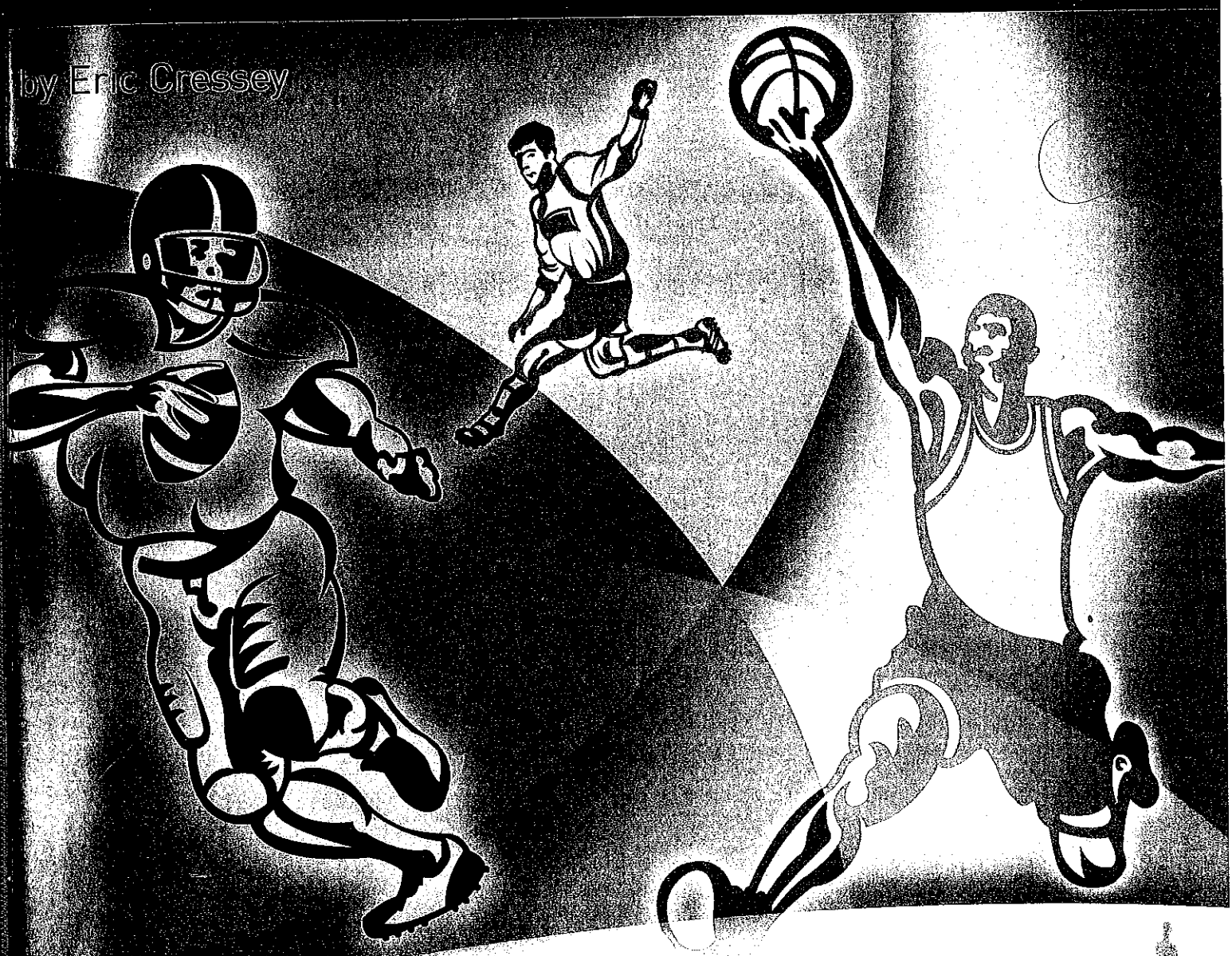
THE ULTIMATE OFF-SEASON Training Manual

by Eric Cressey



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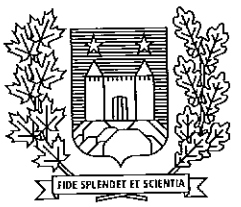

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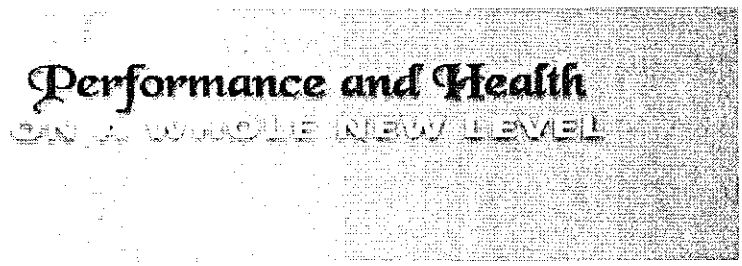

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Disclaimer

The information in this book is offered for educational purposes only; the reader should be cautioned that there is an inherent risk assumed by the participant with any form of physical activity. With that in mind, those participating in strength and conditioning programs should check with their physician prior to initiating such activities. Anyone participating in these activities should understand that such training initiatives may be dangerous if performed incorrectly. The author assumes no liability for injury; this is purely an educational manual to guide those already proficient with the demands of such programming.

Dedication

To my grandparents, Ellen and Marty Fagan, for your unyielding love and unwavering support. Thank you for showing the rest of us the true meaning of "family."

Foreword

"One's first step in wisdom is to question everything – and one's last is to come to terms with everything."

-Georg Christoph Lichtenburg

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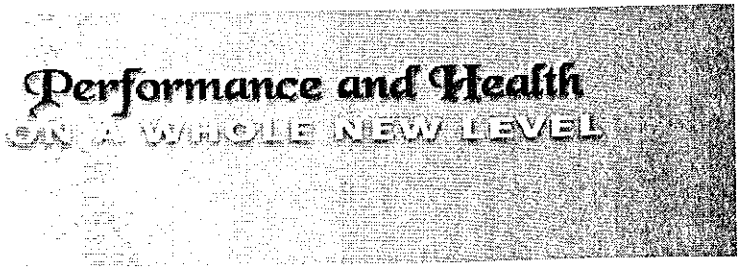

Not a week goes by that I don't receive a dozen emails from athletes who want the secret to getting bigger, leaner, faster, stronger, and more agile in the off-season. They don't want to just improve; they want to ***dominate*** their competition when the next season arrives.

While I absolutely love their enthusiasm, dealing with these individuals can actually be extremely frustrating. They all want results, and they all want them yesterday, but apparently they don't like it when I refuse to tell them what they *want to hear.*

As you scan the pages that follow, many of you will probably feel just as confused as those emailing me do; you might even disagree with me to the point of refusing to read on. However, before you do, ask yourself if you disagree with me because you feel that I'm genuinely wrong in my reasoning, or because my reasoning simply calls into question principles and practices to which you've adhered for years.

Whether you're a coach, parent, or an athlete yourself, this book might not be what you *want to hear*, but it is something that you *need to hear.*

In reading this novel, you can expect to rethink what you are doing and possibly even regret what you have done in the past. In the process, I hope that you'll all walk away from this text with a new paradigm with which to view off-season training.

Conversely, you should *not* expect to find programming that you can simply copy and paste to use with your athletes, clients, children, or yourself. I am a firm believer that the single-most important component of preparing for athletic success and physical transformation is individualization, and that belief will resound throughout this book. All athletes are unique, and programming must reflect each athlete's distinctive needs.

Yes, I have included sample templates at the end of this manual; however, the purpose of these templates is to demonstrate a sample "whole" created from dozens of constituent parts. If you want to learn how to create programs that address your unique needs as a coach and athlete, it's imperative that you first look to the chapters that precede the sample programming. These chapters outline the means to the end; the programs alone will not tell you much – and they may not be suitable for *you*.

If you're a coach looking to existing literature as a means of "pirating" programs for your athletes, you need to consider whether doing so is in the best interests of your athletes or just the individual marketing the cookie-cutter program. In no way am I intending to come across as condescending, as I'll be the first to admit that all coaches – myself included – have areas in which they need to grow.

Rather, my message is that downright terrible coaches don't look to the literature at all. Mediocre coaches look to these resources so that they can have someone else tell them *exactly* what to do. The best coaches read diligently and

critically, scrutinizing everything they encounter to determine if it is correct and, if so, how it can be incorporated into their existing philosophies.

It is my hope that you'll treat the information that follows in this final context. You've already taken a key step; you purchased this book in hopes of making your coaching and programming more effective in order to help your athletes.

As an accomplished exercise scientist, coach, and athlete myself, it never ceases to amaze me that the problems I will outline are even commonly found in the off-season programs of some of the most prominent strength and conditioning professionals at the highest levels. The shortcomings of such programming errors are "merely" significant at the intermediate level; however, at the elite level, these programming flaws may cost athletes Olympic medals, national championships, individual honors, and millions of dollars in salaries and bonuses.

Those of you who are familiar with my writing will likely notice that this work deviates somewhat from my traditional style, which often includes dozens of references. My rationale is very simple: you won't find this information in your undergraduate textbooks or the peer-reviewed publications most commonly referenced in our industry. Instead, you'll only find this information from getting in the trenches, working with athletes, and seeing what works. That's what I've done, and that's what dozens of fantastic coaches with whom I correspond on a weekly basis have done.

If there is information in this text, you can assume that it is the result of countless hours of planning, coaching, and interpreting the results we've found. It's all about reading between the lines – not just referencing what's on the lines.

This is a guide for the practitioner – whether he is a coach or an athlete. If you are someone interested in reading a review of scientific literature that simply doesn't cut it in the real world – where "what is" predominates over "what should be" – this manual isn't for you.

As powerlifter and coach Dave Tate, one of my mentors and friends, has said: "Science tells us what we did." Science might point you in the right direction, but it should never tell you what to do. Instead, experimentation validated with results should tell you what works – and just as importantly, what you use in future situations to *guarantee* success.

Therefore, it should come as no surprise that experimentation in training settings around the world is occurring every day. New anecdotal and scientific evidence abounds, and we must seek it out. Our perspectives should be constantly evolving as new information becomes available to us.

