOR COMPETITION

Introduction

Both strength athletes and physique competitors aim to be their best on game day. While the process for a strength athlete often includes a training taper (see The Muscle and Strength Training Pyramid) in order to produce peak performance, it may also include nutritional strategies to make weight. Like strength athletes, physique competitors also manipulate their diet and training; however, it is for the purpose of achieving a peak in aesthetics rather than performance and making a weight class cut-off.

In this chapter, I'll first discuss the peaking process for physique competitors, and then I'll go into the process of making weight as a strength athlete. The first section will be a discussion of "peak week" as it's known in the physique competitor community, and the second section will discuss whether a powerlifter (or weightlifter) should be cutting weight at all, and if you should be, how to consistently succeed without harming your performance on the platform.

This is a long and particularly geeky section with very detailed examples. If you don't compete, consider skipping to the next section titled, The Recovery Diet.

Peaking for Physique Competition

The final manipulations to achieve peak condition in bodybuilding competitions are made in the final week typically, and most commonly they include carbohydrate loading, water, and electrolyte manipulation, the performance of glycogen depleting resistance training, and the cessation or reduction of cardio and very hard training — often leg work. These adjustments are made in an effort to maximize muscle volume and minimize subcutaneous water retention, to improve the appearance of muscularity [1].

Before discussing peaking, I want to emphasize that 95–99% of the improvement in appearance seen at the end of a contest prep when a competitor is on stage depends on the years of training leading up to the show and the long diet immediately preceding it. Given equal muscularity and symmetry, a competitor who peaks perfectly but is

not appropriately lean, will be beaten by a shredded competitor who peaks poorly.

With that now said, I will outline the strategies that make that final 1–5% difference. However, while some of these practices are useful tools that make a small difference, many traditional practices lack a physiological basis. In fact, some of the most common practices can be potentially dangerous, actually harmful to appearance, and may be rooted in protocols only useful for athletes using pharmaceutical enhancement (if they are useful at all). Therefore, it's important to understand which approaches make sense, which don't, why, and how and when to apply them.

Carbohydrate Loading

Traditionally, 'carb loading' — the act of purposefully increasing carb intake prior to a stage appearance or sport performance — was a tool used by endurance athletes to maximize glycogen storage and thus extend the amount of time they could perform a (relatively) high-intensity effort. Since the vast majority of carbohydrate is stored in skeletal muscle, bodybuilders have taken interest in carb loading as a method to acutely increase the appearance of muscle size.

In studies of carb loading, many protocols have been employed with various effects on glycogen storage and performance. For physique competitors, the only relevant outcome is how much glycogen ends up being stored. It has been repeatedly shown that if one goes from a high-carb diet to a low-carb diet and/or glycogen depleting training protocol, and then follows that up with a carb load, they will acutely reach higher levels of muscle glycogen than previously. However, the traditional carb load used by performance athletes isn't a perfect fit for a physique competitor. Performance athletes don't care about their appearance and load with very high carb intakes in the realm of 12 g/kg (5–6 g/lb) to ensure maximal glycogen storage [2].

A carbohydrate load of this magnitude can make many athletes look worse. This is called 'spilling over'. Simply put, spilling over is the loss of definition when one eats too many carbs in an acute window. The muscles appear big and full, but the hard-earned separation and detail is

blurred as the carbohydrates that couldn't be stored (and the water they bring with them) leak into the subcutaneous (under the skin) layer [3].

However, a perfect comparison between endurance athletes and physique competitors can't be made when it comes to carbohydrate loading. Endurance athletes who perform carb loading are habitually on high carbohydrate diets, sometimes reaching levels nearly as high as how much they would load on. They also couldn't care less about 'spilling over', if anything this would be a good outcome to ensure they had stored maximal glycogen. On the other hand, spilling over has a significant impact on appearance and if severe enough, can make one look a few body fat percentage points higher. Also, physique competitors have been on a restricted calorie diet for months that almost invariably requires carbohydrate to be quite low. After a certain point in prep, most physique competitors are consuming 1–3 g/kg of carbohydrate on days that aren't refeeds. By consuming chronically low to moderate carbohydrate intakes and performing training that depletes glycogen, physique competitors simply won't have the same storage capacity as performance athletes at the time they perform a carb load.

Glycogen storage is not like a gas tank. If you run a car with a 10-gallon tank for 6 months with the tank filled between 3–6 gallons at all times, the tank will still be able to hold 10 gallons at the end of that six month period. In a human being, the glycogen "gas tank" storage capacity will effectively decrease in size as enzymes downregulate over the course of prep from being on a reduced carbohydrate diet. For this reason, to avoid spillover, carb loading is best prescribed as a relative value to the amount of carbohydrate consumed during the diet, rather than as an absolute value relative to body mass. This way, the carb load is more predictable as the amount you are loading is similar to what you have consumed over the course of the diet, and scaled to your insulin sensitivity and gut tolerance.

While 99% of the studies on carb loading have been performed in endurance athletes or using endurance-based measures of performance, a 1992 study examined the effect of carb loading on muscle size in men, in an attempt to replicate the practices of bodybuilders [4].

Interestingly, no significant increase to muscle girths were found as a result of loading. However, this study did not replicate the state bodybuilders are in at the time of carb loading. The average body-fat percentage of the male subjects was 10%. While lean, this is 2–3% higher in body fat than even male bodybuilders coming in not lean enough, and competing "off their game". Also, this carb load wasn't done at the end of contest preparation period that produces chronic glycogen depletion. This study also used a high-fat, low-carbohydrate diet of equal calories to maintenance for the depletion period, which wouldn't be nearly as depleting as a low-calorie and low-carbohydrate energy deficit, which would be representative of the diet bodybuilders consume coming into peak week. As a final note, a lack of change in muscle girths doesn't necessarily mean that there wasn't a visual change. To truly assess the effect of a carb load on appearance, bodybuilding judges blinded as to whether or not the carb load had been performed scoring the participants or their pictures would have been needed.

Would the results have been different had the study more accurately represented a real-world bodybuilding carb load? To answer this question we can turn to observational studies. In one observational study of bodybuilders who were performing carb loading as a part of their pre-contest preparation, an increase in biceps thickness was observed the day prior to the competition. At the end of contest preparation, muscle growth is very unlikely to be occurring. Thus, the increase in thickness was quite possibly a result of carbohydrate loading [5].

While anecdotal, I can say with confidence from my years of coaching experience that carb loading does seem to have an impact on appearance. The potential impact can be positive if you are able to load to the point of fullness, and harmful if you load past that point and spill over. The strategies utilized to achieve this ideal state can be divided into two main approaches: 'front loading', and 'back loading'. The difference is the timing of when the carbs are loaded in the week leading up to the competition.

In front loading, there is a load earlier in the week, then it tapers down, and then you load again in the day(s) prior to stepping on stage. In back loading, there is only one load in the day(s) prior to stepping on

stage. Both protocols can be successful, and both protocols have their place given the circumstances. However, before I go into either, I want to discuss the importance of what is known as “eating up into a show”.

Eating Up into Your Show

Typically, deficits get more severe, cardio volume goes up, and competitors try to “sprint to the finish” to get the last bits of body fat off to achieve true stage condition. Unfortunately, from both a psychological and physiological perspective, you are in a terrible position to "sprint" the further you get into a contest prep.

In an ideal world, you’d actually be as lean as you need to be 3–4 weeks out, so that you could spend those 2–3 weeks before peak week decreasing cardio, increasing food, and subsequently improving your energy availability status, digestive capacity, glycogen storage (and storage capability), training quality, hormonal profile, overall physiological and psychological stress, metabolic status, and regaining some lost muscle. Besides the obvious benefits, doing all of the above has the added benefit of making your body much more predictable when it comes time to carb load. Additionally, ‘eating up’ takes care of many of the improvements in appearance you are trying to achieve from peak week before peak week even rolls around.

How do you do this? Honestly, it’s easier said than done. You have to start your diet early enough, know your physique well enough, and push hard with a focus on specifically getting ready before your deadline. While it is the ideal scenario to be able to eat up, it is often only pulled off by experienced coaches and competitors. With that said, the way to do this is to get shredded 3–4 weeks out, and then start making ~10% increases in your carb and fat intake each week, while dropping a cardio session each week as well, so long as you notice your physique doesn’t get smoother. If you backslide, then you have to pull back to lower numbers and maintain more cardio.

So, for example, let’s say you achieved shredded condition (or very near it) four weeks out at the following numbers (P, C, and F stands for protein, carbs, and fats, respectively):

- **Low days:** P: 150 g, C: 100 g, F: 40 g.
- **Refeed days:** P: 150 g, C: 150 g, F: 40 g
- **Cardio:** 4 sessions of 45 minutes LISS per week

For the next three weeks, you'd increase carbs by 10 g, fat 5 g, and drop one day of cardio per week. Such that after three weeks when you are one week out, set to start your peak week, you'd be at the following numbers:

- **Low days:** P: 150 g, C: 130 g, F: 55 g.
- **Refeed days:** P: 150 g, C: 180 g, F: 55 g
- **Cardio:** 1 session of 45 minutes LISS per week

In an absolute sense, this may not seem like a lot, but remember this example would probably be a 120–130 lb competitor for one, and you can feel very small changes when you are beat up and depleted at the tail end of prep in shredded condition. An additional 15 g of fat and 30–45 g of carbs per day, and three days less of cardio per week will result in a much healthier, fuller, and tighter looking physique, which, as we'll discuss in the next section, can really aid your peak week to come.

Carbohydrate Back Loading

This carb loading strategy is straightforward and it is the appropriate approach to use in two specific scenarios. The first scenario is when you want more time to diet. A front load means five or more days out of a deficit, while a back load only takes one or two days. If you are competing early in the season, aren't quite at the peak of your conditioning and have other shows scheduled in the next few months, a back load can be a good compromise. You can improve appearance on competition day while also not losing diet time.

It may seem like a difference of a week is inconsequential, but the difference between 4% and 5% body fat in a male or 13% and 12% body fat in a female can be the difference between first place and fifth place in a tight show at the highest levels. Considering that's only 1–2 lb depending on your weight class, you can see that an extra week of

dieting can, in fact, make a difference in some cases.

So, if you decide that either in the contest you are about to compete in, or in the rest of the season, that having more time to diet would be more beneficial than performing an extended carb load, the back load is the way to go. If you followed the guidelines in Level 4, you've been incorporating some type of refeed into your diet. This means you have a lot of data to use to assess how you respond to an acute increase in calories and carbs. Additionally, if you structure the timing of your refeed(s) in relation to when it will make you look the best for the show, you can completely avoid any time away from dieting. What I mean by this is if you are just not quite yet at peak condition for your show in April, and you also have a show in May, you can just move your regularly scheduled refeed(s) around to have the day you look your best fall on competition day, without changing your nutrition plan at all in terms of total calories consumed in aggregate for the week.

To do this, you need to assess how your appearance responds in relation to refeeds. Once you are reasonably lean (say at 4–8 weeks out for most people), start taking pictures of your physique and making notes in relation to the timing of your refeeds. Some people look the best on the day of the refeed, others look a bit smoother and then harden up and look better one day later, and some people need two days to reach this state. On the other end of the spectrum, some people don't look their best until after two days of back to back refeeding.

When you try to assess this, be objective. Take pictures of yourself in the same location, time of day, and lighting each week on the day of, one day after, and two days after your refeed. If you have two refeeds in a row, try a week with them split up to see if you look better with one vs. two days of loading. Don't just look in the mirror and get a feeling, look at the pictures (or better yet video) and ideally have someone else give you their opinion too.

When you're deep into prep you often focus on minutiae and the parts of your physique you want to tighten up, rather than having an objective view of your whole physique. I've seen competitors convinced they look best two days after their refeed when they look super flat and

stringy to me because they were hyper-focused on an ab vein that only they could see and not their overall physique.

After going through this process, decide which day you look the best, and once you have, simply move your refeed(s) appropriately on the week of the show so that you hit your peak appearance on show day. It's that easy.

The second, and in my opinion much more ideal scenario, is when you've had the ability to eat up into your show for at least a week, and you've had the opportunity to close the gap on your energy deficit and you are already looking noticeably fuller compared to prior weeks as calories come up and cardio goes down. As I mentioned in the eating up into your show section, when you can do this, much of the work of peak week is already done. Thus, you can simply "top off the gas tank" by doing a back load after eating up. In this scenario, you might use different values than your refeeds to refine your look more, which you'll be able to see in the back load template which follows.

Carbohydrate Front Loading

Front loading is simply taking advantage of the flexible "gas tank" analogy for glycogen storage that I used previously. The idea being, that since you have been persistently on low(er) carbohydrates, you will be able to store more if you have two peaks in carbohydrate intake with a small taper between the two. The first peak "stretches" your tank (upregulating enzymes), while the second allows you to get fuller than you could have previously. In endurance athletes, who habitually consume high-carb diets, depletion followed by repletion of carbs results in the highest glycogen storage amounts compared to just an increase in carbs without prior depletion [6]. This is essentially the rationale for having two peaks, you can achieve greater levels of fullness. Additionally, once muscle glycogen is stored, it remains relatively stable until depleted by training [7], so fullness is more consistent from the first peak in carbs helping to fill you out.

Another upside to front loading is that you have more time to correct. In a backload, if you are flat (not loaded enough) or spilled over, you have minimal time to correct. However, in a front load, you have multiple days to modulate the load if you are fuller or flatter than you

expected. For this reason, front loads are best when dynamic. Just like the suggestion of tracking your appearance in relation to your refeeds when back loading, I suggest tracking your appearance while front loading to help guide the amount of carbs you load on.

So, what is the best strategy between the two? It depends.

Back loads are much simpler, and less mentally stressful — which trust me, you want to minimize stress. Stressed out competitors often seem to look visually worse in my experience (maybe it's cortisol and water retention related, I don't know). Thus, in my opinion, the best-case scenario is getting ready early, eating up into your show, and running a back load. In my experience, when doing this everything runs much smoother, there are less moving parts (front loads change more variables), your body is more predictable after eating up, and you don't need the double peak of a front load because you aren't nearly as depleted.

The second-best option is being ready on time, but not early (which is often an unrealistic goal, especially for first timers) and running a front load. This helps you get fuller, prevents you from being flat, and gives you time to correct if things go awry.

Finally, the least ideal option is if you aren't quite ready, need more time to get lean and run a last minute back load. The main reason this is the least ideal option is because you aren't yet shredded, and typically four extra days of dieting won't correct that. But, even when it does, you're risking a lot on a single day. More often than not, the issue with a back load when you are coming into it depleted, is that you end up looking a bit flat (carb depleted).

In the end, both loads have their place, it just depends on your state coming into peak week. With that said, it isn't all about carb loading, there are other variables at play.

Water and Electrolyte Manipulation

Water retention is often the scapegoat when bodybuilders come in out of shape. Since the early years of bodybuilding competition, bodybuilders have cut water, reduced sodium, and loaded potassium in an effort to retain

hydration intramuscularly and shed water subcutaneously to enhance the appearance of muscularity. Water is reduced to minimize the amount in the body, and then sodium is reduced and potassium is loaded so that what remains, resides in the muscle cell.

The science behind this approach is the so-called "pump", whereby in animal cells a high concentration of potassium ions relative to sodium ions will move more ions and water into the intracellular space, and vice versa if there are a greater concentration of sodium ions relative to potassium ions [8].

While it is 100% true that this is how the sodium-potassium pump behaves, there are some substantial mistakes in this logic, which is why I wouldn't advise doing it.

First, when you are dehydrated, muscle water decreases as well [9], which can make you look smaller and flat. Also, intramuscular is not the same as intracellular and subcutaneous is not the same as extracellular. In fact, the vascular system is extracellular, and it is the delivery system of nutrients to the muscle. Blood pressure drops substantially during contest preparation [10], and also rises or decreases acutely in response to increases or decreases in dietary sodium [11], respectively.

What this means, is that by cutting sodium prior to getting on stage, you are giving yourself a double whammy of decreased blood pressure and not being able to get a pump. If you also cut water and decreased total body water, now you've given yourself a triple whammy of 'no-pump city'. But it doesn't stop there. Believe it or not, glucose transport from the small intestine requires sodium [12]. So you've also hampered the effectiveness of your carb load. If anything, it might make sense to load sodium immediately prior to getting on stage to keep vascular pressure high and aid your pump up [13].

Given the widespread popularity and common use of water cutting, sodium cutting, and potassium loading, despite what I've just told you, you might wonder why competitors still follow these practices.

Well, when these practices became popular, natural bodybuilding really didn't exist. Natural federations didn't come around until the 1980s and

before that oral steroids were easily and legally obtained, not frowned upon, more regularly used by bodybuilders, and despite many of these early drugs being quite androgenic (increasing the risk of hormonally mediated water retention), they were often taken throughout contest preparation.

I personally believe that is where the recommendations for water and electrolyte manipulation began. Back in the day, bodybuilders didn't have access to less androgenic drugs, drugs to control estrogen, and diuretics, which are common today. Thus, water retention may have been a big issue early on — possibly becoming such an issue that appearance was improved by using these practices.