With that in mind, interpret the information in this book as a 2006 snapshot; many of these ideas may evolve in the years to come. Continue to read and scrutinize, and you'll be at the top of your field and your game.

It's time to put hidden agendas aside and apply scientific principles and some actual thought to our off-season training programs. *It's time to get to the truth.*

Eric M. Cressey
May 24, 2006
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Chapter 1: Introduction

"Mistakes are the portals of discovery."

-James Joyce

The recent surge in popularity of youth performance enhancement training in today's world of athletics is a fantastic thing. As I think back to my own experiences as an up-and-coming athlete, I realize that effective coaching *beyond just the field and court* would definitely have made me a much better athlete.

Improving my general physical abilities would have made it easier to learn new techniques in my sport. My balance, strength, coordination, speed, and agility would all have been better. I wouldn't have been injured as often. My confidence both on and off the field and court would have been better, making me an even better leader on the field and in the classroom. I would have had more opportunities – perhaps even scholarship offers. If I had what some kids have at their fingertips today, things could have been a lot different.

In this day in age, some of us have begun to understand how powerful the development of the general athlete really can be – especially when that development occurs at a young age. In spite of the insistence of some overbearing individuals in positions of authority in youth sports, we're gradually coming to realize that early sports specialization is rarely a good thing.

While we have people like Tiger Woods showing us that early specialization does pay off in some cases, we also have a plethora of young athletes – most notably tennis players and gymnasts – for whom early sports specialization has had devastating consequences. The consequences of early specialization may be psychological, physical, or a combination of the two.

We've observed mental burnout leading to legal troubles, drug abuse, or simply wanting to quit. And, we've heard about overuse injuries and conditions such as stress fractures and tendinosis. Regardless of what shortchanges these athletes in pursuit of what were once their dreams, the take-home message is the same: we need to let our young athletes develop, not specialize.

As I mentioned, we're getting to that point, thanks to certain industry leaders and parents and coaches who really "get it." In that sense, I'm proud of our industry; we're progressing toward building better athletes and better people with our youth sports systems by encouraging them to play when the time is right and train at performance enhancement facilities to enhance general athletic qualities.

Ideally, we'll someday see an altogether elimination of year-round organized competitive seasons that typify youth sports like basketball and soccer. Kids will put in their 3-5 months of competition and then spend the rest of the year participating in other sports to develop generally and, just as importantly, experience some fun instead of just pressure. All the while, these athletes should be participating in strength and conditioning measures aimed at making them better athletes – not just basketball, soccer, football, or hockey players, etc.

Millions of coaches, parents, and athletes covet this utopia, but it is not the focus of this book. Rather, my intention in this book is to bring to light the fact that there is a large class of athletes who ***are*** ready to specialize. However, many of these athletes and those coaching them are largely missing

the boat; they simply don't have a true appreciation for when or how to specialize!

Amazingly, in spite of the fact that the balance has inappropriately been shifted to the specialization end of the spectrum for much too long, athletes and coaches still haven't been learning important lessons on how to make it work when the time is right. My goal in this book is to teach you not only *when* to specialize, but *how* to specialize when that crucial time arises.

Chapter 2:
Counterintuition and the Black Hole

"Perhaps the most valuable result of all education is the ability to make yourself do the thing you have to do, when it ought to be done, whether you like it or not; it is the first lesson that ought to be learned; and however early a man's training begins, it is probably the last lesson that he learns thoroughly."

-Thomas H. Huxley

The Athletic Continuum

All athletic endeavors fall on some point along an aerobic-anaerobic continuum, with the vast majority falling somewhere in the middle. As such, in looking to select the training approaches most conducive to an athlete's goals, we need to cover the "what" before we can get to the "how."

While every activity in which we participate requires contributions from all the energy systems, the discussion at hand will focus on the *predominant* energy systems involved in a given activity. The aerobic-anaerobic continuum is illustrated in Figure 2.1.

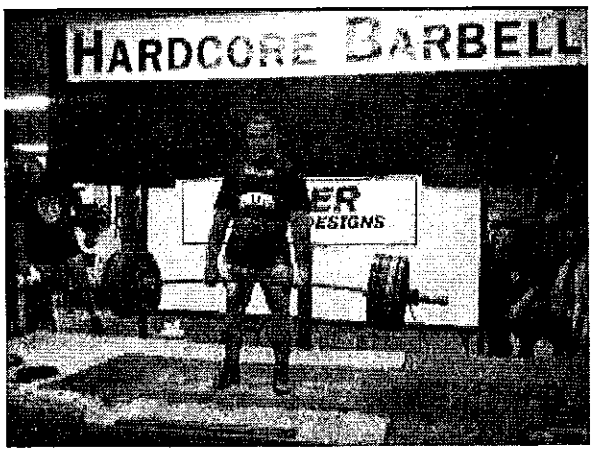
Figure 2.1: The Aerobic-Anaerobic Continuum

Very Aerobic----------Mixed----------Very Anaerobic

As an example, take Jon Boyle, a high-level triathlete with whom I work.

John competes in Ironman triathlons, which include a 2.4-mile swim, 112-mile bike, and 26.2-mile run. Clearly, Jon is about as far to the "aerobic" end of the continuum as they come.

Conversely, let's consider Greg Panora, an Elite powerlifter with whom I worked to help correct a lower back problem. Greg's best total (squat + bench + deadlift) to date is 2,365 pounds at a body weight of 242 pounds.



As a powerlifter myself, I'll venture a guess that Greg wouldn't even dream of doing loads of exercise to enhance his aerobic capacity; it'd make him weak so quickly that he wouldn't know what hit him. We fall as far to the right (anaerobic end) of the continuum as possible, as it makes us successful in our sport.

With athletes like Jon and Greg in mind, let's get a bit more specific with our continuum with some broad examples:

Triathlons-----Black Hole of Athleticism-----Powerlifters

Marathons-----Black Hole of Athleticism-----Shotput

You might be wondering what this "Black Hole of Athleticism" is. To be blunt, it's where many coaches and athletes falter in the planning and execution of training. Virtually all team sports – including soccer, field hockey, lacrosse, hockey, football, and volleyball (in that order, left to right) – fall into this black hole.

Each sport will have its own unique place along the continuum within this black hole, so the challenge in program design is to determine where the "ideal" position along this continuum is for a particular sport. And, more specifically, one must understand where each athlete in that sport fits based on individual and positional factors. Only then can a coach effectively program for the entire training year and – specific to the present discussion – the off-season.

Training in the Black Hole

Intuitively, it would seem that the best way to fall into one's appropriate place on this continuum in order to maximize performance would be to simply participate in one's sport year-round. This participation would, of course, be supplemented with conditioning sessions that are specific to the metabolic demands of the sport in question.

This widespread, yet ***completely incorrect*** assumption is clearly evidenced by the surge in popularity of young-athlete training centers pushing year-round cookie-cutter group "speed" training sessions. While marketed as "speed" sessions, these interventions are in fact poorly supervised, non-scientific, random running drills that only condition the athletes to move at the same speed for longer – but never at a faster speed.

There is a noteworthy difference between "conditioning" sessions and "speed" training. The former serves only to enhance short-term metabolic preparedness, while the latter seeks to effect favorable changes in the powerful neuromuscular system that governs performance via long-term adaptations.

Again, my intention is not to criticize; I'm glad that our industry is growing in popularity and we're attracting enthusiastic coaches. We just need to point this enthusiasm in the right direction.

Chapter 3: The Problems with Modern "Speed Training" Facilities

"Honesty pays, but it doesn't seem to pay enough to suit some people."

-F.M. Hubbard

The Status Quo

Even the most novice student of exercise physiology could not ignore the fundamental shortcomings of the "speed" programs in today's cookie-cutter facilities. Nonetheless, the individuals writing such programs continue to steadfastly adhere to such modalities. Why? As my fifth-grade teacher taught me, "Money makes the world go round." Specifically:

1. Conditioning sessions allow a coach to "supervise" (and I use that term very loosely, in the case of these facilities) several athletes at once, so it is possible to improve the facility's bottom line through sheer volume of participants and a high participant-to-coach ratio.

2. Conditioning sessions require less educated and skilled coaches who can obviously be paid lower wages. In many cases, these facilities simply have their uneducated interns supervise such sessions. It takes much less knowledge to simply tell an athlete to run than it does to instruct an athlete *how* to run; identify technique flaws, structural imbalances, and biomechanical inefficiencies; and implement programs that will improve neuromuscular efficiency and, in turn, performance.

It's much easier to tell a young athlete to "just run" than it is to teach him *how* to run faster and implement programming that will make him stronger and more powerful.

3. Conditioning sessions do not typically last as long as sessions geared toward improving neuromuscular efficiency. When training for speed, strength, and optimal technique, athletes must be allowed sufficient rest periods between efforts; therefore, effective sessions require considerable time devoted to short-term recuperation.

Conditioning sessions, on the other hand, are based on the concept of increasing training density – doing more work in the given period of time – to improve sport-specific endurance. The more athletes a facility can "run through the gauntlet" in a day, the easier it is for the owners to pay the rent and buy fancy sports cars.

4. Conditioning sessions require very little equipment; some cones, a whistle, and maybe a stopwatch will get the job done. Training to improve neuromuscular function almost always requires the use of outside implements – most

notably resistance training equipment – that are more expensive and require more space in a facility.

5. Conducting conditioning sessions instead of programming to improve neuromuscular function allows even the smartest sport scientists to be lazy – both in their thinking and coaching practices.

6. Metabolic conditioning is more rapidly attained than neuromuscular efficiency. So, if a coach is more interested in impressing a parent or athlete in a very short amount of time in order to encourage future cash expenditures for coaching, he'll be able to demonstrate changes in the short-term just by practicing a given skill (e.g., 40-yard dash).

This improvement is short-lived, and such practice amounts to beating one's head against a wall once the first plateau is encountered shortly thereafter. Neuromuscular adaptations may take time, but they provide a foundation for continual improvements for the duration of an athlete's career. Conversely, metabolic conditioning is an acute quality that is more rapidly improved (and detrained, for that matter).

A Useful Analogy

To illustrate my point, one can think of the conditioning versus neuromuscular training conundrum as a leak in the roof. Conditioning sessions are a bucket catching the water – a quick fix, if you will. Neuromuscular training addresses the underlying problems, patching up the hole in the roof and providing for the future.

For the off-season athlete, the "holes in the roof" may be related to any of several shortcomings:

- Poor maximal strength (and, more specifically, relative strength)
- Poor strength-speed
- Poor speed-strength
- Poor explosive strength (rate of force development)
- Lack of reactive ability
- Insufficient mobility/dynamic flexibility
- Structural imbalances
- Technical flaws (technique should not be addressed under conditions of fatigue)
- Excessive body fat
- Soft tissue restrictions
- Existing injuries that require rest and/or rehabilitation (these would likely be exacerbated by the high-volume conditioning sessions, which would just reinforce poor technique and faulty neuromuscular compensation patterns)

Where This Leaves Us

The problems seen with these facilities are often magnified by the misinformation circulated by the coaches of the athletes' teams. I can't tell you how frustrating it is to deal with a head coach who insists on long-distance running in the off-season for athletes involved in lacrosse, soccer, field hockey, and – perhaps worst of all – football. While performance enhancement coaches seek to do the job they're educated to do, some sport coaches may undermine their efforts by pushing conditioning work that impairs an athlete's ability to address the problems noted above.

This conflict of interests and recommendations underscores the importance of open lines of communication between strength and conditioning coaches and sport coaches. A simple conversation between these two entities can often make the difference between average results and phenomenal results for the athletes with whom they work.

Unfortunately, because most sport coaches, athletes, parents, and even some trainers are nothing more than casual observers when it comes to exercise physiology, the "be in game condition year-round" intuition often becomes the norm in sport training. If you want to dominate your competition, though, you have to learn to be *counterintuitive* with your training, especially if you participate in one of the "Black Hole" sports that requires a balance of aerobic and anaerobic qualities.

Simply playing one's ***specific*** sport year-round does not allow for the optimal development of several ***general*** qualities key to athletic performance. With that in mind, the chapters that follow will outline an effective approach to off-season prioritization and sequencing in order to develop the ***general*** athlete. This general foundation will, in turn, provide for the emergence of a more proficient ***specialized*** athlete down the road.

Chapter 4: Your Average Joe Example

"It is not worth an intelligent man's time to be in the majority. By definition, there are already enough people to do that."

-G.H. Hardy

Our Average Joe

I have extensive experience with basketball players at all levels, and as a result, I have a frame of reference when I say without wavering that this is the sport in which these off-season problems rear their ugly heads the most. As such, our Average Joe will be a 20 year-old small forward playing college basketball.

Joe grew up playing streetball, improving as much due to physical maturity as he did due to hard work and actual game experience. Intuitively, Joe assumes that what has worked in the past is sure to work forever. Unfortunately for Joe, his assumption couldn't be further from the truth.

Our Average Joe's "official" college basketball season runs from November 1 to roughly March 15 – about 18 weeks in all. Preseason games typically begin the first week in November, and the ones that count start the last week in November. As such, the month of October is the college basketball preseason period in most coaches' eyes.

That gives Joe 30 off-season weeks per year to prepare himself to be the best player he can be. Why not 52 weeks? Those of us who have ever played a sport know that in-season training will never be an ideal scenario to make progress in fitness qualities (although I have still seen athletes make remarkable progress at this time). The rigors of competition, constant pounding on the body, and the considerable aerobic

stimulus many athletes face make strength and speed gains much tougher to attain.

Why not 34 weeks? Preseason is going to be pretty darn hard on Joe; he can rule out October as a time to really make big gains. Preseason is just like the in-season period – only harder! We all know that coaches like to get their athletes mentally tough with insane amounts of training volume during this time period.

Following the "intuitive" approach, Joe spends his off-seasons playing streetball, participating in voluntary on-court workouts with teammates, attending a summer camp or two, and playing a few hours of video games each day. It's basketball, basketball, and more basketball – *playing* (*conditioning*, if you will), but no real *training*.

Nonetheless, Joe decides that he's going to suddenly become extremely devoted to becoming a ridiculous athlete. Our man is actually going to hit the weight room in the off-season *in addition* to his hours on the court each day. And, since he's so dead-set on becoming the next NBA superstar, he decides that he'll need the most intricate, individualized program that will match his sudden, tremendous dedication and persistent attitude. So, in between video games, Joe turns on his computer and fires me an email to ask me what I think he should do.

My response (with elaboration, of course) is essentially, "Cut your time on the court by 90%. You can't ride two horses with one saddle, and nobody wins championships, MVP awards,

or even starting jobs by being in game-ready condition in the **off-season**. Sometimes, the best way to improve in your sport is to avoid that sport."

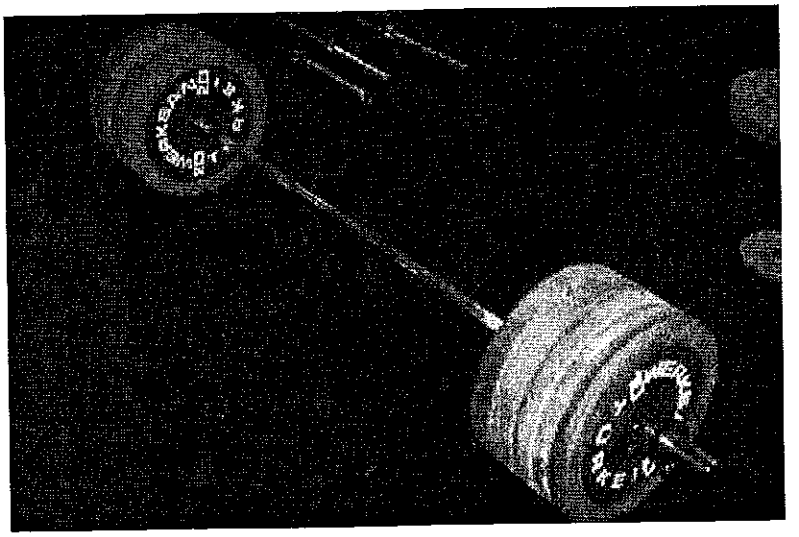
Less than 1% of all the Average Joes out there will believe me the first time. The remaining 99% will either respond with something along the lines of "huh?" or I'll never hear from them again. As I noted in the introduction, these are the individuals who are upset that they haven't been told what they want to hear. They want me to tell them that playing streetball is what they need because *it's fun*.

Why Average Just Won't Cut It

Unfortunately for guys like Joe, there are two problems with asking me to justify their off-season "fun."

First, I'm not a good liar, so I wouldn't be able to sleep at night if I just told them what they wanted to hear, only to send them off on a non-productive off-season journey.

Second, *playing isn't training*. And, to them, it follows that training can't be fun; the basketball world as a whole has yet to embrace resistance training like other sports. Apparently, squats, lunges, deadlifts, presses, rows, chin-ups, and depth jumps just aren't as satisfying as jump shots, crossovers, pick 'n rolls, and alley-oops. I hate to publicize a stereotype, but I've been around enough players at all levels to assure you that this is, for the most part, what is going on.



Not quite as appealing as an alley-oop, is it?

Those with the "it's not fun" and "lifting isn't important for me" mindsets are destined to keep spinning their wheels. Meanwhile, the one-percenters return the following season to take their starting jobs and, worse yet, "posterize" the naysayers in pick-up games, 30,000-seat arenas filled to capacity, and on national television in front of millions of laughing sports fans.

So, the logical next question is, "Where are the 99% athletes failing?" Let's depict this using a chart and our basketball example. In addition to using the continuum as our x-axis, we need to account for "total fitness," as one can improve or detrain various qualities throughout the year; we'll arbitrarily assign total fitness a value between 0 and 10 (10 being superior fitness).

- For the sake of this discussion (just to show relative changes), we'll call Joe's in-season total fitness score a "4."

- Based on previous research (1), we know that basketball's "ideal" in-season position on the aerobic-anaerobic continuum is at approximately 80% anaerobic, 20% aerobic (this will be different for each sport).

- Due to the inferiority of programming (or altogether lack of training) in most in-season programs, total fitness qualities will fall off during the course of the season, largely due to accumulated fatigue. So, while Joe may be a "4" at 20/80 aerobic/anaerobic proficiency at start of the

season, he'll likely fall off to a "3" by the end of the season.

- Likewise, you'll see a shift away from the anaerobic end of the continuum as the long season progresses; basketball is a lot of endurance work that does not allow for the maintenance and/or improvement of power and maximal strength over extended periods of time. So, Joe shifts down toward the 30/70 range to become a "3" at 30/70.

- Joe goes into the off-season and does his normal pseudo in-season thing, but at lesser volume. As such, by removing some of the fatigue he's accumulated, he brings himself up to a "4" at 30/70 initially. Ultimately, he gets right back to where he started in time for the next season, checking in at "4" and 20/80. There's no net improvement in physical preparedness in spite of a lot of hard work; if he improved at all as a player, it was likely due to tactical or experiential factors. Or, Joe may just "earn" a starting job because the guy playing ahead of him graduated!

Please take a few minutes to consider all these fluctuations and orient yourself to Figure 4.1:

Figure 4.1: Basketball Preparedness

Fitness										
10										
9										
8										
7										
6										
5										
4							OS	EIS		
3							LIS			
2										
1										
0	10	20	30	40	50	60	70	80	90	100

% Anaerobic

OS = Off-Season
EIS = Early In-Season
LIS = Late In-Season

Hopefully, you're able to see that Joe takes a beating during the season, so his physical abilities fall off due to:

1. Detraining of certain qualities, most notably maximal strength and peak power output (as a result of prolonged exposure to an aerobic training stimulus)
2. Acute and chronic fatigue preventing him from displaying his true fitness levels (remember that fatigue masks fitness).

The end result is a shift down and to the left on the chart as a result. When the season ends, Joe has a chance to recover a bit, but then he makes a crucial mistake: he goes back to banging his head against the wall by returning to his old (read: in-season) habits – just with less volume. There's less fatigue, so he can display his fitness better; this shifts him slightly up and eventually to the right on the chart. It amounts to a cycle of non-productivity; he always ends up right where he started. The next season comes, and he's still on the bench not even getting a look from the junior varsity cheerleaders – let alone the NBA scouts.