I honestly can't say much about whether it is indeed true that these peak week strategies are necessary, effective, or harmful in enhanced competitors or not (and if they are still necessary in the modern era), because I've only peaked natural athletes. However, I can say that for drug-free competitors, I would advise against these practices. I have never personally seen a natural competitor improve their appearance with cutting water, cutting sodium and/or loading potassium. At best, I've known competitors who don't harm their physique by doing this. At worst, I've seen competitors make themselves feel terrible and degrade their appearance.

Training Considerations for Peak Week

Though the broad topic of training is covered in the companion book, this section would be incomplete without recommendations on how to manipulate training variables in the final week prior to competition.

You still want to train hard the week of the show to maintain the stimulus to the muscles to store glycogen, but you want to avoid training that causes inflammation or delayed onset muscle soreness. This could extend into game day and hurt your posing ability or hamper your muscles' ability to handle carb loading. I've seen some tight lineups where competitors are on stage for 40–60 mins, which is another reason not to cut water and electrolytes.

Remember, nothing needs to be, nor should be extreme; you've already done your homework, we just want to put the proverbial cherry on top. I would advise as follows:

- Keep training volume (number of sets) the same.
- Don't train to failure, leave at least a rep or two in the tank — don't get caught up thinking you have to do depletion workouts. Unless you're eating up into your show, trust me, you're already depleted if you got shredded.
- Shift your rep ranges to the 8–20 rep range to keep things just a tad more glycolytic.
- Don't introduce any new exercises and don't perform any movements heavily loaded in an eccentric stretched position, as they cause more soreness than others. (For example, avoid Romanian deadlifts, good mornings, or full range heavy dumbbell flyes.)
- Perform a pump-up session two days out to keep carbs directed towards your muscles, but still allowing active recovery for any lingering muscle soreness or damage.

For the pump up, I advise two rounds of 15–20 reps of light weights, think 20–25RM loads (so each set at a 5–6 RPE), in a circuit fashion. This shouldn't take more than 30 minutes. This can be performed with machines and some free weights, but you also want to be able to repeat this (minus the leg exercises) on show day prior to getting on stage, so bands and body weight can work.

Sample Pump Up Routine

1. Leg Press or DB Lunges x 15–20 (not performed on show day)
2. Machine Chest Press or Push Ups x 15–20
3. Machine or Resistance Band Rows x 15–20
4. DB or Resistance Band Lateral Raise x 15–20
5. Pushdowns or Chair Dips x 15–20

6. DB or Resistance Band Curls x 15–20
7. Body weight Calf Raises x 15–20

Use a controlled tempo, focus on the local contraction, and try to make these harder than they should be to facilitate a pump. This is just to give a little extra nudge for the carbs to get stored as glycogen, and the purpose on the day of the show is to actually get a pump and improve appearance. On game day don't complete the leg pump up unless you have a track record of this helping your appearance. You'll be on your legs all day and they will be getting plenty (too much) stress from holding posing, so pumping them can be overkill and can cause fatigue and cramping.

Putting it All Together: Sample Peak Week Strategies

PEAK WEEK (BACK LOAD SAMPLE TEMPLATE)						
Days out	**Carbs**	**Sodium**	**Water**	**Weights***	**Cardio**	**Visual assessment**
7	Low	Normal	Normal	Lower	Normal	None
6	Low	Normal	Normal	Upper	Normal	None
5	Low	Normal	Normal	Off	Normal	None
4	Low	Normal	Normal	Lower	Normal	None
3	Low	Normal	Normal	Upper	Normal	AM (baseline)
2	110% refeed	Refeed norm	Normal	Pump circuit	Off	PM
1	70–90% refeed	Refeed norm	Normal	Off	Posing	PM
Show	**60–100% refeed based on appearance. Eat every 2–3 hrs with half of the day's meals eaten prior to prejudging, half prior to finals. Consume 1 g (half a tsp) of added sodium per 1000 kcal immediately before pump prior to getting on stage. Drink water to thirst.				Off	AM

PEAK WEEK (FRONT LOAD TEMPLATE SAMPLE)						
Day	**Carbs**	**Sodium**	**Water**	**Weights***	**Cardio**	**Visual assessment**
7	Low Day	Normal	Normal	Lower	Normal	None
6	Low Day	Normal	Normal	Upper	Normal	None
5	Low Day	Normal	Normal	Off	Normal	AM (baseline)
4	110% refeed	Normal	Normal	Lower	Normal	None
3	Low/ refeed average	Normal	Normal	Upper	Normal	None
2	90% low/ refeed average	Normal	Normal	Pump Circuit	Off	PM
1	85–105% refeed	Normal	Normal	Off	Posing	PM
Show	**60-100% refeed based on appearance. Eat every 2-3 hrs with half of the day's meals eaten prior to prejudging, half prior to finals. Consume 1 g (half a tsp) of added sodium per 1000 kcal immediately before pump prior to getting on stage. Drink water to thirst.				Off	AM

**Your training schedule might be different compared to what's listed, but finish last hard training session 3 days out. One day prior go through a full body pump up routine, with legs included (you'll skip legs on game day though), and do a hard posing practice session 1 day out.*

***Maintain refeed days dietary sodium, then have added sodium (yup, just shoot it with water, yes it's gross) prior to stage. A good guideline is 1 g (~half a tsp of table salt) per 1000 kcals consumed up to that point, but it's best to test your response in prior weeks to ensure it improves appearance.*

In both of the loading templates, training (both cardio and weights) in the week prior to competition is slightly adjusted.

Keep your fat and protein the same throughout peak week for simplicity, and maintain your normal sodium and water intake that you are habituated to when it says "normal" in the template.

Carbohydrate Manipulations

Keeping these variables constant means you focus on carbs. You'll notice carbs are listed as either "low" (normal dieting days), "refeed", or the average of your low and refeed days, or as a percentage of those days. So,

- If on non-refeed days you consume 120 g of carbs, that's what you'll consume when it lists carb intake as "low";
- If you refeed on 200 g of carbs, and the intake says 110% of refeed, you'll consume 220 g of carbs;
- If it says 70–90% of your refeed, you'd consume 140–180 g of carbs; and
- If it's the percentage of your low day and refeed average, you'll add your low day and refeed together, divide by two, and then use a percentage of that etc.

To determine what intake you would choose when given a percentage range, base this on visual assessment. These visual assessments should be pictures or video in the same lighting.

Use the first day noted in the visual assessment column as your baseline to compare everything to. For the '2 days out, PM comparison', assess how you look relative to baseline with most or all of your meals consumed. This will tell you if you are fuller and harder, or slightly 'spilled over', or perhaps even still a little flat, and you use this info to dictate your carb intake the following day (1 Day out). If you are slightly spilled over, the next day should be toward the lower end of the sliding scale. If you are full and hard, the next day should be in the middle, and if you are still

a bit flat, the high end of the spectrum. Repeat this assessment one more time in the evening 1 day out with one meal remaining for the day. Ideally, you are now full and hard, but if you are slightly flat or spilled over, you are still ok. Adjust your final meal to land somewhere along the sliding scale based on whether you are flat, full and hard, or spilled over a touch. On the day of the show you'll assess once again, and also use a sliding scale based on this assessment.

An aside – Peaking Simplified: If all of that really confused you with how to modulate your carb load, I've found you can drill it down to a single decision in ~80% of cases: how you look the night prior to the show.

As an online bodybuilding coach, I've found that the ability to get good pictures or video from my athletes on game day is often not possible. Due to travel, poor WiFi, different lighting, or a competitor already overwhelmed by all the things they have to think of, a good visual assessment that I can reliably use is often not an option on the morning of game day. Fortunately, I've found that if a competitor looks just slightly spilled over the day before the big day, I can reliably advise them to have a moderate carb intake (often the average of a refeed day and their low day) on game day, and they will clean up their minor spill overnight, and end up looking just right, or close to it on stage.

Meal Timing on the Day of the Show

In most show formats, you get on stage twice, once for prejudging and once for finals. So, decide how much you are going to eat, and then divide your food equally between the two shows. To help with digestion and glycogen storage without slowing down gastric emptying with larger meals, I advise at least three meals be consumed before pre-judging, with 2–3 hours between each meal [14], the last meal coming 1 hour prior to the stage. This may mean you have to wake up very early. If you get on stage at 8 am, your last meal needs to be at 7 am, and your meals before that need to be at 3 am and 5 am. Yes, you can

go back to bed after your 3 am meal (if you were able to sleep at all). Most people look better in the afternoon after they've had a few meals in them; however, prejudging is in the morning, so by waking early to start consuming meals we are attempting to correct for this.

Assess yourself at prejudging, if you went into the day thinking the low end of the recommended range would be the right amount, but notice you are flat at prejudging, increase the total days intake closer to the top end of the range and whatever is remaining distribute it between your remaining meals before you hit the stage for finals (again consuming meals every 2–3 hours with the last meal 1 hour before stage).

If your show is one where you have a single stage appearance, which means you typically get on stage in the afternoon, you'll eat 1–2 more meals before you hit the stage the first time compared to a prejudging and finals format show. Fortunately, you will typically fill out better. Your total food loaded for the show will often be less to achieve the desired look because you aren't on stage twice, but you'll get more food in before you hit the stage the first (and only) time.

Water and Sodium

Continue to drink a normal amount of water, don't under or over consume on the day of the show. Have sodium immediately prior to pumping up. I advise just putting this in water and shooting it — nasty, but it's over fast. There is 2.3 g of sodium in a teaspoon of table salt (table salt is sodium chloride, not just sodium), and I recommend 1 g of sodium per 1000 kcals of your total daily intake on show day prior to both stage outings. So, let's say you are consuming 45 g fat, 250 g carbs, and 150 g protein on show day. That's 2005 calories, so you will take in 2 g of sodium *before* both prejudging and finals, yes that's in addition to whatever sodium is in your normal diet. In most cases, this will improve your fullness, but not always. Fortunately, I've seen that in 90% of cases it definitely won't harm your appearance. That said, better safe than sorry, try this a few weeks out and see how you respond. Some people respond great to sodium loads, others don't have much of a response. Once you have a track record from testing a few weeks out, you can adjust for game day.

A final note on show day, consume foods that are low in fiber, and focus primarily on starchy carbs that you are used to consuming that don't bloat you. We want carbs that can be readily converted into glycogen and won't stress your digestive system. Peaking is about not changing much. Your carb intake should consist of foods you're used to and keep sodium and water similar to levels you're used to throughout the week so that the sodium load on the day of, is actually a relative increase. If you switch to carb sources you haven't eaten in months, let your sodium and water vary wildly throughout the week, or over or under drink water on show day, you can erode the efficacy of the plan. Also, if you didn't keep your variables consistent, and things go swimmingly well, you won't know how to replicate it the next time. Likewise, if things do not go as planned, you won't know exactly what went wrong to correct for next time.

Nutritional Considerations for Making Weight

Powerlifting and weightlifting are weight-class restricted sports. Outside of the "super heavyweight" categories where everyone above a certain cut-off is grouped in the same weight class with no upper limit, you compete in a class based on upper and lower bounds of body weight. Many competitors, therefore, manipulate their body weight to fall within a specific class, often through a combination of chronic weight loss from dieting, and acute weight loss primarily through (but not limited to) reductions in body water.

Generally, fitting into the weight class where you have the greatest power-to-weight ratio (i.e. the combination of the most muscle mass at the lowest body weight) gives you a competitive advantage. However, that doesn't mean everyone should cut weight. Likewise, some individuals try to gain weight to reach a higher weight class where they believe they might be able to carry more muscle and be stronger. So, how do you know when it's appropriate to go down, or up a weight class?

When is it Appropriate to Change Weight Classes?

Dictated by height, bone structure, and body fat settling point, most non-novice, drug-free lifters are suited for three potential weight classes.

For those of average body fat, there is the class they can cut to, the class they settle at normally, and the class they can eat into. However, some people fall right on the cusp of a weight class. This limits them to two realistic classes; one they can do an acute weight cut to make and the one they settle at, and two classes they can work very hard to reach; one requiring a long-term diet and substantial weight loss, and one requiring a long-term gaining phase and substantial weight gain. But, just because you have these options doesn't mean they are all equally beneficial options.

Novice lifters or teenagers who aren't done growing, shouldn't intentionally change classes. Those still maturing or experiencing novice-gains are not yet at their "trained" adult weight. Dropping a class can hamper strength and size development and maturation for teenagers [15]. Also, weight gain will come naturally without force-feeding to a higher class, so yes, a teenager should be going up in weight but they shouldn't be trying to; this should just be a function of growing like any other kid.

Intermediate powerlifters should also think carefully before dropping down. Often, these lifters are on the cusp of impressive numbers, just shy of being among the elite. However, going from 'good' to 'elite' is a longer journey than going from novice to good. It is tempting to think, "If I maintained my numbers and dropped a class I would be elite!" While true, this often isn't realistic or sustainable. Intermediates will benefit from being patient and putting in the required years to get stronger. Dieting and holding a lower body weight makes this journey slower and sometimes simply not possible.

Truly advanced lifters are probably the only competitors who should consider cutting weight for competition. If you get the opportunity to compete at an international competition by making a lower weight class, or if you might get a shot at winning an international title, that is certainly a reasonable time to cut weight. If you are not yet at this point, just enter your competitions without worrying about body weight and just compete to improve your previous best total. You can worry about cutting weight once you actually have a reason to do so.

Now, if your normal body weight is, say, within ~1–2% of reaching the next lower weight class, you could certainly do some very short-term manipulations to your diet over 2–4 days to make weight without much hassle. I think that's fine regardless of your experience level, you really just want to avoid significant, long-term energy deficits when you're still coming up as a lifter. Why? Well, let me explain the pros and cons of dieting:

The Pros and Cons of Dieting to a Lower Weight Class

If dropping a class is appropriate, you should still consider the pros and cons before doing so.

Pros:

- Improved physical and mental health for lifters high in body fat.
- Increase in relative strength (IPF, Wilks or Sinclair coefficients) if done correctly.

Cons:

- Likely a drop in absolute strength if dropping a full weight class if not high in body fat.
- Potentially no change or slight decrease in relative strength if done incorrectly.
- Time away from creating an optimal environment for strength gain.
- Mentally, physically, and socially stressful to diet.

Essentially, dieting to a lower class is a stressful departure from an optimal training environment. Thus, it is common to hear lifters discourage dieting and sometimes with hyperbole. I regularly hear it stated that it is impossible to gain strength or muscle while losing weight and difficult even to maintain it. On the other end of the spectrum, I have heard a coach say, "Most lifters are two classes lighter than they should be." These overstatements on both ends of the spectrum lack context, are too black and white but aren't *completely* false. Those higher in body fat can carry more lean mass [16]; sumo wrestlers carry more lean mass relative to

height than even offseason competitive bodybuilders [17]. Also, strength and muscle loss can [18], but don't always [19] occur while dieting. But, like sumo wrestlers, not everyone is built to be a super heavyweight powerlifter and just because you might be able to maintain strength in the short-term cutting a weight class, doesn't mean that it won't hamper your long-term ability to get stronger.

To sum things up, you should really only be doing an extended diet to drop a weight class (acutely cutting 2% of your body weight or less is a different story) if you are a high-level lifter and doing so would give you a realistic shot at a national or international record or title, or qualify you for international competition.

But what about going up a weight class?

Well, greater levels of muscle mass are highly associated with being stronger and having greater competitive success in powerlifting [20]. Meaning, progressing in your powerlifting career should come with hypertrophy. For those who began with low to moderate levels of body fat, this will often mean going up 1–2 weight classes over one's career. How much weight you gain and thus, how many classes you end up competing in over the course of your career also depends on what age you began competing, and your genetic propensity for putting on muscle. Lastly, it also depends on whether you tend to be stronger when higher in body fat, or whether that doesn't seem to make much of a difference for you, and also whether or not you can train effectively and gain strength when you are lower in body fat or not.

On the other end of the spectrum, if you got into powerlifting at a higher body fat and it slowly comes down over time, you might end up losing more fat mass weight than the weight of muscle you gain, and could move down the weight classes. What I'm getting at is that it is quite individual as to whether going up a weight class will occur, and if it does, whether or not it will be the ticket to unlocking greater relative strength and thus, being more competitive.

So, if you are starting at a low to moderate body-fat level, certainly give gaining at the rates recommended in Level 1 a shot. I specifically bring up the rates recommended in Level 1 here because many powerlifters make

the mistake of thinking, "I should be going up a weight class" — which might be a correct assertion — but then think they need to go up a weight class *by their next competition*. This is a big mistake if that competition is not far off. For example, going from the 57 to the 63 kg class or the 83 to the 93 kg class is roughly a 10% increase in your body weight.

As you know from Level 1, an intermediate lifter should achieve this in approximately 10 months. Don't rush to be at the top of your target weight class in a competition just weeks or a few months away, take your time. Growing into a new weight class shouldn't happen overnight, there is nothing wrong with doing a few comps at 58–62 kg or 84–92 kg while you're still "under construction". Trust me, gaining a bunch of extra fat mass won't help your strength much in most cases, but it might make you unhappy. So take your time going up a weight class, don't go faster than the 0.5–1.5% of body weight/month guidelines in Level 1.