Chapter 5: The "What:" Defining the Goal

"The reason most people never reach their goals is that they don't define them, or ever serious consider them as believable or achievable. Winners can tell you where they are going, what they plan to do along the way, and who will be sharing the adventure with them."

-Denis Watley

Setting Joe Straight

If we wanted to design a program that would overcome the flaws in Joe's "logic," where would we like it to take us? Well, if we know that simply playing the game (as we do in-season) will draw us to the left of our "ideal" spot, we need to select training modalities that will position us to the right of our "ideal" at the beginning of our season, and preferably at a higher total fitness level.

In other words, as demonstrated in Figure 5.1, relative to his old chart, Joe wants to be in a position further up and to the right at start of the preseason.

Figure 5.1: Basketball Preparedness with a Good Off-Season Program

Fitness										
10										
9									Joe is a	
8									Stud in a	
7									Good Off-	
6									Season	
5									Program	
4							OS	EIS		
3							LIS			
2										
1										
0	10	20	30	40	50	60	70	80	90	100

% Anaerobic

OS = Off-Season
EIS = Early In-Season
LIS = Late In-Season

From thousands of Average Joes' previous off-season experiences, we know that just playing one's sport and dabbling in other training methods won't get the job done. The Average Joes of the world need a scientifically backed, *counterintuitive* approach to guarantee that they'll return the following season more physically prepared. The secret to continuous improvement year-after-year is to appropriately time various training modalities in the context of the metabolic demands and pre/in/post-season timing of each particular sport.

Exceptions to the Rules

Before we get to the specifics on how to succeed in this broad category of sports, it's important that we qualify these recommendations, as they aren't appropriate for all athletes. There are three main exceptions to these recommendations:

1. Inappropriate Early Specialization

Depending on the sport, young athletes should use caution with specialization at too early an age. Obviously, this is a very open-ended issue, but suffice it to say that most kids would be much better off if they just focused on being athletic and having fun than spending the entire year trying to improve in one sport.

This is a view shared by numerous authorities on the topic of youth training; the American Academy of Pediatrics cautions that "youngsters should be discouraged from specializing in a single sport before adolescence to avoid physical and psychological damage. The risks range from 'overuse' injuries such as stress fractures to delayed menstruation, eating disorders, emotional stress, and burnout" (2). **In the context of training for sports performance, children simply cannot be viewed as "small adults."**

Furthermore, research has shown that off-season variety (resistance training and sports participation) is not inferior to a resistance-training-only program in developing general strength

qualities in high school football players (3). In fact, from a developmental standpoint, variety actually enhances physical development in athletes at this level by expanding the motor pool from which an athlete draws.

According to Brian Grasso, founder and executive director of the International Youth Conditioning Association (IYCA: www.iyca.org):

> **Sport coaches who require young athletes to participate in one sport for extended periods of time are actually shooting themselves in the foot with respect to future ability. To learn complex skills associated with baseball, for instance, a young athlete will be restricted to what they have been exposed to and can neurally call upon in terms of practical athletic intelligence. A young athlete who has been exposed to baseball only, likely will lack the athletic dexterity necessary to perform advanced skills in that sport (4).**

Sports such as gymnastics and figure skating may be exceptions to this rule. The competitive peak generally occurs at a much younger age in these sports, so they may demand earlier specialization.

2. Athletes with Long Competitive Seasons

Athletes (such as tennis players and golfers, to name a few) with long competitive seasons and frequent competitions

do not fall into the Black Hole, as they must essentially be in in-season condition almost year-round. From a programming standpoint, these athletes are basically destined to "ride two horses with one saddle."

3. The Majority of Endurance Athletes

While endurance athletes do benefit from periods away from prolonged duration exercise, these phases are too brief to be considered "true" off-seasons. Therefore, it is best to address neuromuscular efficiency somewhat uniformly throughout the year with such athletes. Doing so allows a coach to avoid compromising endurance performance with temporary detraining of certain physiological adaptations that are crucial for successful endurance performance.

I will say, however, that I have trained endurance athletes in the off-season in this manner when the limiting factors for performance are peak power and maximal strength. Very simply, if an athlete doesn't have good peak power, he won't have good power endurance. And, given that insufficient maximal strength has a ceiling effect on peak power, improving maximal strength is often the quickest means to rapid improvement with such athletes.

If an endurance athlete is seriously lacking maximal strength, the ability to display that strength quickly (RFD), or reactive ability, he would be wise to address these factors in the early off-season and beginning stages of the general off-seasons. Volume should be accumulated in later phases as the competition season approaches. This certainly breaks with the

traditional "Super-Slow Machine Circuit with Long, Slow Distance Training Year-Round" approach to training. Last time I checked, all endurance competitions were about who could finish a set distance the fastest – not who could go the longest.

Recently, this approach worked extremely well with a triathlete to whom I was a consultant. In spite of being a successful athlete, he was just weak all over! It was amazing how close his *best* 1-mile time was to his *average* mile time over the course of an entire race – whether it was 5k or a full marathon. His performance was severely limited by insufficient maximal strength and power and reactive ability; he needed to learn how to go faster *period* before he could go faster for longer.

I won't digress too much, though, as I can't imagine there are more than five endurance athletes reading this manual (probably by accident, too)! Anyway, with these three qualifications in mind, let's set the stage so that we can get to the "how" in Chapter 8.

Chapter 6: Learning from the Football Guys

"This is what learning is. You suddenly understand something you've understood all your life, but in a new way."

-Doris Lessing

Football vs. Basketball

When you think of superior vertical jumps - one of the single-best predictors of sport performance – I'll bet that you immediately think of NBA players effortlessly jumping through the roof. You might be interested to know, however, that the vertical jump numbers at the NFL combine always blow those seen at the NBA combine out of the water!

Take, for instance, the 2003 NBA combine, where only one of the 76 prospects tested had a vertical jump of greater than 35 inches. The average vertical jump was actually *less than* 30 inches for all five positions. Now, consider that there are a dozen or so 40+ inch vertical jumps at each year's NFL combine; you could even say that they're becoming relatively *commonplace*. In fact, in that same 2003 year, of the twelve *quarterbacks* who participated in the combine, ***three*** jumped over 35 inches! So what's the deal?

1. Basketball is pseudo-aerobic (play is more continuous), whereas football is almost completely anaerobic; the average football play lasts 4-5 seconds and is followed by a 20-25 second pause (5). Basketball guys are essentially running laps for 40-48 minutes.

2. Using professional basketball and football as standards (and excluding post-season play), the competitive basketball season (roughly six months) is 50% longer than the competitive football season (approximately four

months). So, football players have more time in the off-season to address neuromuscular efficiency qualities – most notably maximal strength, power, and reactive ability.

3. During the competitive season, basketball players have considerably more "exposures" to true competition than football players. Hoops guys will regularly play up to 3-4 games per week and run game-speed drills and scrimmages in practice. Conversely, football players compete fully only once per week and may only participate in 1-2 full-pad practices per week – neither of which usually qualifies as truly "game-like."

4. This considerable aerobic training stimulus over a prolonged period of time has a negative effect on maximal strength, power, and reactive ability in basketball players.

Taking It a Step Further...

In my opinion, however, this discussion requires attention to a few other profound differences between basketball and football.

First, as I discussed with my Average Joe example, basketball players are notorious for playing year-round. When was the last time that you heard about a football player jumping into another semi-competitive season after his normal season ended? It goes without saying that it's much easier to get ten guys together for a full-court basketball scrimmage than it is to assemble 22 athletes for a true football scrimmage.

Second, while it may sound like a stereotype, the overwhelming majority of basketball players and coaches are light-years behind their football counterparts in terms of appreciating resistance training and other strength and conditioning measures. As a result, they wind up spinning their wheels in the off-season while football players will come back faster and stronger year-after-year simply because they don't specialize in the off-season. The best football players don't *play* in the off-season; they *train*.

Potential Injury Ramifications: One Example

In light of the discussion at hand, one must also consider whether ineffective off-season programming could play a significant role in the alarming rate of lower back problems in collegiate and professional basketball players. I'm not one to speculate – and I even debated on whether or not to include this information – but one prominent sports physician I encountered once estimated that as much as 60-80% of professional basketball players have degenerative disc disease to some extent. And, this doesn't even take into account problems we see from unrelated spasms, spondylolisthesis (vertebral "slippage"), and all-around "aches and pains."

Given the nature of the sport, this "phenomenon" doesn't really seem that phenomenal. Basketball is characterized by frequent high-impact stop-and-go actions, a firm court surface, and repeated, rapid lumbar extension (and, surely, *hyper*extension, as when reaching back for a rebound). Additionally, given the nature of its participants' body types (taller athletes = longer spines), is this really a surprise?

Think of David Robinson, whose career ended somewhat prematurely due to chronic back problems. What very few people realize is that his career would have ended much earlier if he hadn't taken a different approach to the off-season in the latter portion of his career. What was that approach? He got off the court completely in the off-season and did other things to stay active. And, by developing his body in a general

context, he not only prolonged his career, but also helped the San Antonio Spurs to an NBA championship in 2003.

Still not convinced? Do a little background reading on Karl Malone, one of the most durable and successful players in NBA history. Malone was well known for barely even touching a basketball in the off-season; instead, he spent his off-seasons throwing around tons of iron in the weight room. It's funny that nobody ever complained about his shooting touch disappearing, although it wasn't uncommon for opponents to complain after Malone pushed them around with the strong, dense frame he'd built over decades of productive off-seasons.

Coaches need to realize that you simply can't run big men like you run little guys, and you can't run *anybody* year-round. It makes sense that we see the most profound fallout in those most predisposed to such problems in a sport where the off-season programming is the most inappropriate.

Even More Evidence!

As further evidence of the value of avoiding true sport participation except in competition, think of the training of world-class sprinters. When was the last time you heard of an elite 100m sprinter preparing by running full-on 100m sprints and even longer distances? Never!

These athletes train to optimize technique, strength, and power in the off-season using strength training, short sprints (10-50m), and tempo runs. While a tempo run is closer to the distance of the actual race, it's run at a lower intensity in order to improve sprinting mechanics and enhance recovery – not build competition-specific endurance.

In other words, it's not unreasonable to liken a tempo run to a basketball player doing some easy drills on the court, or a soccer player doing some possession drills in a small area. Coaches and athletes need to realize that you can train technique and tactics without falling into the metabolic conditioning "trap."

Going Faster vs. Going Longer

You have to develop maximal power ***before*** you can develop power endurance. Otherwise, you won't be preparing for maximal performance; instead, you'll be conditioning yourself for prolonged submaximal performance. Let's consider an example to illustrate my point.

Imagine two running backs both put in the same hypothetical scenario. Their teams are both up by one point, and there is only five minutes to go in the game. Their head coaches simply want to wind down the clock and win the game by just running for a few first downs; they can't risk throwing the ball. As such, a heavy load is placed on our running backs' shoulders.

Running Back A can run a 4.30 40-yard dash, and Running Back B can run a 4.80 40-yard dash. We know that – all else held equal – Running Back A is going to be able to "hit the holes" created by his blockers faster on a single play and increase the likelihood of a first down with that carry.

However, let's assume that Running Back B really devoted himself to metabolic conditioning in the off-season so that he could be the "go-to" guy play after play after play. He wanted to be as strong in the fourth quarter as he was in the first quarter, so he prioritized a lot of repeated sprints with incomplete rest in the off-season.

For the sake of argument, let's assume that his efforts led him to his goal, so his drop-off is 50% of Running Back A's drop-off on each successive effort. In other words, relatively speaking, his endurance is twice as good.

So, if we matched these guys up in a repeated 40-yard dash contest with 25-second intervals between sprints (designed to simulate a ten-play drive), we might get something like this:

Figure 6.1: The Go-Faster Guy vs. Go-Longer Guy

Sprint #	Running Back A	Running Back B
1	4.30	4.80
2	4.36	4.83
3	4.42	4.86
4	4.48	4.89
5	4.54	4.92
6	4.60	4.95
7	4.66	4.98
8	4.72	5.01
9	4.76	5.04
10	4.80	5.07

Running Back A's *last* sprint was as fast as Running Back B's first *sprint*. Is it any wonder why the NFL combine focuses almost exclusively on non-endurance measures of performance? The guy who runs a 4.30 has a heck of a lot more "upside" than the guy who is running a 4.80!

Now, just imagine what would happen if you took Running Back A and metabolically conditioned him at the appropriate time of year to get him to sustain his performance at a level close to that of Running Back B. He'd be running at a 4.50-rate well into the fourth quarter and breaking 50-yard touchdown runs when you were just expecting him to run out the clock! That's a good "problem" to have, isn't it?

Meanwhile, Running Back B would either be riding the pine or preparing for a go at the New York City Marathon. All the while, he'd overlooked the fact that a correct off-season training program could have set him up to dominate the competition with powerful efforts from the first snap to the last minute of the fourth quarter.

The take-home message is that you can have your cake and eat it, too; you can be powerful and still attain that power endurance. You just have to train intelligently and do certain things at certain times in the training year. Read on.

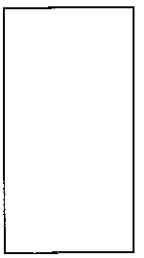
Chapter 7: Is the Glass Half-Full or Half-Empty?

"All animals are equal, but some animals are more equal than others."

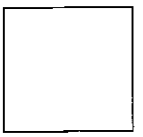
-George Orwell

A Useful Analogy for Optimists and Pessimists Alike

Here's an analogy I like to use with my athletes when I try to relate these points to them. Imagine you represent two different athletes with an 8 oz glass (Athlete A) and a 4 oz glass (Athlete B).



Athlete A (8 oz glass)



Athlete B (4 oz glass)

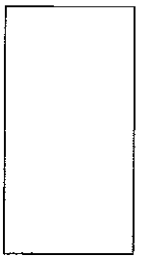
For the sake of this discussion, the size – or capacity – of the glass is our maximal strength. In essence, the more strength we have, the more specific physical attributes (fluid) we can put in our glass; maximal strength is the foundation for everything. These attributes include power, strength endurance, and agility – all of which can be limited by insufficient strength.

Before we move on, I want to make clear that I'm talking about maximal ***relative*** strength; that is, strength relative to one's body weight. While some athletes do need to add body mass, relative strength will always be more important than absolute strength for the majority of athletes.

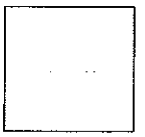
I'd be much happier with an athlete whose squat went from 300 to 400 pounds without a change in body weight than with an athlete who had to gain 50 pounds to make that jump. The heavier athlete will have to run, jump, and decelerate with that extra 50 pounds in the world of athletics. Sure, much of it will be muscle mass, but we still need to be cognizant of finding the right body weight for athletes; relative strength takes the cake. If you don't believe me, try strapping on a 50-pound weight vest and walking around for the day; you'll get the picture pretty quickly.

The best way to determine if added body weight is "functional" mass is to keep track of one's vertical jump as he gains weight. If the vertical jump continues to improve, he's all set. If he gains weight and it goes down, you probably need to back off the calories a bit – unless added muscle mass is going to help him in other ways (i.e., more cushioning to protect against injury, or larger surface area to block opponents).

Now, let's assume that both athletes/glasses have 4 oz of fluid (athletic ability) in them.



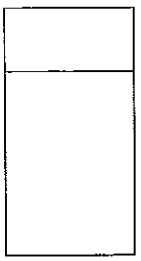
Athlete A (8 oz glass, 4 oz fluid)



Athlete B (4 oz glass, 4 oz fluid)

From a performance standpoint, they may be completely equal – right now. However, from a *potential* for physical improvement standpoint, Athlete A certainly has the upper hand; he has more "trainability." To improve, Athlete A needs to address the individual attributes – and most likely continue to improve the size of the glass with more maximal strength work so that he never plateaus.

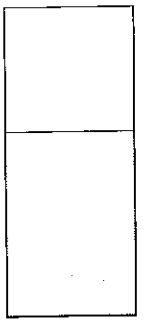
Addressing the power, endurance, and agility (not at the same time) might turn Athlete A into 6 oz fluid in an 8 oz glass.



Athlete A after addressing qualities other than maximal strength (8 oz glass, 6 oz fluid)

I should note that power and agility work in opposition to endurance, but for the sake of this discussion, we can essentially group them together simply because they aren't maximal strength. Training these qualities exclusively might also drop maximal strength, so that 8 oz glass could become a 7 oz glass (as we see in the post-season period in many athletes).

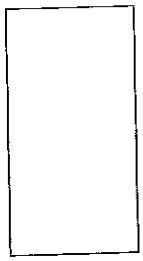
Moreover, addressing both maximal strength and one or more of these qualities will turn him into 6 oz fluid in a 10 oz glass – a much better scenario.



Athlete A after enhancing maximal strength and other qualities – most likely power and agility – in the off-season (10 oz glass, 6 oz fluid)

Athlete B, on the other hand, can't add any fluid to his glass; his lack of maximal strength is standing in the way of him developing the qualities that will make him a successful athlete. If he wants to get better, he needs to get stronger first – period.

Let's say that Athlete B hits the weights hard and builds some maximal relative strength in his off-season. When the season rolls around, he's at an 8 oz glass and has managed to maintain his 4 oz fluid (yes, it's possible; maximal strength is that important).



Athlete B after a solid off-season of maximal strength gains (8 oz glass, 4 oz fluid)

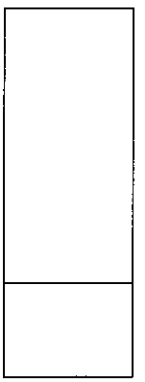
Athlete B is now poised to take advantage of this newfound strength as he applies it in sport-specific contexts in the new season at hand. His agility, power, and endurance will go through the roof.

What's that? You don't believe me? "A powerlifter can't teach me anything," you say?

Putting My Money Where My Mouth Is

As a frame of reference, I'll use myself. In April of 2005, my vertical jump was 26 inches: not too shabby, but far from spectacular. For my sport (powerlifting), a vertical jump isn't nearly as valid a predictor of success as maximal strength (e.g., 1-rep maximum squat, bench press, and deadlift). At the time, I was already quite strong for my body weight (my best deadlift was 518 pounds at a competitive body weight of 165).

You could say that I had a big glass: lots of maximal strength – and more specifically maximal relative strength. I didn't have much fluid in the glass, though, as I don't train those qualities as much because they aren't as important to my sport. My power output was only decent (as indicated by the average vertical jump, *power*lifting isn't *power*ful at all), agility was nothing of which I'd boast, and my endurance was practically non-existent (powerlifting is one rep). Let's arbitrarily say that I was a 12 oz glass with 3 oz of fluid:



EC: Strong, but not much of a runner or jumper (12 oz glass, 3 oz fluid)

Now, fast-forward almost exactly one year to April of 2006, when I tested my vertical jump again. I had remained heavily involved in powerlifting during the year in question, so you can be sure that I wasn't training for anything other than to get stronger; this sport is all about maximal strength. My deadlift had risen to 617 pounds – still at 165 pounds of body weight.

I went out and jumped 30 inches.

"Huh?"

"That shouldn't have happened, right?"

"Eric – Your glass was almost completely empty, and you didn't directly train for power!"

What Happened to Cressey?

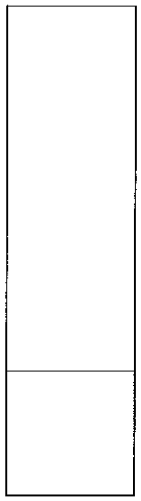
What had happened was that by making my glass bigger (enhancing my maximal relative strength), I had further broadened my foundation for improvements in all these other realms. Sure, we did some power and rate of force development work with speed squats and deadlifts and the occasional box and broad jumps, but I wasn't doing the jump training exercises people normally associate with improving one's vertical jump.

I just got stronger. Most athletes would be extremely wise to pay attention to my example.

You see, maximal relative strength has a "trickle-down" effect to all things athletic. If you took your best squat from 200 pounds to 400 pounds, a single body weight squat would feel a lot easier, wouldn't it? How about a single vertical jump? You have about 0.2 seconds to exert force on a classic vertical jump test; you'll never make use of all the strength that you have, regardless of how good your rate of force development (explosive strength) is.