Also, track your relative strength to gauge the effectiveness of your efforts to move up or down a class. Whether you estimate your current total with AMRAP-based 1RM estimates, RPE-repetition relationships (e.g. a single at an 8 RPE) or actual 1RM testing, you should know your estimated total with relative accuracy most of the time. Normally, you're probably just focused on getting stronger in an absolute sense; however, while changing weight, relative rather than absolute strength is what matters. So, focus on your IPF, Wilks or Sinclair coefficient. You can easily determine this by Googling the appropriate relative strength equation and then entering your current estimated total, and your current body weight.

It's a good indication that if relative strength isn't trending up over time while dieting (regardless if absolute strength is decreasing) or while gaining weight (regardless if absolute strength is increasing), that perhaps your training or nutrition is off-base or you simply shouldn't be changing classes in the first place.

Making Weight

Everything in the book leading up to this section was dedicated to teaching you how to manage your nutrition for your strength sport.

Thus, if you fit the bill as someone who could consider dropping a weight class, you already know the long-term process of how to achieve that. However, this doesn't necessarily mean you need to diet all the way down to your weight class via fat loss. Indeed, if you are up to 5% over your target weight class, one week out from the competition, you can utilize short-term weight reduction strategies to drop the last bit of scale weight via losses of body water and the weight of gut contents.

Before we get into these strategies, let me first say that as a coach who works with drug-free lifters, 99% of my experience is with the IPF and its affiliates. Thus, the following primarily applies to 2-hour weigh-ins (after making weight you only have two hours until competition). This is why I don't advise cutting any more than 5% of your body weight in the short-term (and I prefer less). While more can be lost from acute methods, it is very difficult to put that much (water) weight back on in two hours. Making weight isn't the issue, it's getting back up to a weight conducive to performing that is the problem.

So for those who aren't quite following me, to be clear, in this final week before you hit the platform we are no longer thinking about fat loss. In the final week, the only concern is what your actual weight is when you weigh-in, and how to manipulate that in the short-term. Thus, the variables of interest at this stage are the actual weight of food relative to their energy content, body water, the weight of the contents of the gut, and ensuring a minimal impact on performance after making weight.

Reducing Gut Content

The safest way to lose weight that won't impact your performance is to simply consume a low fiber, high energy-density diet. While fiber is great for long-term gut health and it is one of the reasons why fruits, vegetables, and whole grains are considered part of a balanced diet, they also slow the digestive process and leave more fecal matter in your colon. Spending 2–4 days on a <10 g/day fiber diet can reduce the weight of the contents of your digestive tract. In addition to a lower fiber count, eating foods that are energy dense and low in weight to reach your caloric and macronutrient targets is a good idea. Instead

of having multiple servings of fruit, vegetables, whole grains and lean meats like you might during a fat loss phase, a couple scoops of whey, some candy, and chocolate would allow you to hit your energy and macro targets, while keeping the weight of food much lower. Between eating a diet that simply weighs less and reducing your gut content via a low fiber intake, you can achieve a lowered body weight without dieting or dehydrating yourself at all (often good for approximately a ~1–2% reduction in body weight depending on the individual) [21]

Reducing Body Water

Aerobic and skill-based performances are hindered by even a 2% loss in body water, but strength and power seem to be slightly more resilient to harm from dehydration [22]. Thus, out of the maximal recommendation of dropping 5% of your body weight in the final week leading up to your competition, the last ~3% can safely come from losses in body water. Body water losses of this magnitude can typically be rehydrated to an adequate degree to avoid a loss of strength. However, how you achieve this loss of body water matters.

Both active sweating from exercise and passive sweating from heat cause stress. Doing a bunch of cardio in a hoodie is obviously not the ideal way to get ready to perform a feat of strength. Likewise, undergoing heat stress isn't ideal either (and obviously a combination of the two would be even more stressful). Less stressful ways to reduce body water are to simply acutely restrict your fluids, lower sodium, or even chewing gum or sour candy and spitting repeatedly into a cup (gross, but can contribute). Weight-class restricted athletes will commonly minimize their fluid and sodium intake the day prior and/or day of their weigh-in to drop weight. However, a 2018 study showed that "water loading" — whereby you increase your water intake to high levels for a few days *before* the day you restrict your water and sodium — results in slightly greater losses of body water as you maintain a higher fluid output during the restriction period (via urination and sweating) [23]. If you do need to reduce body water, this option is the least likely to harm performance, and thus better than heat, exercise, or exercise in the heat.

If you recall from Level 2, I discussed how low-carb diets typically don't harm strength in the short-term. Additionally, low-carb diets also result in body water losses when initially implemented as there is a diuretic effect and some bound water with glycogen is lost [21]. But, you'll also recall that a ketogenic diet can leave an athlete feeling fatigued initially before they adapt. This is something we want to avoid. Meaning, we could leverage a low carb — but not full-blown keto — diet to lose some extra weight.

A decent guideline is to trade carbs for fats. I typically use an isocaloric exchange of dropping carbs by 45 g (180 kcal) and increasing fat by 20 g (180 kcal) each day in a tapered fashion, starting the Sunday before a Saturday competition to ease the person in, and I also don't take carbs below 1 g/kg to avoid the often reported "keto fatigue".

While theoretically, this should be a pretty safe way to reduce body water without actually inducing dehydration (and in my experience it can result in another ~1% reduction in body mass), I've heard some lifters report that they just feel a bit off when doing this. Perhaps this is a metabolic effect or the feeling of slightly depleted muscles. I'm not sure, but I think it's probably something to only do if you need to lose closer to the 4–5% body weight range.

Finally, the last thing you can do to acutely drop weight is fast completely; e.g. no fluids or food for the 14 hours prior to competition. The 14-hour value comes from the many anecdotal reports among the intermittent fasting community for how long they can fast without noticing any negative effect on training. Now, this might sound extreme, but if your weigh-in is at 10am, all this means is stopping all food and fluid consumption at 8pm the night prior. If you go to bed at 10pm and wake up at 6am, that means you're really just not eating or drinking anything while awake, from 8–10pm before bed and from 6am–10am the next morning. This is basically just having a late breakfast and not drinking anything until you have breakfast, if you think about it.

Unfortunately, not everyone weighs in first thing in the morning. If you have an afternoon or evening weigh-in, fasting can be more stressful because you're awake, hungry, and moving around. Thus, I see fasting

when you have a morning weigh-in as a low-stress weight loss strategy, and fasting when you have an afternoon or evening weigh-in as a higher stress strategy.

So, you could pull out all the stops and go on a low-fiber, high energy density diet while doing a fat:carb exchange, water loading and then water and sodium restriction, and fasting 14 hours prior to weigh-ins. All together this reliably results in a loss of 3–5% body weight depending on the individual (sometimes more or less).

However, you only want to use the necessary and preferably least risky methods to make weight so that you minimize the risk of hurting your performance on the platform. I'll list these in the next section.

Acute Weight Loss Methods from Highest to Lowest Performance Risk

1. Low-fiber and high energy, low (food) weight diet.
2. 14-hour fast if you have an early morning weigh-in.
3. Water loading, then fluid and sodium restriction.
4. Tapered fat:carb exchange.
5. 14-hour fast if you have an afternoon or evening weigh-in.
6. Heat and/or exercise-induced dehydration (not recommended).

Rehydrating After Weigh-Ins

Arguably the most important piece of the equation is rehydrating after weigh-ins to ensure performance is minimally affected.

If you only had to do a low-fiber, high-energy low weight diet, you won't even have to do this. But if you fasted, did a water load or a water/sodium cut before fasting, it's imperative you rehydrate.

Immediately after getting off the scale, your first priority should be to get in fluids and electrolytes. A good way to go that provides the right balance of carbohydrates, electrolytes and fluids is to have 15 ml/kg of a 50/50 blend of a sports drink and water, with a little extra salt in the

realm of a ½ tsp (especially if you did any sweating). Get this down immediately. Then once you've had a few minutes for your gut to settle after putting down those fluids, you can have a small meal as outlined in the template which follows. Speaking of the template, remember, it includes all the methods listed above. But you only want to do what's necessary, in the order of least potential risk of harm to performance as I listed above.

As a final note before you read the template, a good rule of thumb is that you will typically wake up at least 1% lighter than when you go to bed due to losses of body water from the moisture loss of breathing (and perhaps urinating in the middle of the night if you are middle-aged or older like me).

So, if you are ~1% over your target weight the night before your morning weigh-in, you are on point. Similarly, you are good too if you have a mid-day or evening weigh-in, and you are 1% over ~8 hours out while fasting.

Acute Weight Cutting Template for Saturday Competition

DAY	FAT	CARBS	PROTEIN	KCALS	H2O	SODIUM	NOTES
Sun	+20 g	-45 g	Normal	Maint.	Norm	Normal	Min 1 g/kg carb intake
Mon	+40 g	-90 g	Normal	Maint.	Norm	Normal	Min 1 g/kg carb intake
Tue	+60 g	-135 g	Normal	Maint.	100 ml/kg (1.5 fl oz/lb)	Normal	Min 1 g/kg carb intake
Wed	+80 g	-180 g	Normal	Maint.	100 ml/kg	Normal	Min 1 g/kg carb intake
Thu	+100 g	-225 g	Normal	Maint.	100 ml/kg	Normal	Min 1 g/kg carb intake, Low fiber
Fri	0.5 g/kg (.25 g/lb)	1 g/kg (0.5 g/lb)	1.6 g/kg (0.7 g/lb)	Per macros*	15 ml/kg (0.2 fl oz/lb)	50% Normal	Low fiber, fast 14 hr
Sat	.1 g/kg 1st meal easy to digest food	.5 g/kg 1st meal easy to digest food	.2 g/kg 1st meal easy to digest food	Graze on easy to digest food post weigh in	15 ml/kg post weigh in then normal drinking	50/50 Gatorade H2O mix and ½ tsp salt	Finish fast right after weigh-in, liquid first then food

**Eat 1.6, 1.0 and 0.5 g/kg of protein, carbohydrate and fat leading up to your 14-hour fast to help reduce the weight of food in your gut the day prior to competition. If hunger becomes a distraction or limits sleep quality eat more as needed, but use low-weight, high-energy foods; chocolate is a great go-to. Remember, we don't care about the energy content, this is just to lower food weight.*

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THE RECOVERY DIET

Introduction

This chapter is *almost* completely aimed at competitors who have to get so lean that it is truly unhealthy to try to sustain those levels of leanness, not to mention counterproductive to the goals of a physique competitor. I say almost because some of the concepts of what to do post-diet have trickled down from the bodybuilding community into the general population, which requires me to address them.

If you are dieting as a non-competitor, it should only take you to a level of leanness that is sustainable. Please read that sentence again. The only exceptions would be fitness models, or strength athletes who sit maybe 6–8% over their weight class limit, who then diet to within "striking limits" for acute weight loss methods to make weight (< 5% over), and for just the month or two prior to each competition, are in a "too lean" state temporarily.

Meaning, the rest of this chapter is for those individuals (physique competitors, very lean strength athletes who diet for meets, and fitness models). If that's not you, what to do after a diet finishes is quite simple: go to maintenance (how to do this is discussed in a few paragraphs), or to a slight surplus (depending on your goal).

If you are starving, can't stop thinking about food, regularly cheated on your diet, or if this is maybe not the first time you tried to diet down and sustain a lower body fat but previously failed, it means you need to address either: 1) the approach to dieting; 2) your relationship with food and your body; or 3) you might be trying to maintain a body-fat level that is simply too low to be sustainable (which could be related to number 2). This book teaches you how to fix number 1. Number 2 is unfortunately beyond the scope of this text and would require individual professional guidance. If number 3 is the case, it simply means accepting a higher level of body fat. Specifically, if you are always food-focused and a little hungry, even months after returning to maintenance post-diet, it's too lean.

If you only dieted for a brief period or lost only a small amount of weight, you can probably return to a caloric intake level that is 95–100% of your previous maintenance. If you lost substantial weight or

dieted for a while (but still to a sustainable level of body fat), I would recommend going to a conservative estimation of your maintenance. For example, cut your cardio in half, and increase your calories by 200–400 per day. Since you don't know exactly how much downregulation of energy expenditure occurred after a long diet, it's not a bad idea to be conservative at first and taper up over a few weeks until you either are at maintenance or gaining at an appropriate rate if that's your goal.

Also, more on this to come, but once you have reached a sustainable body fat, you can take a qualitative approach to nutrition at this point which would probably be a good idea for a non-competitor who wants to have a healthier relationship with food long-term (see Behavior and Lifestyle).

The Reverse Diet vs. The Recovery Diet

Now, let's discuss post-competition strategies for physique athletes. Most likely you've heard of the concept of the 'reverse diet'. If you haven't, I can summarize this approach (or rather, the way it's often implemented) as follows: slowly increase calories in a stepwise manner after a contest preparation diet ends, to eventually get you back up to maintenance, and slightly beyond once it's time to be in full, 'offseason mode'.

The theory is that doing so will minimize fat gain while maximizing energy intake, to set you up for a great offseason. Hypothetically, you'll be lean, calories will be high, and you will be ready to make great progress and start your next diet with more muscle mass, less body-fat, and eating as many calories as possible.

Now, all of those are good things but unfortunately the reverse diet when taken too far, rarely delivers them. In its more extreme iterations, the reverse diet may result in you spending many weeks in an energy deficit, even after your diet, before you are in a surplus. That may strike you as odd, or perhaps not and maybe you're wondering, "Why does that matter?"

Let me explain.

Metabolic adaptation (also known as adaptive thermogenesis) is the process by which your body reduces its energy expenditure over the course of a diet, to try to slow down your weight-loss [1]. This is a

survival mechanism and the normal response to dieting. What reverse dieting doesn't acknowledge, is that the fastest way to reverse these adaptations is to not only increase calories but also to gain weight [2].

I understand that at the end of a contest prep, the last thing you want is to see your hard-earned condition fade away. I get it, I am a competitor too, and to be clear, I would not advise going out and eating everything in sight, like many competitors do after the season is over. Certainly, if you had to choose between bingeing your way out of a show, or doing the traditional reverse diet, I would recommend the reverse diet. But, a middle of the road approach is even better.

So, what does this middle of the road approach look like? Well, it's what we at 3DMJ (originally coined by Jeff Alberts) call 'the recovery diet'.

The reality is, the long grueling process of contest prep is a controlled state of starvation and it is stressful both physically and mentally [3, 4]. Sleep disruption, mood disturbance, drops in testosterone in men, losses of menses in women, reductions in metabolic rate, thyroid output, strength loss, lean body mass losses, increases in food focus, hunger, irritability, and an increased likelihood of disordered eating are all reported consequences of dieting for a physique competition [3–11]. Contest preparation requires a period of recovery to get back into a healthy state [4, 5] where you are both physiologically and psychologically ready to make offseason progress. If you truly want to reverse the negative adaptations that come from a prolonged deficit that results in a large loss of body-fat, unsurprisingly you must get out of the deficit and gain body fat.

- The recovery diet gets you out of a deficit immediately, in contrast to the reverse diet which many times acts to initially extend the diet, albeit with a smaller and decreasing energy deficit.
- The focus of the recovery diet is on appropriate rates of weight gain, rather than adding as much food as possible *without* weight gain, which is common among some iterations of the reverse diet.
- Importantly, the reverse diet gives you unnecessary, and unrealistic goals. There is no conceivable reason to remain in an energy deficit after a diet is over (especially given it is the energy deficit that is

the source of the metabolic adaptations you are trying to reverse). Remember, being shredded is not conducive to gaining muscle mass, it's only conducive to doing well on a bodybuilding stage. The only time you need to be shredded is when you're on stage. Now that doesn't mean you want to get so heavy that it's a hassle to diet all the way back down until you're shredded but it does mean you want to spend the minimum amount of time possible in this peak condition, so you can get back to making muscular progress in the offseason.

- Furthermore, without the goal of getting onstage in a posing suit to motivate adherence, and after a long and grueling diet, it's very difficult to follow a reverse diet approach. In our experience (we used to implement reverse dieting practices at 3DMJ), reverse dieting had over a 90% failure rate.

Setting unrealistic goals and failing to reach them can make a competitor who just willed themselves through a grueling contest preparation feel like a failure and a fraud. Additionally, it can prompt corrective behavior — for example, slipping up and binge eating, followed by a restricted calorie day with more cardio to "make up" for the slip up, which then prompts subsequent binges.

Unlike the reverse diet, the recovery diet acknowledges you're not a robot. Even the most hardcore bodybuilders struggle with the period immediately after prep, often more than the prep itself. So, expecting an extremely regimented, slow, stepwise increase in calories to be good for adherence is unrealistic and potentially harmful. Sometimes, even when you achieve a state of energy balance or a slight surplus post-contest in a reverse diet, you'll still be in a state of relative energy deficiency (see Energy Availability in Level 1).

Hopefully, I've convinced you that the reverse diet is not the way to go, largely because of the pace and magnitude of increasing calories. Now, I can move onto the details of how to transition from the contest preparation period in a healthier way, better than not only the reverse diet approach but also the traditional approach of binge eating for weeks on end.