However, let's say (hypothetically) that you can put 50% of your maximal strength to work in that short time period. If we keep that percentage constant, isn't an athlete with more maximal strength automatically at a great advantage? The 200-pound squatter can exert 100 pounds of force into the ground; the 400-pound squatter can exert 200 pounds. Is there really any question as to who can jump higher?

In my example, I was probably using 25% (3 oz fluid) of my maximal strength (12 oz glass) in those 0.2 seconds in April of 2005. One year later, that 25% hadn't changed, but the size of the glass had. In the retest, I was up around a 16 oz glass with 4 oz fluid.



EC: Stronger than before – but still a lot of untapped jumping and endurance potential – not to mention an ugly glass! (16 oz glass, 4 oz fluid)

If I wanted to jump through the roof, it would be as simple as dedicating myself to training designed to enhance my reactive ability and rate of force development – both of which will allow me to make use of more of the strength I possess in that 0.2 second window.

Now, let's take this a step further to the endurance end of the spectrum. If you go from 200 to 400 pounds on that 1-rep max squat, wouldn't a set of 20 body weight squats feel easier?

If you could do lunges with 100 pound dumbbells in each hand, wouldn't running five miles with just your body weight feel easier? You may have never thought of it, but every athletic endurance endeavor is really nothing more than a series of submaximal efforts.

Piecing Together the Puzzle

The take-home message is that with a few rare exceptions, building more maximal strength is not going to hurt you. Anyone who tells you that being strong will make you slower is flat-out wrong. As long as you're not training with super-slow tempos and your body weight isn't increasing out of proportion to those strength gains, you'll get faster – a lot faster.

Unfortunately for the Average Joes in the crowd, you simply cannot develop maximal strength – or power and agility – optimally when faced with a profound endurance-training stimulus. The millions of athletes like Joe need to play less and train more.

Again, I reiterate that you do not win awards for being game-conditioned in the off-season.

Chapter 8: The "How"

"A goal without a plan is just a wish."

-Antoine de Saint-Exupery

When *Don't* I Specialize, and How?

While it may seem counterintuitive, once you've realized that you're ready to truly specialize in one sport, the single best thing you can do is avoid your sport in its EXACT nature for large parts of the year. Broadly speaking, divide your entire training year into three separate phases: preseason, in-season, and off-season.

Next, in the context of our discussion we need to subdivide the off-season into the early off-season, general off-season, and late off-season. Determining the points at which the early, general, and late off-season periods should be separated is a task dependent on each sport. Decisions in this regard should be based on five factors:

1. **Competitive season duration** – In addition to the individual differences between sports, there will also be variation among players within each sport depending on the level of success attained in the season. Teams that do not qualify for post-season play will be able to start the early off-season sooner, effectively giving them more time to prepare for the subsequent year.

2. **Amount of fatigue accumulated** – The duration of the early off-season period – as well as the type of training included in this phase – will be dependent on the athlete's physical and emotional state at season's end. If an athlete accumulated an appreciable amount of fatigue

over the course of a season, he will require a more prolonged early off-season phase.

3. **Schedule of the subsequent preseason** – With respect to this factor, one should consider if the athlete will be facing a short preseason where competitions will occur immediately upon return to participation. Or, will several weeks elapse in the preseason prior to the first competition?

4. **The athlete's proficiency with sport-specific metabolic conditioning** – In the transition from the general off-season to the late off-season, this factor is particularly important, as will be clarified in further detail in Chapter 12.

5. **The position of the sport on the aerobic-anaerobic continuum** – Again, as you'll learn in Chapter 12, the more aerobic a sport, the sooner the late off-season must begin.

Sample Yearly Planning Models for Various Sports

Sample yearly divisions for several randomly chosen scenarios can be found on the pages that follow. Note that all divisions are based on what would be seen in starters who play a significant amount of minutes throughout the season; non-starters who do not get much playing time might jump directly into the general off-season phase. For the sake of standardization (and simplicity), let's also assume that our sample athletes are of average-proficiency with respect to metabolic conditioning in their particular sports.

I would strongly encourage you to draw up a chart for your own sport in the "notes" column as you read through this chapter. You'll find that doing so will make planning the individual programs within the off-season much easier when we get to that task later in the manual.

Figure 8.1: Professional basketball player on a non-playoff team

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.

--------IS---------][EO][-------GO--------][LO][PS][----IS-----

Figure 8.2 (for comparison): Professional basketball player on a team that goes to the NBA finals

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.

------------IS-------------][EO][---GO--][LO][PS][----IS-----

Notice that the length of the in-season period cuts into the duration of the off-season; this further underscores the need for effective off-season programming – not more work on the court!

Figure 8.3: College football player on a team receiving a bowl bid

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.

[EO][----------GO----------][LO][PS][---------IS----------]

Figure 8.4: College soccer player on an NCAA championship team

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.

[----------GO----------][-LO-][PS][-------IS------][EO]

Note that given the more aerobic nature of soccer, the late off-season period is extended slightly to allow more time for metabolic conditioning.

Figure 8.5 (for comparison): College soccer player on a team that does not qualify for post-season play

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.

----------GO----------][-LO-][PS][-----IS----][EO][GO

This extra lengthy off-season should give rise to outstanding improvements in neuromuscular efficiency if off-season programming is appropriate.

Figure 8.6: Professional hockey player on a non-playoff team

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.

--------IS----------][EO][----GO----][LO][PS][------IS--------

Figure 8.7: Professional baseball player on a team that reaches the World Series

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.

-GO-][LO][PS][----------IS----------][EO][GO-

Figure 8.8 (for comparison): Professional baseball player on a non-playoff team

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.

-GO-][LO][PS][----------IS----------][EO][---GO---

With an early end to the season, the months of October and November can actually be very productive times.

Figure 8.9: College field hockey player on a team that does not qualify for post-season play

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.

----------GO----------][-LO-][PS][-----IS----][EO][GO

Field hockey, like soccer, is one of the more aerobic field sports, so the late off-season period is extended slightly.

To determine the yearly model for your situation, start with the duration of your competitive season, and then work backward. Everything that isn't the competitive season is the off-season or preseason (for all intents and purposes, you can treat the preseason as part of the competitive season). Subdivide your off-season according to the principles outlined in this manual, and you've got a broad template from which to attack your programming.

Before We Move On...

I feel that it is important that I make clear that for the duration of the three distinct off-season periods, one should still pay attention to tactical work in some regard. As examples, basketball players should continue to shoot and dribble, receivers should run easy routes and catch passes, soccer players should have a ball at their feet, and so on.

Training or maintaining sport proficiency in the form of tactical work is fine, but *metabolic conditioning* needs to take the backseat – at least until the late off-season. At these times of year, seek optimal performance with sufficient recovery; don't push the envelope with "gassers," 300-yard shuttles, dozens of 40-yard sprints with incomplete recovery, and (worst of all) 8-mile runs at that horrible 70-90% intensity zone that turns beasts into marathoner look-alikes.

Chapter 9: The Early Off-Season

"Take rest; a field that has rested gives a bountiful crop."

-Ovid

Early Off-Season Goals

The early off-season is a period during which athletes should be allowed to recover from the rigors of the competitive season. Nonetheless, at the same time, it must be seen as the foundation of a successful off-season program. The early off-season phase is generally a time to cut back on volume of sport-specific movement patterns and anything that can be perceived as overly stressful to the neuromuscular system.

Be forewarned, however, that many athletes allow the early off-season phase to last much too long. While the prehabilitation emphasis should continue for the duration of the off-season (and the entire year, for that matter), the markedly lowered neuromuscular stress period shouldn't last more than 1-3 weeks in the overwhelming majority of cases.

The logical next question, though, is, "How do we know when to end the early off-season regeneration period?" The answer to this question could be a book in itself, but I'll do my best to establish a framework upon which you can base your decisions.

Over-what? Over-everything!

In their classic review, "The Unknown Mechanism of the Overtraining Syndrome," Lawrence Armstrong and Jaci VanHeest discussed the importance of differentiating among overload, over-reaching, overtraining, and the overtraining syndrome (OTS). They defined the terms as follows (6):

Overload – "a planned, systematic, progressive increase in training stimuli that is required for improvements in strength, power, and endurance"

Over-reaching – "training that involves a brief period of overload, with inadequate recovery, that exceeds the athlete's adaptive capacity. This process involves a temporary performance decrement lasting from several days to several weeks."

Overtraining – training that "exceeds over-reaching and results in frank physiological maladaptation(s) and chronically reduced exercise performance. It proceeds from imbalances between training and recovery, exercise and exercise capacity, stress and stress tolerance; training exceeds recovery, exercise exceeds one's capacity, and stressors exceed one's stress tolerance."

Overtraining Syndrome (OTS) – "a set of persistent physical and psychological symptoms that occur subsequent to prolonged application of heavy training loads. The critical

diagnostic factor is a chronic decrease in performance, not simply the existence of SAS [signs and symptoms]."

Overload is inherent to a successful training process. Over-reaching is actually quite valuable when used appropriately (as in the sample templates that appear in Chapter 14), but it is far from overtraining – a term that is thrown around far too often. Over-reaching may be attained in as little as 7-10 days, and remedied in a matter of days or weeks with adequate deloading. Conversely, the process of overtraining must take place for months for the outcome, OTS, to be apparent. Recovery from OTS requires at least several weeks – and more often several months; you really have to go out of your way to get OTS.

Since high level performance – and even just normal physical health – is a priority, it is imperative that coaches, parents, and athletes recognize the signs and symptoms of over-reaching and overtraining syndrome – and the differences between the two. According to available literature, the signs and symptoms of OTS may include (6):

- Decreased physical performance
- General fatigue, malaise, loss of vigor
- Insomnia
- Change in appetite
- Irritability, restlessness, excitability, anxiety
- Loss of body weight
- Loss of motivation
- Lack of mental concentration
- Feelings of depression

What All These "Overs" Mean to You

Many of these signs and symptoms are shared between over-reaching and OTS, so how do we know the difference? How do we know when to hold back for a day or two (for overload recovery), 7-21 days (over-reaching), or even months (overtraining syndrome)?