How the Recovery Diet Works

To get you out of the fragile state you're in post-competition, the first steps you take depend on whether: 1) you have more shows; 2) you're finished with your season (or the next show is quite a way out).

Scenario One — You Have More Shows to Do

First, let's go over the scenario where you've got more shows to do. If you are doing back to back shows just one week apart, you'll simply keep dieting after peak week is over. Maybe you can work in a controlled celebratory dinner the night after the competition, but it can't be an all-you-can-eat feast. If your next show is another 2, 3, or 4 weeks away, you can have either a celebratory dinner after the competition or a celebratory breakfast the morning after.

- When you have a celebratory meal, take into consideration that it is occurring at the tail end of a peak-week where you ate higher calories and carbohydrates for at least a few days. Thus, the meal doesn't need to be huge.
- For a post-competition dinner, a serving of meat with steamed vegetables is a safe bet.
- Focus on the time spent with your friends and family that have come to support versus trying to satisfy every possible craving.
- If you're a vegetarian or only eat fish, you could have either a tofu salad (or similar) or fish and steamed vegetables; in either case, find something that has a similar energy and macronutrient content to the meat eater's example.
- Or, if you can wait until the next morning, just skip the celebratory dinner and go out for a traditional breakfast the next morning with your friends and family. Bacon and eggs, with a few slices of toast, or hash-browns would be a solid choice.

If your show is over a month away but less than four months away, you can probably get away with having both a celebratory dinner and breakfast.

- Eat your post-competition celebratory meal and since you have more time to prepare, you can probably also get away with a starch with that meal. So, instead of a steak and steamed vegetables, you could probably have that and the bread that comes as an appetizer. Or you could have your fish, a salad with croutons and a potato or rice.
- The next morning, you could also have your traditional breakfast. Enjoy your pancakes, eggs, bacon, toast, etc.
- Don't track these two meals, but do eat like your best impression of a health-conscious, non-starving adult (this will be easier said than done). Meaning, don't get multiple meals, don't get a dessert, an appetizer and a cocktail, don't eat off others' plates etc.
- After you finish your untracked breakfast, hit your macros for the rest of the day, just pretending the clock started after breakfast.

Scenario Two — You're Finished for the Season

Now, let's cover the scenario where your show is either four or more months out, or you're done for the season and ready to start your recovery diet.

- Just like you would if your show was less than four months away, you'll have a post-contest celebratory meal.
- Then, instead of just having breakfast the day after, have three, untracked, normal-size, yet complete meals. For example, breakfast out with family and friends as described above followed by a square lunch. This could be a cheeseburger, fries and a milkshake, or a few slices of pizza. Enjoy yourself but avoid bingeing if you can. Finally, either a homemade meal with the family or a night out for dinner, don't forget dessert! The goal is to have three, untracked square meals the day after your show, without any meal turning into a binge fest.
- If a binge does occur, don't self-loathe, don't dwell on it, just carry on as this is a pretty normal occurrence after months of semi-

starvation and controlled eating.

- The next day, go back to your planned approach which you have for your next show (this might include diet breaks and/or "eating up" into your show since your condition probably didn't backslide as much as you'd expect).
- Or, if the season is over, begin the long-term recovery diet plan, which we'll discuss next.

Recovery is not complete with just a weekend of eating more like a normal human. Indeed, as I stated before you must intentionally gain weight, in a controlled manner so that you can get to the point where you are ready to have a productive offseason. But how long should a recovery diet last? For most, it's going to be somewhere around 4–8 weeks. Not to say that in 4–8 weeks we're going to fix everything, rather, in the first 4–8 weeks, you are going to set up a lot of the groundwork to reduce the major negative symptoms from the long diet and large-scale weight loss you endured.

Weight gain is what we're after here. How much weight gain? You want to end up somewhere between 5 to 10 percent above of your contest prep weight at the end of this 4 to 8-week period. For example, a typical male natural bodybuilder with a low weigh-in of 165 lb (75 kg) would want to be between ~173–181 lb (~78.5–82.5 kg) at the end of this period. I provide a range because everyone has a different body-fat settling point where they can feel normal, and not be overly food-focused, and not feel "off" physically (this takes time though, as well as weight gain).

In my experience, most people should end up somewhere in this range after 4–8 weeks, and doing so goes a very long way in terms of reducing food focus, and normalizing things like sleep, libido, menstrual function and mood (although not completely in many cases).

To make this happen, you must adjust cardio and calories. Over the course of contest prep, typically cardio goes up and calories come down. You are going to do the exact opposite now. So how much cardio should you cut right away? A good place to start is getting rid of all excess cardio. Excess cardio is anything you added over the course of

your contest prep diet. So, say in the offseason you were doing two sessions per week and at the end of your contest prep diet you were doing cardio every day, a good place to start would be going back to doing just those two sessions per week.

On the other hand, I don't want to do the exact same thing with your calories because our goal is not to return to baseline, but rather achieve an energy surplus. In fact, this surplus should probably be the biggest you see over the course of your whole offseason because the goal is to gain weight at a rate that would be inappropriate for any other time.

Normally in the offseason, I would want a small surplus to minimize fat gain (see Level 1), but that's because your body fat isn't incredibly low, and I don't want it to get unnecessarily high, making the next season more difficult. But after a competition, you *are* incredibly lean, so lean it makes gaining muscle harder, and I want a larger surplus because the goal is to gain not only muscle but some fat as well. In many cases to achieve a body weight 5–10% above stage condition, a 400 to 1,000 calorie surplus (which, if you are in a deficit often means adding 600 to 1,500 kcal to your diet with a cardio reduction) is needed (depending on how much of a "head start" you got the night of the show and the day after). Institute a surplus of this size until you are 5–10% above stage weight at some point 4–8 weeks after your season ends.

Believe it or not, at this point, you can start implementing some of the approaches that are characteristic of a reverse diet; the slow addition of calories over time while trying to minimize weight gain. This is a very feasible approach, but only once you have achieved a healthy body fat level that coincides with getting yourself 5–10% over stage weight. We'll talk more about how to transition from the recovery diet to the offseason later, but first, let's talk about the insecurities you may be feeling after processing that you should be intentionally gaining weight and body fat.

Dealing with Fear of Weight Gain

Insecurity, anxiety and even some fear is normal at the end of a multi-month period dedicated to fat loss when confronted with the possibility

of weight gain. You've worked extremely hard for weeks on end to get in the best shape of your life for your show. Additionally, you may have been sold on the reverse dieting approach previously, or at least finding the idea more attractive because of your insecurity or fear of weight gain. So, I understand if hearing everything I've said up to this point is a lot to take in.

For those of you that have competed before, you've experienced how performance can degrade when you're very lean, and how your energy levels are hit or miss. You know what it is like to struggle to add weight to the bar, and likely even see some lifts go down. You may have noticed certain muscle groups have deflated after months of hard dieting and you might feel more susceptible to injury. Even motivating yourself to train can be harder than normal. But, you could get past all that in the middle of prep because you saw yourself getting leaner, and the goal was to look your best in just a few weeks or months. But, now the contest season is over. Ironically, your desire to keep your newly attained leanness can become a barrier to you looking your best in future competitions. It is hard, but you must come to terms with the transition, and get out of that state in order to look towards the future.

Your overall energy, mood, libido, hormonal function, and sleep quality will improve once you regain some body fat and more calories come in. Contest prep requires a different perspective, it is basically controlled starvation. While you can push through the difficulties of prep because it's necessary for competition, can you really convince yourself that feeling like you did at the hardest stages of prep is helpful for building muscle or feeling healthy and normal again? It's difficult to turn a 180 at the end of a contest prep and shift this perspective, but it's critical for your longevity and enjoyment in the sport. I would advise you to plan your recovery diet a couple weeks before you finish your season, just so it's not a complete shock to the system when it comes time to execute.

Transitioning to the Offseason After Recovery

While precision and accuracy are extremely important when you're in contest prep, there should be different standards in the offseason.

During contest prep, when the outcome is important, the margin of error that matters is small, and your energy levels, performance and mood can be impacted in large ways by small changes in macronutrient content, spending most of your time in what I call the 'Best" tier (the tiers of tracking are concepts that I will introduce in the Behavior and Lifestyle chapter), where you track all three macros within a narrow range is the goal. That said, time periods like diet breaks, anniversaries, birthdays, holidays etc., can fall into the 'Better" or 'Good" categories — which focus only on protein and calories — to allow a sustainable and flexible contest prep diet (see Behavior and Lifestyle).

In the offseason, when you've regained a fair amount of body fat, glycogen, hormonal stability, and recuperative capacity, it's highly questionable whether it matters if you are consuming ~350 g of carbohydrate, 200 g of protein and ~100 g of fat or say 400 g of carbohydrate, 175 g of protein and ~90 g of fat, given calories are equal. From a performance, muscle gain, and physiological perspective, there is no reason to track within 5–10 g of your targets. Even a fat loss phase in the offseason (for example the infrequent mini cut) should allow more flexibility than contest preparation.

As you progress through the recovery diet and then into the offseason you should also work your way towards being less meticulous with tracking. Initially, shift from macros to just calories and protein, broaden the acceptable ranges on protein to something like + or - 10–20 g and calories to + or - 150 kcal, and allow yourself to go from eating out 1x/month during prep, to 1x/week during the recovery diet. Then, slowly incorporate more internal cues (satiety and hunger). Initially just focus on the sensations of satiety and hunger, for a while it may be all hunger and not much satiety, but this will improve as you progress into the recovery diet and offseason. Once the signals are more obvious, and satiety is more common, start modifying how you divvy up your calories (but while still maintaining a fixed intake) based on hunger and satiety; eating larger proportions of your allotted calories and protein when hungry, and stopping when satisfied. Then, get away from tracking all three macros or calories, and just track what you need to in order to be consistent, like protein for example. On top of that, just make sure you reach the target rate of weight gain.

Remember, just because you aren't tracking your macros, doesn't mean you aren't consuming them in appropriate ranges if you developed good habits. Make these transitions based on your confidence level: for example once you can comfortably track your macros with broader ranges, then you can move to just tracking protein, and then calories plus habits. This allows some days to be higher in fats and lower in carbs while others are the opposite, and the occasional consumption of alcohol (in moderation).

Moving forward, if you know you would consume enough protein even without tracking it, you could move to the 'Good" tier (see Behavior and Lifestyle) and just track total calories plus or minus 100. Then, to take it a step further, remember that a big focus in the offseason should be rate of weight gain. While you are after relatively rapid weight gain during the initial 4–8 week post-show period, the rest of the offseason should be much slower (see Level 1).

Towards the end of your recovery diet and moving into the full offseason, body weight itself should become a surrogate for energy balance and probably the only variable you track. If you are gaining weight at an appropriate rate, you know your calories are at an appropriate level. Thus, if you are confident enough in your eating habits to know that your macronutrients would be in the appropriate ranges, you can just track body weight and adjust based on sensations of hunger and fullness (once you regain them, which may take some time). With that said, typically most people have one or two things that don't quite line up with "optimal nutritional guidelines" when they stop tracking. So, if you notice that you under-eat protein unless you keep track of it, or if you don't eat enough fruits and vegetables unless you're paying attention, you can track just those variables in addition to body weight changes.

The goal is track as few variables as possible while still ensuring you are ticking all the boxes which ensure your offseason is productive. But, don't feel like you must rush through this process. If you are used to meticulously tracking your macros, it may take some time to feel comfortable tracking in a looser manner.

Some people do great with habit-based tracking, some people feel

more comfortable tracking macros, some people fall in the middle. Push yourself to use more and more internal cues and learn to listen to your body, there can be long-term consequences to ignoring your body's signals that you want to avoid, and this is one of the main reasons I advise not competing every season. (If these concepts sound intimidating, or maybe just too amorphous, don't worry, in Behavior and Lifestyle I go through them all in much more depth.)

Allowing a full year off between seasons allows not only complete recovery physiologically, and time to put on muscle, but also allows time for you to get back to using satiety and hunger signals to a greater degree. At a certain point, even body weight should be tracked less frequently. The rate of weight gain recommended for advanced athletes, which should describe most physique competitors, doesn't create large-scale weight shifts over short periods anyway, so weighing in 1–2x/week and observing trends over one to two-month periods is a great way to minimize potential scale-related stress.

In Summary

So, let's summarize the recovery diet protocol. Remember, the goal is to gain some body-fat, which is not the same as getting fat. As I talked about, that will be somewhere between 5–10% over stage weight, achieved within the first 4 to 8 weeks after your season ends. How do you do that? Well, immediately after your show you get to have your celebratory meal, and if it's the end of the season, add an untracked full day of three square meals the following day. After that, create a surplus that will result in ~1–2 lb (0.5–1 kg) weight gain per week so that you reach the weight gain goal in 4–8 weeks. Once you've hit that, decrease the surplus and level off to a normal rate of gain for an average lifter, as described in Level 1 (which would be 0.5 to 1.5% of your body weight gained per month).

In terms of your nutritional habits, move through the nutritional tracking tiers and towards more internally cued, qualitative habits (as described in detail in Behavior and Lifestyle) until you get to an appropriate blend of tracking and internally cued eating that is the least amount of tracking and weighing you can perform, while still ticking all the boxes

that will help you achieve your goals long-term. Remember, these are just guidelines, gaining slightly less or more weight than I suggest, in slightly less or more time than I suggest, is not the end of the world. The main principles are what's important.

You also must consider the competition schedule, which doesn't always allow the strict adherence to the timelines we've outlined. For example, a new pro that decides to compete in their first pro show in 5 months so that they can then have an extended offseason will take a different approach than a new competitor who is ready to embark on a 2 to 3-year offseason. In the second scenario, the recovery diet is probably a good fit, the person in the second scenario will need a different approach. Or maybe, you also have a fitness model career and a 5–10% increase in body weight is too much and doing what's optimal for muscle gain and mental health must be balanced with the needs of your job. Your mileage may vary, but don't neglect your long-term health...because it will catch up with you eventually.

So, remember the principles, because even though what I've outlined is ideal theoretically, humans are different from each other. This is not always an exact science and should be adjusted to the needs of the individual.

Finally, let's discuss how a recovery diet fits into the long-term periodization plan for a physique competitor.

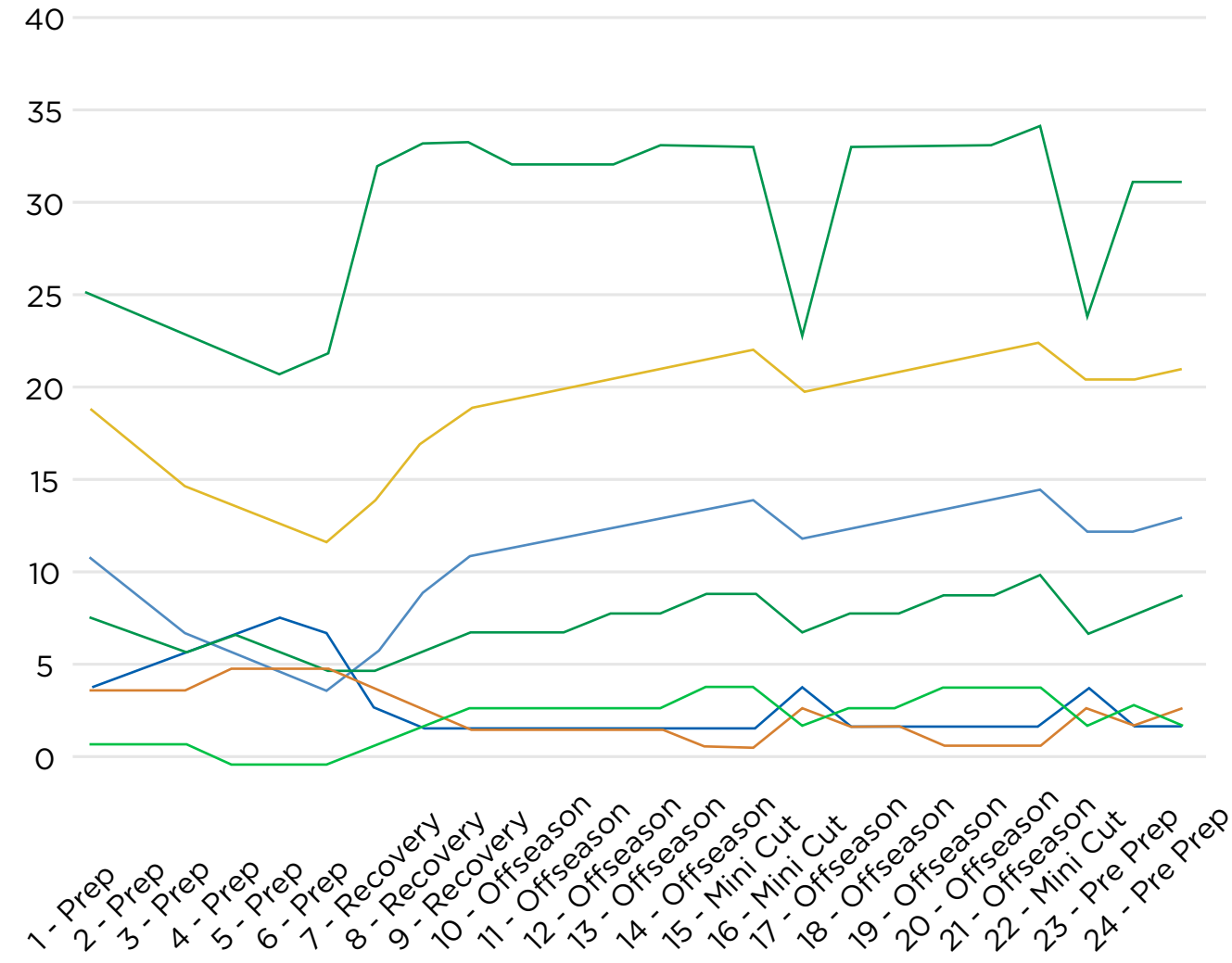
Global Nutrition Periodization for Physique Competitors

In the chart below, I've outlined a two-year period consisting of a six-month contest prep, a three-month recovery period (yes the recovery diet is 4–8 weeks, but I'm illustrating how long it can take to get back to a normal psychological and physiological state [4, 5]), and then a 15-month offseason period that has two, separate months for mini cuts, and a two-month phase that I call "pre-prep". In the chart, you can see how energy intake, body fat, training stress, cardio volume, and external (food scale, tracking app) vs internal eating cues (hunger, satiety) change in each phase.

Getting to true contest condition, depending on division and starting

leanness, takes 5–7 months for most people. The recovery period may take half as long to regain lost muscle mass, strength, and return to normal metabolic and hormonal function. The return to a healthier relationship with food, your body image, and an ability to recognize and use satiety cues to stop eating can take much longer. This improves season to season as you gain experience transitioning from contest-prep food behaviors, to more normal, offseason food behaviors. However, in my experience as a coach, it's important to have an intentional return to normalcy in a semi-structured manner, or a healthier relationship with food can be delayed substantially within, and between seasons.

PHYSIQUE COMPETITIOR PERIODIZATION



Returning to the timeline, after physiological recovery, and the return to baseline levels of pre-prep muscle mass, the natural competitor would only have three months to gain new muscle before having to prep again. For this reason, I recommend all but highly-experienced competitors to compete no more frequently than every other season (this also facilitates a recovery of your relationship with food). Doing so, as you can see in the chart, gives you 15 months to make progress on your physique through eating in a small surplus. Inevitably, this will result in body fat gain, which can be curtailed by infrequent mini cuts (here you see two separate mini cut months). The final mini cut finishes a couple months before prep starts, which allows you to move from your last mini cut into the pre-prep phase. In this phase, you eat at roughly maintenance and get re-familiarized with tracking so it's not a shock when prep begins. Additionally, you focus on eating as much as you can by slowly adding food, without actually gaining weight. This ensures you start prep appropriately lean, but also not in a 'dieted' state (i.e. metabolically downregulated). Finally, you might run a specialization training cycle or two for any last-minute lagging body parts before prep begins.

Global Nutrition Phases and Their Characteristics

- **Prep:** Body fat, energy intake, and invariably, the externally imposed training stress will all fall during prep (although the internal experience of training stress will increase). Additionally, the cardio volume will go up to maintain an appropriate rate of fat loss and finally, an increasing focus on external nutrition cues (self-weighing, tracking macros) will have to be relied on as hunger and satiety become dysregulated.
  - **Diet Breaks:** During prep, every 4–8 weeks (and sometimes autoregulated in reaction to plateaus), a 1–2 week diet break at approximately maintenance calories should be implemented to mitigate some of the hormonal and metabolic adaptations to dieting, allow an improvement in training quality, a regain of muscle mass, and a mental break. Tracking can go from all three macros to just calories and protein, to further reduce psychological stress.
  - **Eating up:** Ideally, stage condition is reached 2–4 weeks out,

and prior to getting on stage, small incremental increases in carbohydrate and fat can be made, alongside incremental decreases in cardio volume to allow greater glycogen storage, a regain of muscle tissue, and a reduction in stress to facilitate a more predictable peak week.

- **Peak Week(s):** The week of the show(s), either a back or front load is utilized as needed to provide a slight improvement in appearance through increasing muscle glycogen storage and blood pressure, to facilitate a pre-stage pump and the appearance of being larger, tighter, and having more muscle separation.

- **Recovery:** Training stress remains similar to prep, while energy intake and body fat increase concomitantly with cardio being reduced. As the recovery side of the stress-recovery balance equation improves, lost muscle tissue is regained, a healthier body fat is eventually achieved, sleep is normalized, hormonal balance is restored, menses are regained in amenorrheic competitors (unfortunately common), performance is improved, and the biological drive to constantly eat slowly diminishes. As normal hunger and satiety signals return, the process of moving from less-strict tracking to internal-cue guided eating should occur.

- **Offseason:** Once a competitor is at least 5% over stage weight, and fully recovered (hunger and satiety levels, mood state, energy levels, libido, menses, performance, muscle fullness, and sleep quality and quantity normalized), a reduction in energy intake to appropriate levels to achieve the rates of muscle gain advised in Level 1 should occur. Cardio is minimal as required for health and enjoyment, body fat steadily increases as an energy surplus is sustained, and more and more, eating becomes driven by internal cues.

  - **Mini Cuts:** With a ratio of no more than 4:1 should time be spent in a surplus relative to a deficit (i.e., don't diet more frequently than this, but less is fine). Thus, every four months of offseason could be interspersed with a one-month mini cut. These cuts use the upper end of the target rate of weight loss (~1%/week), and some tracking (body weight, calories, and protein) should occur to assist in achieving this body fat "clean up' phase. Training stress should be reduced slightly and some cardio added.

- **Pre-prep:** In the final ~4–12 weeks before prep, following a mini cut, maintenance calories should be consumed with a steady attempt to see how much maintenance can be "pushed" prior to body fat regain. This period should be tracked to rehabituate the athlete to the process and lifestyle of tracking to come in prep, and the best, individualized combination of a lower-end offseason body-fat level and highest food intake possible should be achieved leading into prep to set up the competitor for success in the season to come.

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BEHAVIOR AND LIFESTYLE

Now that you are aware of all Pyramid Levels, their order of importance, and the guidelines from each level, how do we put all of that into practice? What good is a nutrition plan if you cannot follow it? And unless you're in a contest prep fat-loss phase, what good is a nutrition plan if it is not maintainable in the long run? These are some of the queries and topics that I will address here in this final portion of our guide.

In this section we'll talk about the long-term sustainability of your nutrition plan, how to adopt true lifestyle changes, how to minimize the potential downsides of tracking and self-weighing if you are a competitor, and for non-competitors how to use more internal vs. external cues for eating to achieve your goals. I'll even discuss practical considerations like eating out with loved ones while tracking, and even alcohol consumption in moderation while tracking — if you so choose.

Tracking Your Numbers with the Three-tiered System

Throughout this text thus far I've made it a point to always acknowledge that contest prep is different than a fat-loss phase, which is different than maintenance, which is different than off-season gaining.

This very broad spectrum of goals and seasons throughout the life of an athlete is not often addressed in nutritional programming, which is why many individuals get stuck in social isolation and can easily adopt those dreaded "all or nothing" ways of thinking.

Without context, everything appears to be of equal importance at all times and a great deal of effort can be spent micromanaging a laundry list of dietary details. So the question becomes, which of the details need to be managed and when? While The Nutrition Pyramid in and of itself can help you navigate this question, it is also true that some elements of The Pyramid can become nearly irrelevant in certain circumstances.

An analogy I often use to describe the different nutritional needs of an off-season bodybuilder or powerlifter compared to a bodybuilder during contest prep or a powerlifter dieting to a lighter weight class, is that the former is walking a wide path while the latter is walking an ever-narrowing path slowly becoming a tightrope.

What I mean by this is that when one is lean and calorically restricted, they have less leeway in their nutrition before it has the potential to negatively impact them. A greater amount of energy is created by metabolizing body protein in lean individuals compared to those overweight [1], and when lean individuals are calorie restricted they experience a reduction in testosterone [2] while those who are overweight likely will not [3]. For these and other reasons, the leaner you are the more likely you are to lose lean body mass during weight loss [4].

Additionally, resistance training depletes glycogen to a degree [5] and when glycogen depleted (which is more likely to occur while dieting), muscular performance can degrade [6]. Resistance training is also partially fueled by intramuscular triglyceride which is depleted to a degree alongside glycogen during resistance training [7], and a diet low in fat may not completely replenish intramuscular triglyceride levels [8]. Since both carbohydrate and fat will likely be restricted while dieting to reach the requisite caloric deficit, performance is more likely to be negatively affected while dieting. Logically, the magnitude of the caloric deficit has a direct impact on how much dietary fat and carbohydrate is consumed, and thus it is no wonder that faster rates of weight loss (achieved through larger caloric deficits) can result in poorer strength performance [9] and muscle maintenance compared to slower rates [10].

In addition to these physiological impacts, the psychological stress associated with intensive weight loss can be much higher than the stress experienced during a non-energy restricted period [11, 12].

Matching Precision to Needs

Due to all of the above, there are disparate needs based on nutritional status. I hope I have conveyed thoroughly that contest-prep dieters require high levels of consistency and accuracy, which usually comes with far less flexibility. However, when one isn't dieting and is in the 'off-season' (or simply doesn't need to diet, such as in the case of a powerlifter staying in the same weight class), what needs should be focused on and what degree of precision and accuracy are required on a day to day basis? Well, this comes down to interpreting concepts and

theories to create a framework for the practical application.

Nutritional science and exercise science rarely tell us explicitly what to do. Rather, they help us determine what should be measured and managed. We then have to translate that knowledge into something actionable for us as athletes.

An example of this would be managing macronutrient ranges and the size of a caloric deficit. When coaching my contest-prep athletes, I typically give them a daily target for the three macronutrients and decrease or increase them based on the rate of weight loss that occurs on a week to week basis (while also looking at body comp change via pictures and weight room performance). During weight loss, the specific balance of macronutrients becomes more important because there is an imposed maximum energy intake and an increase or decrease in any macronutrient necessitates the subsequent increase or decrease in another to maintain the caloric deficit.

For this reason, I use a relatively tight range for the macronutrients, often + or - five to 10 grams while dieting. This degree of accuracy helps the dieting athlete walk the "tightrope" as described in my analogy above. However, it also requires attention to detail, the use of tracking software or applications, a digital food scale, abstaining from eating out the majority of the time, and planning some meals or even entire days in advance when traveling. This degree of attention to detail is certainly sustainable for finite time periods and is the cornerstone of success for my competitive clients with shorter-term goals requiring enforced energy restriction.

On the other hand, when we're talking about long-term success and sustainability as an athlete, adherence and happiness are the most important variables. In my experience as an athlete and coach, the harder it is to stick to a plan, the less likely it is that you are going to achieve your goals using it.

So in a culture where "if it fits your macros" or "follow a meal plan and eat clean all the time" are often presented as the only two ways of doing things, it seems like you're stuck with two rigid options. Option one means hitting your macros every day for the rest of your life, and option

two means eating that chicken breast and broccoli at exactly 3 pm for the rest of your life. For most people, neither is sustainable and both share the weakness of asking you to rely on external cues (a meal plan or three numbers) while ignoring internal cues (sensations of hunger and fullness) and promote a black and white mindset. You're either on your meal plan or off it, or you either hit your macros or you didn't (see "Magic Macros" in the Mindset and Materials section). Fortunately, this doesn't have to be the case.

The solution for those who aren't dieting, or for non-competitors looking for long-term plans, is to seek non-binary approaches. Meaning, it's not either a zero or a one, black or white, on or off. Rather, you have a continuum which you can follow and options to use based on the demands of the given situation that include more external cues when you have to disregard hunger and fullness (such as when trying to get shredded or making a weight class) and more internal cues when you don't have those requirements. Early on in this book, I explained the importance of developing this mindset, now I am going to give you systems to apply the concepts.

The first system I want to introduce, is the 3-Tiered approach to tracking, which is appropriate for when you do have to track: such as during contest prep, cutting to a weight class, or fat loss goals which you weren't able to achieve with qualitative changes — which we'll discuss more in this chapter later on (and remember, if you can't get there without qualitative, habit-based interventions, you have to consider if the goal is sustainable).

Defining the Tiers

So even though we might aim to be as precise as possible, life happens and it's usually not practical to be exact all the time. With a binary approach, a slight deviation results in "falling off the diet", but a flexible approach allows for other outcomes. For example, when a target is not perfectly hit, this simply means that you broaden the target by dropping to another level on the precision scale and carry on.

To build upon this notion, here are the basics of our three nutritional tracking tiers:

- Good: You hit your target calorie goal within a certain + or - range. Typically I recommend using + or -100 kcals for your calorie goal. This is appropriate for when you can't effectively track macros (including protein) but can estimate kcals.
- Better: You hit your protein within a certain + or - range and also hit a target calorie goal within a certain + or - range. Use the same ranges for protein below, and use + or -100 kcals for your calorie goal. This is appropriate for offseason tracking (if needed at all), post-contest recovery, non-competitive cuts, mini cuts and diet breaks.
- Best: You hit your macros within a certain + or - range. Should be used only for contest prep or cutting a weight class. I recommend + or -5 g if deep into the final stages of prep, and + or -10 g for early phases of prep, or cutting to a lower weight class.

This system is used when tracking is needed, such as the situations described above. If your goal requires a certain level, the levels above it are also options. For example, if you are in contest prep, most of the time, you try to do 'Best', but remind yourself that both 'Better' and 'Good' are totally acceptable options that can occur on a regular basis.

This approach allows for social events, going out to eat, holidays, and drinking alcoholic beverages. It's also handy for times when you accidentally went over on one macronutrient target, or when hitting your protein target would put you over your calorie goals for the day.

Borrowing

Another system to use if you are pursuing a goal that requires tracking is borrowing. Normally we are accustomed to sticking to our targets in a 24-hour period. This might be ideal during contest preparation where most days are low in calories and at a certain point, you are walking the "tightrope". However, for casual diets, when you have ample glycogen and body fat stores and plenty of calories to play with, you can be more flexible. Take the 24-hour period off the pedestal and all of a sudden you have more options. Also, sometimes you might have a day where your energy expenditure is substantially higher than normal during

prep, or you just go over a bit inadvertently.

With the borrowing approach, you can take up to 20% of the macros/calories on any one day, and give it to another day(s). That way, if a planned event is coming up or if you simply are very hungry on one day or not hungry at all on another day, you can shift your calories around. A 20% reduction on any isolated day in a non-dieted and depleted body is going to have very little impact on anything of import, and it allows one to mix and match to account for the occurrences of real life.

Another way to institute borrowing is to set up an excel sheet that calculates a 7-day average of your calories for the week. You can simply have the goal of hitting the target calories on average by the end of the week. When doing so, by the end of the 7-day period, if your daily goal was 2500 kcals for example, so long as you averaged that over the 7-day period, you've met your goal for the week. This way, you can have a day at 3000 calories, a day at 2000 calories, a day at 2700, a day at 2300 and then the remaining three days at 2500 calories and that's absolutely fine, rather than having to rigidly consume 2500 calories every day. This is just an example mind you, I don't actually recommend bouncing around that much. Having a foundation of structure and consistency is actually ideal, but you don't want to be so rigid you can't adapt to life, which is where borrowing can help.

Eating Out

So now that you've got some systems (3-Tiers and Borrowing) to implement during periods where you have to track, it's important that you are able to implement them outside of your own kitchen when out with friends and family. But before we dive into food choice strategies, let's address all of you in-season competitive bodybuilders.

Simply put, during contest prep, eating out is something you want to avoid doing regularly. A decent guideline is not more than once a month, and I would reserve these monthly outings as needed. The times I suggest that you do eat a meal out during a competition diet is when you have something that is very important in your life.

For example, in 2011 I dieted from January to August, and I ate out 3 times: for my anniversary with my wife, for Mother's Day, and for my mother's birthday. Each time I went out, I got a very simple meal. I had double steamed broccoli and a lean sirloin steak with no butter. I didn't weigh the food, I just estimated the calories and macros. But, I knew that even if the cooks didn't ensure that I got exactly a 7 oz sirloin steak and exactly two cups of broccoli, that at most my estimations would be off by maybe a couple grams of carbohydrate and maybe 6 or 7 grams of protein and fat each. So the consequences from estimating that meal's macros incorrectly, if any at all, were very low.

However, if I had ordered pasta, that could have been off by massive amounts. It's so easy for a chef to put an extra two tablespoons of oil above and beyond what the restaurant lists for the nutrition information. Adding that oil alone means you could have an extra 250 calories that you didn't plan for and most likely wouldn't even notice simply by taste. Even if I could have fit the macros of the pasta dish into my diet for that day, I would have been making a big gamble assuming that the macros I estimated or that were listed on the restaurant's menu were accurate.

So just remember, chefs and cooks are not going to weigh your food out for you. They don't care about your macros, they care only about giving you a tasty meal. So when you eat out, be aware that the nutrition information won't be accurate, and your best guesses can be way off if you order foods that are likely to have a large margin of error (due to being energy dense). However, there are ways you can mitigate the risk by making smart choices. Again, if you are a competitive physique athlete, I would limit eating out to once per month at most.