Unfortunately, as much as I would like to be able to offer you the magic answer, I can't do so. The scientific community has yet to agree on a single, highly sensitive diagnostic test to differentiate among the three.

In fact, the only diagnostic tests that are universally accurate are those of physical performance; if performance drops off, there must be some degree of accumulated fatigue. Other measures – such as heart rate, bloodwork, metabolic rate, substrate metabolism, and a host more – are subject to so many factors that they are hardly reliable tests of one's training status.

So, what is a coach to do in the early off-season? First, communicate with the athletes. And, more specifically, in a team setting, communicate with the athletes who you know to be completely honest and not swayed by incredible motivation or utter laziness. The overachievers will want to overachieve, and the slackers will want to slack; you need to know which athletes will paint you the most accurate picture. Find out how they feel.

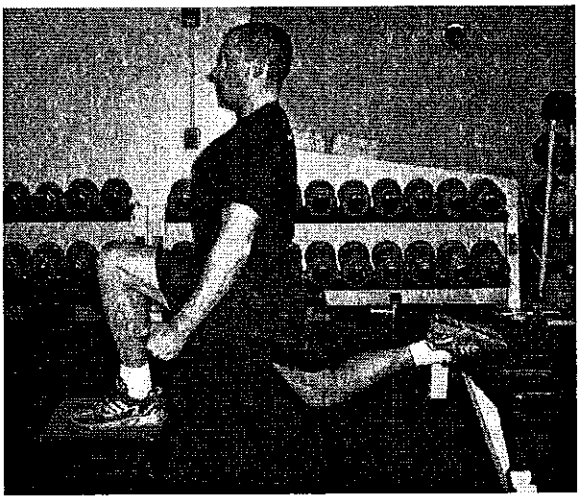
Second, and more importantly, test key performance variables. If vertical jumps and maximal strength are both down, chances are that your athletes are fatigued and not just detrained following the season. Watch to see if they can focus before their attempts; are they distracted? Watch their technique; is it inexplicably sloppy? And, above all, are they kicking down the door to the weight room, or do they need to be dragged in to train?

Performance testing and your intuition and motivation to gather information will tell you far more than any laboratory tests. Use your best discretion and apply the principles below in the time period that you see fit.

Early Off-Season Training Principles

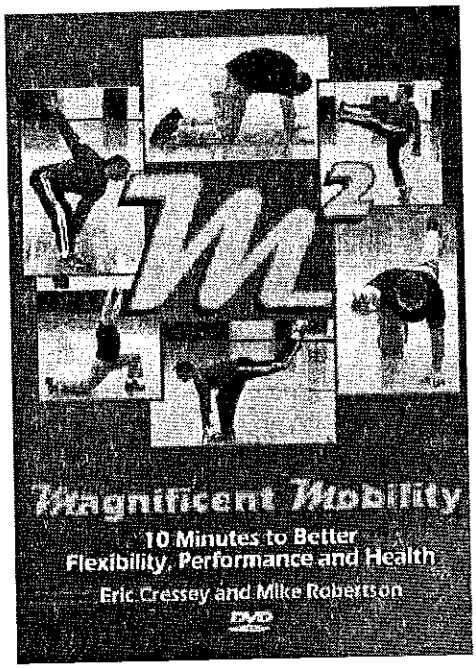
While one should still strive to reestablish detrained strength qualities in the early off-season, it may be more advantageous to devote more work in the early stages of this period to slightly higher rep brackets, especially if athletes are feeling "intensity-burnout" after a long season. The low-intensity sessions I outlined in my "Cardio Confusion" article (Appendix A) can also be extremely valuable in this regard; they can even be used to rehabilitate residual injuries and correct muscular imbalances present after the season.

This first phase is a great time to crank up the volume on prehabilitation exercises to maintain connective tissue health. Longer eccentrics are good choices here, and isometric holds can be valuable for strengthening weak points in movements, maintaining muscle activation with lower joint stresses, and teaching or reaffirming appropriate lifting postures.



The elevated split squat isometric hold is one example of how isometric movements can maintain muscular activation and range-of-motion specific strength with lower stresses on the joints.

During this phase, it is completely acceptable to ignore sport-specific metabolic conditioning altogether. Extended dynamic flexibility drills – as covered in *Magnificent Mobility* – can delay any associated detraining while addressing this more pressing need for most athletes.



Dynamic flexibility drills are valuable interventions year-round, especially during the early off-season, when athletes must "undo" the imbalances caused by their sports.

Likewise, the aforementioned minimal stress tactical work deserves a few hours per week separate from the general training. Basketball players might just shoot, pitchers might throw lightly, and middle-distance sprinters might do tempo runs up to 60-75% effort, for example.

All in all, the early off-season phase should be an extremely individualized training period, so it can be just as challenging for a coach as is in-season programming when training entire teams at once. Some athletes may need reductions in intensity, while others may respond best to

elimination of volume on assistance work so that they can just get their in "money" movements, do a little prehabilitation work, and get out of the gym. As is the case in the rest of the year, in the early off-season, there is no one right way to do things!

Basically, the planning of the early off-season phase underscores the importance of communication between coaches and athletes. If writing his own programs, an athlete must be in-tune enough with himself to understand what he really needs – not necessarily what he wants.

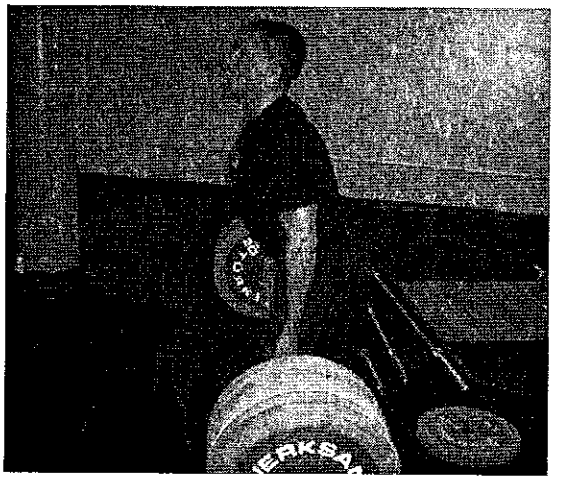
This is an important differentiation to make, as many athletes will be frustrated over season-ending losses and will want to get back to hardcore training immediately. This is rarely the best solution, as their bodies and minds still need this very crucial recuperation time. Remember, the early off-season is the phase that will set the stage for the entire "true" (general) off-season period. If things aren't done correctly in this phase, an athlete will be starting the general off-season from "behind the 8-ball."

Self-Programming Precautions

On a related note, this is a valuable time to make clear the potential shortcomings of self-programming. There is an innate tendency in all enthusiastic athletes to gravitate toward the training initiatives at which they're already highly proficient. It's only natural that we want to do more of the things at which we're successful.

Unfortunately, if you only do what you've always done, you'll get the same results you've always gotten. While thinking counterintuitively in the grand programming scheme, an athlete must also train counterintuitively in terms of exercise selection.

For example, if an athlete is quad-dominant, he'll need to devote more attention to posterior chain work – even if it means he'll have to lay off his precious Olympic squats for a short period.



Deadlift variations are great posterior chain movements for the early off-season, especially in athletes – such as skiers and cyclists – who heavily rely on the quadriceps during the in-season period.

Performance enhancement coaches make these decisions for athletes when they write programs, but athletes who are on their own with programming must be honest enough with themselves. If you're in this situation, ask yourself:

What are my weaknesses?

Which of these weaknesses are the most profound?

What do I need to do to correct them?

Unfortunately, this is much easier said than done, as instinct can easily take over in the weight room. As such, it's wise for self-programming athletes to run their programs by one or more individuals who are "in the know" to determine if what is written is, in fact, the best course of action.

Individualization in the Early Off-Season

Some athletes (e.g., non-starters who didn't get much playing time) may even be ready for the general off-season phase right away. The majority, however, will respond well to taking it easy and avoiding high intensity, high volume, or both. Regardless, correcting imbalances and rehabilitating injuries take precedence; get healthy and establish movement efficiency first!

The majority of athletes need more horizontal pulling volume to keep their shoulders healthy. Football offensive linemen are good examples; in-season, they do a lot of pushing, but not much pulling. Exercises like seated rows warrant prioritization in the early off-season – and the whole training year, for that matter.

Also worthy of mention here is the fact that the early off-season can be a great time for teaching athletes new exercises or fine-tuning techniques. I see this as "making lemonade out of rotten lemons;" if I need to deload an athlete for a week or two, I might as well use this time period to get some productive, yet non-stressful training into the mix. Teaching new movements with light resistances is a perfect fit in this case.

While an athlete who didn't get much playing time might be able to jump right into a true general off-season program, Figure 9.1 shows a sample split for an athlete who is really feeling beaten down at the end of the season. A few days of active recovery or even complete rest generally precedes the first day of the early off-season program (which, as noted earlier, should last approximately 1-3 weeks).

Figure 9.1: An Early Off-Season Training Split for a Fatigued Athlete

	AM	PM
Sunday	Off	Optional Regeneration
Monday	TBT	Off
Tuesday	Off	Optional Regeneration
Wednesday	TBT	Off
Thursday	Off	Optional Regeneration
Friday	Off	TBT
Saturday	Off	Optional Regeneration

Notes:

1. TBT = Total Body Training: The focus will be determined by the athlete's present state (may be more volume-oriented or intensity-oriented).

2. Optional Regeneration sessions include low-intensity "blood flow" circuits, pool sessions, rehabilitation work, or easy short-field/ice/court pick-up games.

3. For the sake of this manual, CNS-intensive training comprises lifts at or above 90% of 1-repetition maximum (1RM), dynamic effort training (compensatory acceleration to account for

submaximal loading), reactive/shock training methods, and sprinting drills above 90% of maximal effort.

4. In the above training split, the most CNS-intensive training (if included at all) would occur on Friday to allow for a full weekend of recovery. This set-up changes as the general off-season begins and the athlete returns to feeling well enough to jump back into things.

5. Non-CNS-intensive total body training sessions consist of isometrics, the repetition method, and – arbitrarily speaking – all other training initiatives performed with non-maximal effort.