Now remember, I am talking about the specific case of contest preparation for a competitive physique athlete. I am not saying that those of you who are powerlifters cutting a weight class or dieting for non-competitive purposes should strive for this level of control. In fact, I don't think you should, it would likely hamper adherence. But in the end, competitive bodybuilding is an extreme sport, and thus, even when approached in a flexible manner, it takes a relatively extreme level of commitment to achieve success on stage.

If you're not in contest prep, if you're doing a cut for a weight class or other purpose, eating out 1 to 2 times per week is fine, so long as you make conservative (i.e. err on the side of overestimation) estimations of the caloric and macronutrient contents of your food and choose low-calorie options (like the steak and broccoli versus the pasta). Doing so will ensure that you are accurate while still participating in important social aspects of your life.

Outside of cutting (for various purposes), eating out is perfectly fine. Just be aware that the portion sizes are out of your control, and you're more likely to eat what's put in front of you regardless of the energy content of the meal. Also, chefs will make foods as hyper-palatable as possible, which often means higher calorie counts than you'd expect. So long as you can maintain the physique you want (assuming you have reasonable expectations for leanness), or gain weight at an appropriate rate (see Level 1), and hit appropriate ranges of macro and micronutrients (see Levels 2 and 3), while eating out, there is nothing wrong with doing so (although it is more expensive).

Alcohol

Simply put, the key with alcohol is moderation. No matter how popular it is in college or how common it may be in certain cultures, binge drinking until you are completely wasted or throwing up is not a healthy habit. It's also not normal or conducive to an active healthy lifestyle.

That said, what does moderation mean? Well in my opinion, it means drinking to the point where you don't feel it the next day. Or if you did feel it slightly in the morning, it certainly wouldn't hamper your performance. In addition to that guideline, I'd also say that it would need to fit within your dietary goals as well.

Although we did not mention alcohol in our macronutrient section in Level 2, it definitely has calories. To be precise, it actually contains 7 calories per gram, and most of the time it's combined with carbohydrates. Wine is made from fruit and beer has hops, wheat, and barley. All of which are carbohydrates, which also have calories.

Now that said, we don't have a fourth macro that we follow. So if you are tracking, and you decide to drink, you have automatically shifted to the 'Better' or 'Good' tier. Since you don't have an alcohol target, consuming alcohol means you automatically revert to calories and protein, or just calories.

So let's say you had a couple of beers which ends up being 400 calories total. Your macros are normally 200 protein, 300 carbs, and 70 grams of fat, which gives you a daily calorie intake target of 2630. By consuming alcohol, you now are simply focused on either hitting calories and protein (tier 2 'Better') or just calories (tier 3 'Good"). After the alcohol consumption, you would have 2230 remaining to spread between protein, carbs, and fat for the day (finishing by hitting your protein target and calories within a + or - 100 kcal range). This way you've still met your number one goal of energy balance and you've ensured adequate protein. This is also a moderate amount that wouldn't affect your training the next day, so you're all good.

Just like eating out while tracking and dieting, I would recommend a limit for drinking. A rule of thumb I use with my clients is limiting drinking to only once or twice a week, in moderation (though this is probably too frequent during physique contest prep). If pressured to define "moderation" further, I would recommend consuming no more than 15% of your total daily allotted calories from alcohol. For most people that amount is one, two, or maybe three drinks if you're a big person with a lot of calories to play with.

Relearning How to Listen to Your Body

If you are a competitive bodybuilder, there is a certain point during contest prep where you have to stop listening to your body. Your hunger signals become constant, and your satiety signals disappear. In these cases, your plan is the only tool you have to ensure you don't overeat. Simply put, you must rely on external cues (scale weight, appearance, macros, etc.) to reach your goals. If you listened to your body's signals, you'd be in a surplus gaining weight! And while this would be a healthier thing to do than dieting to shredded levels, it wouldn't get you on stage looking the way you needed.

However, when you are not in a contest prep phase, it's important to transition back to internal cues and relearn how to listen to your body. If you spent months weighing and tracking your food and body weight, looking at nutritional labels, learning where calories come from, and changing your eating habits to reach nutritional targets, you are better equipped than you once were. But, at the same time you've gotten so used to following a relatively rigid plan that doing so can become second nature and can even replace what normal humans use to regulate their energy intake: hunger and satiety.

Ironically, after you spend years "going by the numbers" and modifying your body composition using the quantitative approaches outlined in this guide, it is actually very important to then learn how to once again listen to your body [13]. The goal of integrating the awareness of your hunger and satiety levels with your newfound nutritional knowledge and experience is to eventually develop an approach that requires minimal day to day effort. The first step in checking if you are ready for this would be to stop following your nutritional plan for a day. Don't try to hit your targets, just simply eat, and start to pay attention to when you feel hungry, satisfied, and full. As a competitor, these signals simply won't normalize until you've fully recovered from prep — meaning increased calories and body fat appropriately (see the Recovery Diet). But even after they return, regaining your awareness of these signals will take time.

However, you won't just forget what portion sizes you used to eat, or what a serving of 40 g of protein looks like, or what the energy content of foods is either. In the early stages where you just aren't good at recognizing the internal cues of your body, it's ok and probably not a bad idea to use your prior quantitative knowledge to curtail your food intake if you find that you overeat during this transition. At the end of the day, it's a process and it will take time for you to learn how to rely on your hunger and fullness signals a bit more.

Habits and Internal Cues

This section is all about using more qualitative, i.e. non-numerical information, to modify your nutrition. The strategies herein combine habit-based approaches (rules and routines you adopt and maintain

regularly), and autoregulating food intake by using internal cues (satiety and hunger), in combination with the minimum possible amount of quantitative external feedback (tracking food and self-weighing).

As you hopefully recall from Mindset and Materials, I pointed out that regularly self-weighing [14] and tracking calories and macros [15] are associated with, and could potentially exacerbate, body image and eating disorders, which physique [16] and weight-class restricted athletes [17] are at a higher risk of developing. This is not to say one can't maintain a healthy body image and relationship with food while tracking and self-weighing. Indeed, self-weighing and tracking can be helpful tools to learn about the quantitative side of nutrition. They also can be used to ensure you are meeting the best-practice guidelines for body recomposition and performance enhancement outlined in Levels 1–5. However, the more one relies on external cues to dictate energy intake and eating behavior, the more they must consequently ignore natural, internal cues of hunger and satiety, which can have lasting consequences [13]. For this reason, the end-goal for a competitor should be to get to a point where meeting the guidelines of Levels 2–5 becomes "automated" into one's lifestyle habits, and then internal cues are used to guide total energy intake (Level 1) for the larger part of a lifting career (e.g. being in a surplus or at maintenance). Subsequently, external cues should only dominate your approach as needed when hunger signals run directly counter to an athletic goal; such as when dieting to reach a weight-class cutoff, or to step on stage.

Therefore, in this section I will cover strategies for two different scenarios: 1) the non-competitor, strength athlete or offseason physique competitor either attempting to maintain or slowly gain weight and 2) the non-competitor who wants to lose body fat and then maintain a leaner, but still healthy and fully functioning body.

Scenario 1: Qualitatively Informed Gaining or Maintenance

First of all, let me make it clear that the following strategy is most appropriate when hunger and satiety signals are operating. That means after prep, and after the recovery phase for competitors. This section is all about how to get back to more normal eating, or at least eating that

supports your goals that is primarily informed by internal cues.

Ideally, this is where most of your life as a lifter should be spent, which should mean a healthier relationship with food. For non physique athletes, this approach is typically more successful after you've gone through a brief tracking period as described in the initial chapters and established some basic diet structure — not necessarily tracking for fat loss or even with macro or calorie targets, but just to teach you energy and macronutrient contents of food, portion sizes, and to make you aware of your habits.

This prior knowledge will help you learn which nutritional habits may need to be more externally informed (tracking in some manner). For example, many of my clients tend to fall short of either their fluid, fruit and vegetable, or protein intake if they aren't mindful. This is different for everyone, but identify which guidelines from the pyramids you haven't quite habituated yet. Then, for each of these specific items (and there shouldn't be too many or you likely haven't done enough initial work establishing your structure and sticking with it) keep a running tally in your head that you always hit, or establish a system to ensure completion.

For example, I actually struggle to hit my fruit, fluid and protein intakes on a day to day basis. To ensure I reach these targets, every day I make a shake with 3 pieces of fruit, a scoop of whey or 20 g of protein from Greek yogurt, and as much water as I can put in my blender without it overflowing. This is just what I do no matter what. However, outside of this, I modulate how much I eat based on hunger and satiety.

This identification system of habits that need operationalizing, along with occasional body weight monitoring if needed, allows you to follow a nutritional plan without completely abandoning the very valuable signals your body gives you and may help you avoid a negative relationship with food.

The following bullet points below offer some guidance on how to implement this approach. Once again, this approach should only be taken after you have some experience with tracking, and when your hunger and satiety signals are functioning. If you have this experience and have

established that you can "auto pilot", then use the following advice:

- If your goal is to slowly gain weight and you slowly lose or maintain weight when following your habitual eating patterns, strive to be a little full (or more full) after most meals. Also, eat foods that you enjoy and find easy to eat a lot of. Take your protein down to 0.7 g/lb (1.6 g/kg) if it was higher, consume the minimum intake of fruit, veg, and fiber (see Level 3), and use your blender to make some meals liquid.
- Likewise, if your goal is to slowly gain weight or maintain weight and you gain weight too quickly, try to visually decrease portion sizes and stop just when satisfied at meals. Also, try eating more slowly to allow time for your satiety to catch up. Increase protein, but no higher than 1.5 g/lb (3.3 g/kg), increase your water intake and fruit and veg to the higher intakes for dieting (see Level 3), and eat "healthier" foods that you "don't dislike" (such as vegetables); foods which will generally be less calorie dense and more filling because of it.
- If your goal is to maintain your level of leanness, use the same strategies as listed in the last bullet point. Focus on making progress in the gym, and you may slowly "recomp". However, eventually as you put on more muscle, and subsequently your body fat percentage decreases, you will eventually get hungrier. When this occurs, eat more! Allow this to happen when you get leaner than your body "wants" to be. If this never happens, and you can't make gym progress, or if you find you trend towards being hungry and gain body fat despite these strategies, you are trying to stay too lean.
- For each of the previous bullet-pointed goals, use the scale only as much as needed. For example, if you are trying to slowly gain weight at the rates listed in Level 1, you could very easily just weigh in on one weekday and one weekend day. Then, assess 3 weeks of weigh-ins to see if you need to modify your habits based on your internal cues since the relative changes in weight are small. This minimizes weighing-in, which can be problematic for many people. If your goal is to maintain your leanness and not gain weight, don't weigh in at all. Your goal is a certain appearance, it doesn't really matter what

weight is associated with it. If you can progress in the gym, and you aren't regularly hungry, it's sustainable. If you can't progress, and you are hungry regularly, it's probably a counterproductive level of leanness to health and performance long-term.

Scenario 2: Non-competition Fat Loss with Minimal Tracking

For readers who aren't competitors, you probably want to have a muscular physique that you are proud to see in the mirror year-round. Historically, bodybuilding was not only a competitive endeavor, but rather a lifestyle described as a "physical culture" [18]. Still today many people are unknowingly a part of that movement as they want to feel, be, and look strong, or express themselves artistically, or feel empowered by changing their body through good nutrition and challenging training. However, competitive bodybuilding has changed drastically since the origins of physical culture and thus, non-competitors should follow a different path than physique athletes.

Competing requires getting to a point where you are objectively less healthy than you were at some point earlier in your diet, or in the offseason. Even doing everything right, and mitigating as many of the adaptations to dieting as possible, some degree of negative physiological (see Energy Availability in Level 1) or psychological consequences will occur from the competition process. There is a reason competitors have to diet for shows, instead of just waking up on a Saturday and deciding to enter them.

Therefore, if you are a "lifestyle bodybuilder" with a goal to feel and look strong, express yourself artistically, or experience a sense of control or empowerment from changing your body, your nutritional approach should align with that goal. Meaning, it should be a sustainable approach and should, eventually, result in the best body composition you can healthily sustain.

Weighing yourself multiple times per week as a regular practice [14], tracking macros as a state of being [15], ignoring hunger signals [13], compensating for times you "slipped up" by exercising more or eating

less [19], engaging in negative self-talk or viewing yourself negatively because you aren't happy with your progress or don't compare the way you want to other people [20], isn't healthy. Thus, these practices aren't congruent with the ethos of bodybuilding as a lifestyle. Rather, a bodybuilding lifestyle should consist of adopting eating habits that support your training and health, being more in tune with your body's signals and eating more or less based on them, having a healthy social life where your lifestyle choices are accepted, and pushing yourself to improve, while still appreciating how far you've come.

For all of the above reasons, if your goal is to develop a more muscular physique and sustain it, I think it's important to follow a plan that is primarily built around internal cues and sustainability. Indeed, if I could go back in time to 2005–2012 when I was still a face-to-face personal trainer, I would make tracking body weight and food an initial stage to gain mindfulness, awareness and to learn the basics of nutrition knowledge. After that, I would only implement it if absolutely necessary, if every other option couldn't produce the fat loss my client desired. Even then, I would only implement tracking with the express intention of having an exit strategy: getting my client back to using internal cues.

So you are probably wondering, "What the hell does this look like? You just spent an entire book telling me quantitative information, now I'm supposed to not quantify things?"

It's okay, calm down my overly-analytical friend. Remember, step one is to take a few weeks up to a few months, and actually track your food, read nutrition labels, learn about the concepts of muscle-building nutrition (which if you've made it this far in the book, congratulations you've done that), get a quantitative awareness of portion sizes and how they compare to your normal eating habits, note when you eat past fullness and why (social situations, stress, boredom, distraction, etc.), and see where you fall short of the guidelines when you aren't mindful (protein, fruit, veg, fluids, number of meals, post-training protein intake, etc.).

With this awareness, you can then start to make changes that don't require MyFitnessPal or a digital scale, that will result in you getting leaner [21–34]:

- Establish a simple structure to your eating and try not to eat outside of it regularly [21]. When you can't eat at home, bring a piece of fruit and protein serving with you via sandwich, wrap, or protein bar or find the equivalent at a grocery store.
- When you eat, don't do anything else, turn your phone off, focus on the experience [22].
- Have water at each meal, and between meals [23], and check your urine color (Level 3).
- Use artificial sweeteners (in moderation) when you would use sugar — yes, they are safe in moderation [24], and if you replace sugar with them it can result in weight loss [25].
- Stick to diet soda, in moderation, if you used to drink regular soda [26].
- Have a fibrous vegetable serving at each meal [27].
- Have a fruit serving in each meal, if you don't like fruit at dinner, have more at lunch [27].
- Eat 3–5 meals typically [28, 29], closer to three for smaller folks, closer to five for bigger, with most of it prepared at home.
- Have a protein serving at each meal [29].
- Pace yourself when eating, spend more time chewing [30].
- Remind yourself of what your long-term goals are regularly, why they are important to you, say them out loud to yourself at a regularly scheduled time, and/or write them down a couple times per week regularly in a journal [31].
- Have a scoop of whey protein after training in water [32].
- Only eat out occasionally [33], choose the lowest calorie option that is appealing and order only one dish [34]. Use cooking with your friends or family for social bonding, like you did when eating out.
- Eat more single ingredient food items [21], and buy more single ingredient food items in the store [34].

- Adopt new, non-eating, stress-relief and reward behaviors such as going on a walk, reading, listening to a podcast or music, meditating, or journaling, and use them instead of food rewards for relief [21].
- Don't ban foods, eat primarily single ingredient food items (veg, fruit, nuts, cheese, meat, eggs, yogurt, beans, tubers, grains), but not exclusively to the point you feel restricted [21].
- Don't regularly buy foods that you tend to eat past the point of fullness [34].
- Put foods you eat past fullness in places you can't see and that aren't easy to access [34].
- Pay attention to satiety; try to be satisfied, but not full after each meal. A good practice is to ask yourself whether you are eating how much you need, or everything in front of you? Many times if you listen to your body, there should still be food on your plate [34].

My advice with the above is to choose 3–4 of the bullet points (especially ones that go well together) and work on incorporating them into your lifestyle for a month or two. As you're getting that down, visually assess if your physique is shaping up. No need to step on the scale, it's not actually your goal to be a certain weight, it's to achieve an aesthetic, which logically should be visible. If you're not seeing changes, first remember you're healthier and fitter for it regardless, but then incorporate another 3–4 of the bullet points. Repeat this process until you start to see body composition changes, which is very likely if you incorporate the majority.

In most cases, doing so will get you to a point of leanness where you'll get hungrier and your energy intake will go up. That's good! That will help you maintain that level of leanness while supporting your training more effectively, allowing hypertrophy to occur, and further progress to come from muscular gains. If you use internal cues within the context of the new lifestyle you've picked up, it will often pay dividends, even if it's mostly qualitative.

Now, what if it doesn't work? That's okay too. You might have to follow a more similar path to the competitive physique athlete. Meaning, you'll

have to first use quantitative tools to reach a lower body fat, and then transition to the situation described previously in scenario 1. Granted, it is harder to go from using external cues, to transitioning to listening to internal cues again, but it's what the vast majority of the successful, well-adjusted competitors learn to do who stick with the sport long-term. The process of tracking and weighing for many competitors helps to ingrain an awareness of one's habits, and of the energy and nutrients in foods which results in lasting habit changes. Then, those habit changes can eventually become more informed by internal vs. external cues. Make sure to read the above sections more directed to competitors if a qualitative, habit and internal-cued approach didn't lead to changes in body composition.

THREE-TIERED TRACKING AND HABIT AND INTERNAL CUE-BASED APPROACHES	
Best: Contest Prep, Cut for Weight Class	**Hit your macros within a certain + or - range.** First half of prep/weight cut: + or - 10 g ea/macro Second half of prep: + or - 5 g ea/macro
Better: Recovery, Diet Breaks, Other Cuts	**Hit your protein AND calories within a certain + or - range.** Protein + or - 10 g, Energy + or - 100 kcal
Good: When You Can't Estimate Macros	**Hit your target calorie goal within a certain + or - range.** Energy + or - 100 kcal
Habit and Internal Cues-based Approach	Aim for consistent implementation of habits after establishing accuracy and consistency with initial tracking. If you regularly undershoot protein, overeat dietary fat, miss out on fruits and veggies, or fail to execute any other beneficial behavior, monitor yourself around that one thing until you can achieve it consistently. Once mastered, find another behavior, repeat as necessary. Continue until habits are established in agreement with your goals. Use hunger and satiety to modulate energy intake naturally while ensuring guidelines from Levels 2–5 occurs habitually. *For weight gain goals, like a bodybuilding offseason, combine internal cues with infrequent weigh-ins. Be more or less full after meals to adjust intake as needed to reach target gain rate. *For moderate fat loss to sustainable levels (non-competition), adopt habits that increase satiety, reduce mindless eating, replace use of food for comfort or reward, aid hypertrophy and create structure to avoid snacking. Use visual changes to assess progress. Use tracking and weighing only if unsuccessful.

Social Environment

The entire purpose of this text was to give an evidence-based approach to some often-debated topics related to some not-so-common ways of living. Because you have chosen to embark on a different path than a lot of the rest of the world, it is quite possible that you will receive some resistance from various people in your life when they witness or are affected by your personal choices and habits.

Given that, I think it's important for me to leave some of my anecdotal recommendations for physique and strength athletes to better exist in society. I'm not simply talking about how you can make it through your day, because if you were able to purchase this guide you are probably doing alright in terms of basic survival. Rather, what I want to cover is how you can progress towards your athletic goals while maintaining an emotionally stable existence, and stay happy without alienating people in your life who deserve the best parts of you.

Support

From birth, we are obviously unable to do things on our own. Throughout the first few years of our lives, this continues on for survival. But beyond that, no matter how much people want to think they can do everything on their own, it is simply not the case. Humans have evolved to be social creatures, and it is imperative that we maintain relationships with other individuals in order to lead fulfilled lives.

This is not just about personal happiness, but also about your success as an athlete. Yes, I will argue that having a stable and supportive social environment aids your ability to increase your muscle and strength to some degree. The optimal amount of social engagement might be more or less for you depending on how introverted or extroverted you are, but human connection and support are necessary to some extent for all of us and it is imperative that we strive to balance this aspect of our lives and integrate it with our goals. Scientifically, there is a great deal of research that shows the beneficial effects of a positive support network on behavior change for nutrition and exercise [35–39]. It is for this reason that we emphasize *Team* 3DMJ, not just 3DMJ in our coaching model.

Framily

This word, "framily", is a catch-all phrase for your friends and family: your wife, your dad, your best friend, your coach, your colleagues, all the people who make up those you care about and who care about you and your life.

They can only support you if they understand what you're doing, what you're going through, how you experience it, and what it means to you. I've run into a lot of people who start eating different foods, start losing weight, and possibly even start dieting to get extremely lean for a competition without having some basic initial dialogue with their framily unit. Neglecting to do so can generally cause athletes to lose the support of their loved ones just a few shorts weeks into the dieting phase.

And this is not because their framily doesn't care about them, it's because their framily doesn't understand. So, I would really suggest that you enlist the aid of the people you care about and who care about you. Obtain a support network if you don't already have one and give them the communication they deserve, so they know what journey you are embarking on.

A support network can be online, at a local fitness club, an exercise class, or anywhere really; there's a lot of ways to do this. But get your support, find your framily, and explain to them what you're doing in a calm, collected, informative manner right from the beginning of your journey.

Communication

Once you've decided to have this conversation, you want to include not only what you are doing, but why you are doing it and why it is important to you. Your framily doesn't have to be a fan of bodybuilding or to "get" what you are doing necessarily. However, they do need to understand how you feel about it, why, and how important it is to you. I have a lot of framily members who flat out don't like bodybuilding. That's okay! What is important is that they love and respect me, and they show me support, even if they don't necessarily "get" the sport I compete in. Also, be explicit with your desires. For example, if you want the support of your loved ones you could say, "I would really appreciate your support

in this. It's going to be difficult for these reasons, at these times, and it would mean a lot to me just knowing that you have my back."

Don't make assumptions about what they do or don't know about what you're doing or why you're doing it, and likewise, don't make assumptions about why they're acting the way they're acting. Take responsibility for your choices and have dialogues with your framily on occasion throughout the process. Adult communication means stating what you need, informing the people you care about as to why it matters to you, and then asking for feedback on how you are holding up your end of the relationship as well.

It is extremely important to understand that asking for help is not weak. Anyone who is smart and who is honest with themselves shouldn't be afraid of looking weak. Showing your vulnerabilities takes true courage and puts you ahead of most people who don't show or admit to any vulnerability, and therefore can't meaningfully connect with others. So do yourself a favor as an athlete and communicate effectively, get the support you need, and interact with your loved ones responsibly in an emotionally mature way.

Also, remember that you are choosing to do this. If you are dieting or competing, that is your choice, and it is not reasonable to expect the world to change around you. Being emotionally healthy and being clear with your needs and expectations is not the same as acting as though you are entitled to different treatment because you voluntarily chose to get on a bodybuilding stage.

One of the goals I try to encourage my athletes to pursue is to try to leave as small of a social impact on those around them due to the process of dieting. Meaning, they try to live their lives during prep in a way that minimally affects their loved ones. This might mean still going out with the boys or girls on a weekend, but instead of drinking, offering to be the designated driver and ordering diet soda but still laughing it up and connecting with your friends. Or, instead of just eating your own pre-prepared meal at home and never taking your significant other out to eat, maybe you instead cook a meal and have a date night in and watch a movie.

Perhaps, even though you don't go out on dinner dates as much, you might go on movie dates. Or maybe, you do occasionally go on dinner dates during your diet, but you make the right choices so it doesn't get in the way of your nutritional targets. Proverbially (but probably not literally, unfortunately), the goal is to have your cake and eat it too.

Helping Others

Although your framily might not always know that it is helpful to ask questions and have regular dialogue with you about your health and fitness goals (until you train them to, of course), there will also be a select group of people on the flip side who cannot help but ask for advice and input from you. These individuals can typically be found at the gym where you train or amongst coworkers. I'm talking about the people in your daily life who notice your progress and want similar results for themselves.

Some people do a great job interacting with these people in an empathetic, intelligent, and open-minded way. Others, not so much, and often alienate, shame, judge, or even give out inappropriate advice to those they interact with. If you are someone who wants to be a leader in the fitness field, it is imperative that you understand that what you say can carry a lot of weight in the eyes of those who are seeking answers.

Here are some thoughts and strategies to help you carry on your training, your reputation, and your integrity without alienating or upsetting those around you.

Challenging Beliefs

Some of the things I've said in this book challenge the conventional wisdom of the old school or the beliefs held in certain fitness or nutrition communities. So, when people ask you for help, don't be surprised when sometimes they express shock that you aren't doing things that they think are required for success (such as banning certain foods or food groups, having rigid meal timing or frequency, etc). So, when you respond to questions do it in a way that you are not intentionally bashing tradition just for the sake of feeling smart or clever.

An example of handling this situation poorly are the common interactions you see when the topic of "if it fits your macros" vs. "clean and dirty" dietary approaches comes up. These conversations often lead to shame and bashing rather than education, which simply creates more deeply entrenched divisions. Both groups are trying to get healthy and be in better shape, but by developing two hard lined camps that throw stones at each other, neither learns anything from the other. What many of them don't know (or choose not to acknowledge) is that there are flawed philosophies on both sides.

You don't have to tell someone else they're stupid to answer a question. You don't need to attack individuals for being wrong, you can just focus on the information instead of making it personal. It's not necessary to "myth bust" and attack someone's idols to get across new concepts, and it's more likely to turn them off than convert them in many cases. You can just simply tell them what to do and the logical reason why to do it.

Don't approach conversations with a condescending mindset or tone of voice. When people ask you what you're doing or say, "Hey I thought [insert inaccurate claim here]", approach them without a shaming or condescending demeanor. If you do bash what they were doing in your explanation, you are more likely to put them on the defensive, embarrass them, and you are more likely to entrench them against the message you want them to learn.

Just try to explain to them what you're doing and why. And if they want more help, direct them to some of the resources that you learned from, and/or share more of what you do at your leisure. What you don't want to do is give out unsolicited advice or bash the opinions of anyone else who tells them different information than you do.

Unsolicited Advice

Let people come to you rather than approach them unsolicited because that indicates they are ready to learn and try something different than what they've been doing. If you're sitting on the bench press waiting between sets (or on social media), odds are if you even eavesdrop just a little, you're going to hear things that will make you want to face palm. Fight the urge of interrupting someone else that is either giving

advice or sharing what they are doing by giving unsolicited advice.

Understand that the person you hear saying these not-so-accurate, but very common philosophies, is not intentionally doing anything bad; he or she is just trying to help somebody reach the same goals we all want to reach. It's also worth pointing out that what the person receiving the "bad advice" was doing before (which may even be nothing) is possibly worse than even the incorrect or unnecessary advice they are receiving. So the simple fact that they're getting involved, asking questions and taking a step forward is a good thing.

Please remember that the "evidence-based" fitness professionals and the so-called "bros" are on the same team. It's just different mindsets and different approaches. If you don't corner yourself and put a label on what you're doing and what they are doing, you can actually learn from one another and the fitness community would actually see progress in more areas.

In short, be open-minded, compassionate, address false concepts instead of bashing individuals, and don't give unsolicited advice. Also, you don't need to make someone else feel stupid or wrong to give them advice when it is solicited. Just share your knowledge in a non-emotional, non-attacking, non-confrontational way when asked for it and you're more likely to actually effect positive changes than entrench others and create division.

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RESOURCES

I'd like to close out this guide with a list of resources for your further learning and application of the material discussed in The Muscle and Strength Pyramids. Please take the time to examine the following information, links, and people at your leisure for additional reference and in-depth discussions on training and nutritional topics involving physique and strength athletes.

NUTRITION CALCULATION AID

Here is the spreadsheet calculator to help you with the nutritional calculations in the book. The password for the page is "nutrition-aid".

THE ORIGINAL YOUTUBE SERIES (NUTRITION / TRAINING)

As discussed in the preface of this book, the Muscle and Strength Nutrition Pyramid was originally presented as a video series that I created for the 3D Muscle Journey YouTube channel back in 2013 (with the Training Pyramid in 2015). Many of the ideas are similar, and watching those videos may be useful for some people's absorption of the material. However, be weary in that some of the information may be outdated, which is why I have created this updated guide with current recommendations in accordance with more recent scientific findings.

Contributors To The Pyramids

Here are the links to access other resources available from myself, my coaching team, and my co-authors, Andrea and Andy. Without these ideas, videos and people, the creation of this pair of books would not have been possible.

RESOURCES FROM 3D MUSCLE JOURNEY

The home base for all 5 of the crew from Team 3D Muscle Journey. Here you can find our podcast, blog articles, videos, and information on coaching from Jeff Alberts, Brad Loomis, Alberto Nunez, Andrea Valdez, and yours truly. We offer coaching for both strength and physique sport competitors, and non-competitors.

- **Coaching**: We offer 3 methods of coaching and consulting to natural

bodybuilders, powerlifters, and serious weight lifters of all types.

- **Podcast**: Where the team regularly gets together to discuss the ins and outs of the coaching, competing, and lifestyle experiences of being a lifter.
- **YouTube**: Here you can find an abundance of free instructional videos and video diary series from many of our coaches on their very own athletic journeys.
- **3DMJ Vault**: This is where we've created numerous courses for strength athletes and physique competitors to become better students of their sport. We have both free and paid courses which span the spectrum of topics relevant to lifters and competitors, from posing, to muscle gain, to fat loss, to recovery, to proper lift execution.

MASS: MONTHLY APPLICATIONS IN STRENGTH SPORT

Eric teamed up with Greg Nuckols and Dr. Mike Zourdos to produce a monthly research round-up and review of the most relevant studies for strength and body composition improvement goals. The research review has videos each month by Mike and Eric, and seven written articles on recent research by the whole team. Continuing education for personal trainers, guest articles, audio summaries of articles, and additional subscriber content are all available if you sign up. Finally, you get access to all previously published issues going back to early 2017 if you become a subscriber.

SUBSCRIBE NOW >>

KIZEN: NUTRITION FOR LIFTERS

Eric teamed up with Omar Isuf and the Kizen crew to put together a video course on the ins and outs of nutrition for lifters. If you prefer video content to written, or if you want a simplified operationalized program based on all the principles of the pyramid, you definitely want to check this out. In addition to the video content, a spreadsheet helps you track and modify your progress over time. Both a gaining and fat loss series are available, those who get both get bonus sample meal templates to help them structure their nutrition.

RIPPEDBODY.COM (ANDY'S WEBSITE)

The content of Andy's site is delivered as an all-encompassing guide on how to adopt a straightforward, no-nonsense approach to your nutrition and training.

- **Coaching**: Andy specializes in working with those who are serious about their physique goals, but don't have plans on competing in a show.
- **The Last Shred**: He also has a book dedicated to making diet adjustments for your goals. This is an excellent companion to The Muscle and Strength Nutritional Pyramid, and a book I've contributed to as well.

ERIC'S RESEARCHGATE PROFILE

ResearchGate call themselves "The professional network for scientists and researchers", so that's what I use it for. Here you can find all of my publications, co-authors, abstracts, and contributions as an investigator in the field of nutritional sciences and human performance. When I am legally allowed, I also post up the full texts of the articles I have published. When I'm not allowed, you'll at least be able to read the abstracts and send me a personal message in regard to any of the publications.

FOLLOW US ON INSTAGRAM

If day to day content is your thing, we'd love you to join us on Instagram. **@Helms3DMJ** is Eric's personal account. **@andy_rippedbody** is Andy's personal account, a mix of coaching related memes, cars, and life in Japan. **@Team3DMJ** is the official 3D Muscle Journey team account.

Tools and Databases

FITGENIEAPP.COM

A smart nutrition app powered by artificial intelligence, FitGenie is a self-adjusting, smart calorie counter that tells you exactly what to eat to reach your goals. Eric is a co-founder and the concepts of the pyramids were used to develop the algorithms in the app. FitGenie combines the tools of a calorie counter with dynamic and adaptive macronutrient adjustments, such that based on your goals, adherence, weight loss, and subjective feedback, your nutrition plan changes over time. Additionally, premium users receive high quality, individual nutrition plans every week that hit their energy and macronutrient targets.

GRAVITUS.COM

The app for lifters, Gravitus allows you to track your training in highly intuitive ways, track your progress by plotting volume, sets, and various other metrics against estimated 1RM, and also interact socially with other users. Track personal bests, record your RPE, and support your community. You can even purchase The Muscle and Strength Pyramid sample programs in the Gravitus store and run them in the app with fully operationalized feedback so you can't mess it up.

EXAMINE.COM

This site proudly claims itself as, "Your unbiased source of nutrition information," and I'd have to agree 100%. Their database of dietary supplement information is unparalleled online, and the absolute best part about the depth of their research is the way it is presented in the Human effect Matrix, a tool for informing readers how strong the evidence is to support the proposed outcomes of these supplements.

MYFITNESSPAL.COM

Of all the food calculating databases, I'd say that MyFitnessPal is the most accessible and the most complete one on the market. Although there are options to pay for upgrades, the standard free web and mobile app does everything you'd need it to. Track your calories and

macronutrients manually at home, using a barcode scanner, or by using their large database of common restaurants and eateries as supplied within the app itself.

EATTHISMUCH.COM

Similar to some of the functions of FitGenie, Eat This Much helps you fit numbers to foods, and can be a great tool to develop sample, custom meal plans to hit your targets as a training wheel phase to tracking, or simply for convenience. To reiterate previous chapters, obviously meal plans aren't the end-goal and have limitations, but in certain phases of your journey this can be an excellent tool.

Companies, Courses, and Publications

JISSN.COM

This is the homepage for the Journal of the International Society of Sports Nutrition. This peer-reviewed publication is unique in that it is entirely open access. That means you can read the full texts of any of the studies published in this journal. The articles published in the JISSN can give insight into the acute and chronic effects of sports nutrition and supplementation strategies on body composition, physical performance and metabolism.

CITADELNUTRITION.COM

I wanted to include citadel Nutrition's website because it is one of the very few companies that I have found to give such transparency and attention to detail when it comes to the quality and integrity of their products. Their products are evidence based, and they also go out of their way to get the input from evidence based professionals in the field to ensure they are doing right by the customers. To give you an idea of their integrity, they are one of only two supplement companies that I have written articles for. No, I don't think supplements are necessary, but if you were going to purchase some, Citadel is a great candidate.

DE NOVO SUPPLEMENTS

Ran by some of the most genuine, intelligent, and altruistic folks in the

industry, De Novo is the other supplement company I've worked with besides Citadel. Like Citadel, they are evidence based, support lifters and do things right from both a quality and integrity perspective.

STRENGTHANDCONDITIONINGRESEARCH.COM

Strength and Conditioning Research is an encyclopedia of strength and conditioning methods for improving muscular strength, size and athletic performance. This is a monthly subscription to receive the latest research, trends, and summaries of unmissable information as curated by Chris Beardsley.

THE SBS ACADEMY

The Shredded By Science Academy is where I have the unique privilege of specifically teaching an entire course for personal trainers to learn how to coach physique athletes. Everything from coaching psychology, to training theory, nutritional theory, posing, peaking, and the offseason. This was organized by Luke Johnson, in my opinion one of the best educators in the fitness industry for personal trainers. He got Dr. Mike Zourdos on board to teach trainers how to coach powerlifters in a similarly in depth manner! Definitely check out this material if you're looking to enter the physique or strength coaching industries.

Other Awesome Websites Worth Checking Out

THESTRENGTHATHLETE.COM

The Strength Athlete has quickly become one of the most successful coaching services for raw drug-free powerlifters in their industry. Founded by one of my personal 3DMJ coaching clients, IPF raw world champion Bryce Lewis, this site offers weekly coaching, online consultations, and an abundance of free articles and programs for lifters of all levels. Bryce is a master when it comes to creating resources for the drug-free raw powerlifting community. He has a unique combination of an analytical yet creative mind, artistic talent, and he and his team have a lot of experience as coaches. He was the artistic designer for the pyramid images that appear in both books, and the excel-wizard who created our webpage where purchasers of The Muscle and Strength Nutrition Pyramid can set up their nutrition plan.

WEIGHTOLOGY.NET

James Krieger is by far one of the sharpest minds in the fitness industry who writes both free and subscriber-based articles for his research review on improving body composition. Not only does he have decades of experience as a coach and has competed in men's physique himself, but he has in-depth knowledge of both nutritional and exercise physiology. Finally, he has been involved with many of the most influential meta-analyses published on resistance training and nutrition which define a large part of current best practice. Subscribers to his research review get regular updates on in-house meta-analyses on training and nutrition.

STRONGERBYSCIENCE.COM

This website, primarily authored by former world record-holding powerlifter Greg Nuckols, has become one of the best sources of original content on strength training on the web in the last couple of years and is growing rapidly. Check it out.

RENAISSANCEPERIODIZATION.COM

Coaching, books, articles, and meal plan templates for strength and

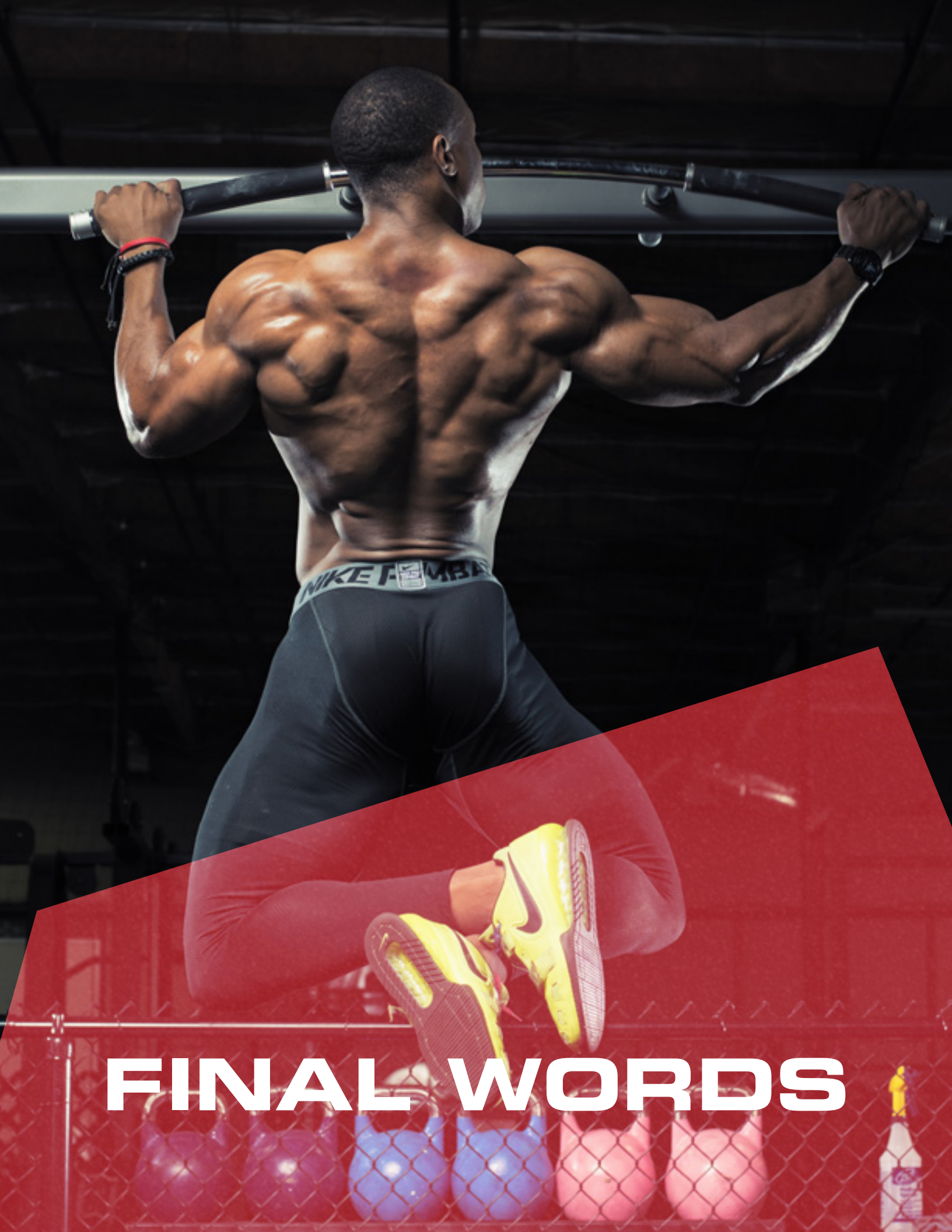
physique athletes are provided by a team of experienced health and academic professionals at RP. In addition, RP supports science in the areas of sports performance and body composition, providing unattached funds to researchers for studies o*f the researchers' choice unrelated to RP.* They are truly paying it forward and helping the forward march of knowledge and I'm honored to say that they have helped to fund my research projects multiple times.

LOOKGREATNAKED.COM

Researcher Dr. Brad Schoenfeld's blog. A good opportunity to see an exercise scientist with a lot of experience in the trenches as a trainer discussing their latest research and the limitations in a transparent and authentic manner. His applied research is well-presented for those who find some scientific literature daunting or difficult to understand.

REACTIVETRAININGSYSTEMS.COM

Founded by World Champion IPF raw powerlifter Mike Tuchscherer, Reactive Training Systems is a wealth of knowledge for anyone interested in gaining strength. Not only are they publishing content at the forefront of autoregulation in strength training, they also provide custom coaching services and a variety of products to further your programming education.



FINAL WORDS

Final Word from Eric Helms

First, let me just say thank you for reading. The fact that you read through this entire book gives me a profound sense of accomplishment. While it may seem like "just a fitness book" to some, this book represents the entirety of my professional, personal, and academic knowledge as it relates to lifting, which is my life's passion. The hours, days, weeks, months and years spent reading scientific articles and textbooks, performing experiments, writing and reviewing published papers, teaching personal trainers, teaching undergraduate and graduate exercise science and nutrition students, mentoring research degree students, presenting at conferences, debating and discussing topics on and offline, helping athletes develop from novices to intermediates, to elite competitors, to world champions, and the years of putting the theory to practice as an athlete myself, has culminated in what you just read. While it is important to me that you benefit from this information whether you are an athlete, a coach or a recreational trainee, I also want you to know that just by reading this book you've taken the time to step into my experience. For that, I want to thank you as that act is an incredible sign of respect that I don't take lightly.

Also, I hope that the big picture concepts in this book have shifted your perspective for the better. I hope now that you are able to differentiate between what is most important, and what might not matter at all. I also hope that you can shift away from black and white thinking and instead understand the aspects of context and individuality that will help you surpass your goals and reach new goals in a much more time efficient manner.

Finally, I want to take the time to say thank you to all the people who have helped me develop into the person I am today and influenced my development as a professional coach, educator, and researcher. You know who you are, and in fact, I've probably told you as much in person or online. But, I want you to see this book in many ways as your own because I truly could not have done this without you. To Andrea and Andy, a huge thanks for providing the structure, organization, and motivation to put this together. This book is infinitely better because of the two of you and you both have a drive and a passion that is rare in this world, and I am grateful to have you in my corner!

To the reader, I'm sure you will be hungry for more and I encourage you to check out the resources section of this book that will help you flesh out your understanding of the concepts you learned here, and that will also complement this information. Also, be sure to keep an eye on The Muscle and Strength Pyramids website as well, as we have resources available to those who purchased the books. Additionally, our website will be updated with useful information, links, and blog posts, and you can also contact us through it if you have any pressing questions.

Once again, thank you and good luck!

Sincerely,
- Eric

Final Word From Andy Morgan

When Eric first asked me to work on this project it was probably the happiest moment of my career. Though three years have passed since we published the original editions of these books, I still struggle with a degree of imposter syndrome as a co-author.

There are certainly others who are far more qualified for the job and I think it would be fair for you to wonder why he chose me.

To be sure, there was a healthy mix of luck and karma involved in this happening, but it would be disingenuous to not acknowledge the consistent hard work as being a critical factor of any modicum of career success I have had so far. And, as I have a feeling that the lessons I have learned will remain true for any young fitness professionals reading today, I'd like to take this opportunity to tell you briefly about it.

What surprises people who know me in person is that, in a particular corner of the internet, people see me as something of an authority figure on building a coaching business online. But this is something that happened entirely by accident.

Similar to many, feeling lost upon graduation as to what to do with my life, I left Birmingham in the UK in 2005 to teach English in Japan for a year while I learned karate, thinking this would give me time to figure

my life out. Still there in 2011, I decided to start a blog with the idea of helping my Japanese gym friends. With the language barrier, there exists an information gap where charlatans thrive, and I was sick of seeing my friends (and the populace as a whole) ripped off.

I started making summary articles in English to help me translate them into Japanese. I also wrote about the methods I used to help the few personal training clients I had. It was years before anybody looked or cared about the Japanese part of the site, but fortunately, very early on I had a guy called Phil from San Francisco ask me in the comments of one English blog post how much I charged for online coaching...

My online coaching program was born.

I started to write about working with people online, which attracted more clients. I used part of the money to hire a guy who I knew through some friends who I heard was studying translation. This was an absolute killer stroke of luck. Unbeknown to me at the time, he had tested out as one of the most intellectually gifted students in his area when he was younger. He knew nothing about fitness but wanted to practice his translation skills. Now seven years later he has self-studied to a level where he has the respect of even the most bitingly-critical academics in the fitness industry here. This man is called Kengo Yao, I owe him a debt of gratitude, and he has been the driving force behind our Japanese website's success ever since.

In early 2015, I approached Eric to ask if we could make a short ebook version of his Training Pyramid YouTube series to give away for free to our Japanese readers. Eric graciously gave us the go-ahead, and Ken made a 30-page booklet. It was a hit, and the quality of the structure and content so impressed Eric that he asked me to help him put together an English version.

Ken's original layout formed the base from which I created the first draft of the Training Pyramid. But my main contribution to the first editions of these books was to pull more and more information out of Eric at every revision and to get him to write in a way simple enough for even a dummy like me to understand.

In these second editions, I've had a far greater role in the writing process, but credit for the vast majority of the content belongs to him.

This project has been a humbling experience. At the time we first wrote them I had been coaching people for a few years, and I thought I knew the topic well enough, but this collaboration (and the people it has connected me with) turned out to be a real blessing for my education. I am now comfortable enough to say with a straight face that I am good at what I do in the niche population that I work with (*serious* trainees, but not competitors like Eric and his coaching team), but I am still keenly aware that there is a vast amount that I have yet to learn.

I remember around five years ago, I was told of a comment made by someone I looked up to a great deal in the industry which went something like this: "Andy's a nice guy, but not the kind of person to change the industry."

Well, at the time I absolutely agreed with that comment, but now I am not so sure.

What if, by helping to spread the work of others and be the bridge between Japan and the West, I do change the Japanese fitness industry for the better? Would that count?

If I think of the unique impact I can leave on the world when I am gone, I think Japan is where the opportunity lies. There are thousands of us who speak to the western fitness industry, and I am confident that the coming generation [yes you, reading this] are going to crush it moving forward, but I am unique in what I can do here.

For the longest of times, I didn't see a path forward. I felt lost, silly, and have been close to quitting on multiple occasions. However, there are three things, principles that I held on to, which I think ultimately kept me going and I feel they may be relevant for you also:

Always be honest. Your word is your bond and reputation is fragile. I had told people I would do my best and I knew they were counting on me, so I felt I could not let them down.

Aim to be the dumbest in your friend group. Do your best to surround yourself with people smarter than you. It's the people I met who inspired me and picked me up when I was down. Meeting people online is nice, but fly to conferences to meet people if you can. There is no substitute for face to face interaction.

Always be helpful, whenever you possibly can, and *expect nothing in return*. The world is full of takers; be a giver, and you will stand out. This can lead to friendships, both personal and professional that will last a lifetime and affect your career in unimaginable ways. It certainly has for me.

From the heart, I'd like to thank you for picking up these books and reading these words. I wish you all the best with your fitness journey whether that is for yourself or in the professional capacity of helping others. If you ever feel the need to get in touch, I'm always available in the comments on my site, and if you'd like to join me in the weird world they call Instagram, here's my account name: **@andy_rippedbody**.

Peace,
- Andy

Final Word From Andrea Valdez

Now that you have made your way through this guide, I'm sure that you are completely sold on the fact that Eric Helms is simply brilliant for a number of reasons. The only thing I'd like to take credit for is recognizing this information early enough to do something about it.

Back in 2011, when I first discovered the wonders of YouTube, Eric and the other coaches of Team 3D Muscle Journey began changing my life from afar with their unconventional outlook on training and nutrition. It was because of these four gentlemen that I was able to come out of my own post-contest depression and get my normal existence back.

The next year I began sharing what I had learned on my own website and was accepted as one of their athletes for my 2013 contest season. I moved across the country to be around the 3DMJ buzz of coaches, teammates, training meet-ups, and competitions for the following two years. By 2015, I had worked my way into becoming the fifth and only

non-original coach to be added to Team 3D Muscle Journey and I could not be more humbled to call them my family.

I don't tell you this to brag (although I really am quite proud of the company I keep), but more so to let you readers know how much it truly means to me that you have taken the time to read this.

This is not a simple project that took a few months to put together, it actually originated from years of writing, failing, succeeding, competing, suffering, investing, learning, and evolving. Yes, I am now a part of one of the best natural bodybuilding and strength teams in the world, but the basis of all my education began with those YouTube videos so long ago.

And one video series in particular (Eric's Nutrition Pyramid, obviously) was the catalyst that pulled me out of many psychological and physiological issues that had arisen due to my chronic under-eating and lack of dietary prioritization... And that situation is a prime example of why it was so important for me to help bring these books into the world.

I know the value of this information you have just read, and I consider it one of my life's biggest achievements to have helped spread these ideas to those who need to hear them. This is not about telling people how to "be optimal" with their training and nutrition, but more about giving them the tools to navigate through their frustrations, failures, and mental hang-ups in order to proceed toward their goals with minimal negative outcomes. This mission is a damn important one and I am happy to share it with Eric and Andy.

I can only hope that you have enjoyed our work as much as we have enjoyed putting it together for you. Eric's incredible breadth of knowledge mixed with Andy's prowess with all things internet business enabled me to transcribe and edit my little fingers to the bone for these little gems to become what they are. Our combined efforts have turned a few whiteboard cell phone videos into the most comprehensive manuals in our industry to date.

But all that said, I think it's high time I acknowledged you.

For those of you reading this, those who have invested time in their

education, I'd like to thank you for being the type of person whose curiosity will continue to further this field of study for decades to come. It's people like you, those who truly have a passion for science-based learning with an open mind, that will also be the role models, leaders, researchers, and spokespersons for people who truly need it in the future. It's quite a large responsibility, but after reading these guides, I think you can handle it :)

With tons of love and appreciation,
- Andrea

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