6. Remember that this phase is very short in duration unless the athlete is demonstrating signs of the overtraining syndrome. In most cases, 1-3 weeks will suffice. Far too many athletes take too much time after the end of the competitive season and therefore miss out on valuable training time.

7. It is acceptable to shift the AM and PM sessions; this is just an example.

We're almost ready to get to the general off-season, which is where the fun really begins. First, though, as Chapter 10 will show, it's extremely valuable to conclude the early off-season with a solid set of assessments.

Chapter 10: Testing for Success in the Early Off-Season

"We can have facts without thinking,
but we cannot have thinking without facts."

-John Dewey

Establishing a Baseline

The end of the early off-season is often an ideal time for an athlete to test performance indices (e.g., vertical jump, broad jump, pro-agility time, 40-yard dash) that are good predictors of success in one's particular sport. However, I like to take it a step further and use this testing period as not only a time to monitor progress, but also as a means of gathering information on how I can best train the athlete in the months that follow.

The early off-season is often the first time I'll encounter an athlete, as they'll be looking to change things up or get started on something to take them to the next level for the following season. As such, this testing is often my first true assessment of an athlete. I have found that the following tests provide highly useful information.

Efficiency First: Get 'Em Moving!

While I'll already be familiar with any injury issues I might be facing with those with whom I've worked in the past, I won't have a complete picture of what's going on with athletes I'm seeing for the first time. Sure, they'll do health histories and I'll gather all the medical reports I can, but that only goes so far in telling me the current state of the athletes.

As such, beyond a simply Q&A session with an athlete to get up-to-date background information, the best thing I can do is "throw him into the fire" by getting him moving with low-intensity drills. I've found that simply putting an athlete through a collection of body weight only dynamic flexibility drills is the best way to see what "shakes free."

These drills include lunging, squatting, and single-leg balance challenges in multiple planes of motion.

A simple overhead lunge walk can tell you a tremendous amount about an athlete's weaknesses if you know what to watch for in terms of dysfunction/inefficiency.

In the example of the overhead lunge walk, I'll be watching for the following:

- Does the front heel lift?
- Does the back foot externally rotate? What about the front foot?
- Can the athlete achieve a long stride?
- Can the athlete get full shoulder flexion, or does he have to hyperextend the lumbar spine to get that range of motion?
- Does the front knee cave inward?
- Does the front foot overpronate?
- Does the athlete easily lose balance?
- Does the athlete lunge straight-ahead, or does he step partially to the side?

When I pick out an inefficient pattern, I'll give the athlete a cue on how correct it. If it resolves right away after this modification, I know that it's just a matter of making that new pattern a habit through constant practice and reinforcement. In other words, I won't necessarily have to go out of my way with specific programming designed to strengthen a weak link. I just need to convince that weak link that it isn't weak!

However, if the athlete can't correct the issue after a cue alone, chances are that there is an underlying deficit in strength and/or proprioception, and likely some soft tissue restrictions. This is where more isolated manual muscle testing comes in, and I determine the appropriate course of action based on what I find. The athlete might need something minor like activation and mobility drills, soft tissue work, or even just a change in footwear.

If the athlete is in pain and the problems are extensive, it's best to refer out to a sports orthopedist and/or physical therapist. A knowledge of functional anatomy is extremely valuable, but you also need common sense. These professionals have resources available to them – including a variety of diagnostic modalities like x-rays and MRIs – that you don't have at your fingertips. Likewise, if you're training dozens of athletes, chances are that you won't be able to give the athlete the individual attention he or she deserves in a therapeutic context.

Recognize when to defer to someone who has the time and resources to better help an athlete than you do, and you'll be a much more successful coach.

Testing Static-Spring Proficiency

The next step is to test where an athlete falls on the static-spring proficiency continuum. Don't worry; it's not as complex as it sounds!

The Static

When you want to run, jump, lift something heavy, throw a javelin, or do anything else athletic, your central nervous system (brain and spinal cord) relays a message to the peripheral nervous system, which calls into action the appropriate muscle fibers to get the job done. This voluntary – or "muscling it" action – constitutes the "static" on the static-spring continuum. Powerlifters are generally very static; they've got tremendous strength, but not much spring.

The more trained we become, the better we are able to recruit muscle fibers. It might surprise you to know that estimates hold that untrained individuals are lucky to use one-half of the muscle fibers in their body, while highly trained athletes approach 90%.

In a broad sense, using more muscle fibers is one means by which we get stronger. The other means is being able to relax the antagonist (opposite) musculature, thus allowing the prime movers to exert more force in the desired direction of movement (7).

For example, if we want to extend our knee forcefully with a concentric action of the quadriceps, the activity of the hamstrings must be minimized to allow this action to occur forcefully. Some hamstring activation is a good thing, as it provides joint stability, but too much will limit our force output in the direction we want to go.

For the sake of this discussion – and to keep things from getting too scientific – it's correct to state that the "static" end of the continuum is predominantly voluntary in nature. There are reflexive feed-forward and feedback factors at work here, but they are beyond the scope of this discussion; we're looking to build freaky athletes, not debate minutia!

The Spring

We have a phenomenal built-in feature in our neuromuscular system that allows us to become more efficient and powerful in athletic endeavors – and even activities of daily life. It's called the stretch-shortening cycle (SSC). Think about the guy in the gym doing seated calf raises with way too much weight; he's bouncing like crazy, isn't he? That's because the SSC is doing most of the job. How does this work?

Every time a muscle-tendon complex is lengthened (eccentric action), the musculotendon unit stores energy – just like when we stretch an elastic band. When we reverse directions to shorten the muscle-tendon complex (concentric action), we can put this energy to use to provide for an extra forceful action. This involuntary mechanism – the "spring" on

the static-spring continuum – has the potential to more than double the force output one sees with purely voluntary action!

Each SSC action consists of the eccentric (deceleration, preloading), amortization (isometric, pause), and concentric (propulsion) phases. Komi (2003) outlined three fundamental conditions required for an effective SSC action (8):

1. "a well-timed preactivation of the muscles before the eccentric phase" [we need our muscles to be ready to go to decelerate]

2. "a short and fast eccentric phase" [deceleration has to occur quickly, as the faster the rate of stretch, the more energy the musculotendon complex stores]

3. "immediate transition (short delay) between stretch and shortening (concentric) phases." [if we spend too much time paused at the bottom, the stored energy is lost as heat instead of being used for subsequent force production]

So, going back to our seated calf raises buddy, he probably wouldn't be doing as much weight if he:

1. Just allowed the weight to drop without preparing his lower leg musculature for it

2. Lowered the weight really slowly

3. Paused for a few seconds in the bottom position

You can bet that this would kill the ability of the Achilles tendon and plantarflexor (calf) muscles to explode that weight right back up to the starting position. And, it would kill our buddy's ego in the process!

The "spring" end of the continuum can largely be seen as involuntary, although (as noted above) there is certainly a voluntary component to all SSC movements. An athlete who is very "spring-proficient" has excellent reactive ability, meaning that the more force he takes in, the more force he'll put out. This is to a point of diminishing returns, of course; otherwise, we'd be doing 90-foot depth jumps!

Static-Spring in the Real World of Athletics

I know what some of you are probably thinking: "All this science mumbo-jumbo doesn't mean a thing unless it'll make me a freaky athlete!" I couldn't agree more; let's talk about the static-spring continuum in the context of athletics. The modern era of baseball is a great example, as we've had several homerun hitters who have all been successful – albeit via different means.

At the "spring" end of the continuum, we have hitters like Gary Sheffield and Vladimir Guerrero demonstrating incredible bat speed. The ball absolutely rockets off their bats; they aren't "muscling" their homeruns at all. Doing a lot of extra training for bat speed would be overkill for these guys; they'll improve their power numbers by increasing maximal strength alone. In the example from a few chapters back, these guys have glasses that are almost overflowing with fluid.

At the other end of the spectrum, we have "static" homerun hitters like Mark McGwire and Jeff Bagwell, both of whom were well known for taking weight training very seriously. These guys are the ones "muscling" baseballs out of the ballpark; the ball almost seems to sit on the barrel of the bat for a split-second before they "flip it" 500 feet. Getting stronger might help these guys a bit, but getting more spring by focusing on bat speed with upper body reactive training (e.g., medicine ball throws, ballistic push-ups, etc.) would be a more sure-fire means to improvement. Their glasses are huge, so they need to focus on adding fluid to the glasses.

Then, we have the "middle-of-the-road" guys like Barry Bonds and Manny Ramirez. They possess an excellent blend of static and spring, so they need to train some of both to continue improving physically. The glass and fluid are "right" relative to one another; they both deserve equal attention.

Bonds is actually a good example of how an athlete's position on the static-spring continuum can change over the course of a career. When he started out, he was definitely a "spring" guy, hitting most of his homeruns with pure bat speed. As Bonds' career progressed, his maximal strength improved due to neural adaptations and increased cross sectional area (more muscle mass).

In light of the media attention surrounding the use of performance-enhancing substances in baseball, I should mention *how* he increased his muscle mass isn't the issue in question in the discussion at hand. The point is that he *did* increase muscle mass, which increased maximal strength, which favorably affected performance. The performance-enhancing substances question really isn't of concern to this discussion.

One Step Back, Two Steps Forward

Before we move on, let's recap what we've established:

- If you're a "static" athlete (think powerlifter), you're very strong, but lack reactive ability. Your training needs to focus on initiatives ("plyometrics," although it's not the best term for what I have in mind) that prioritize reactive ability: your ability to effectively make use of the stretch-shortening cycle. Doing so will condition the nervous system and musculotendon unit to better store elastic energy and use it for subsequent muscular action.

  You may or may not need to prioritize rate of force development (RFD, or explosive strength), which is your ability to develop force quickly. If you have tremendous strength, but cannot develop it quickly, that strength is useless in athletic contexts.

- If you're a "spring" athlete (think of a basketball or volleyball that just runs and jumps all day, but never lifts weights), you've got good reactive ability, but lack maximal strength. Your training needs to focus on "lifting heavy stuff" to make your "maximal strength glass" bigger.

  I've actually worked with a lot of athletes in this category who enhanced their vertical jumps by several inches without doing any jump training; they just got stronger! These athletes have gotten plenty of reactive stimuli over

the years from just playing their sports; embarking on a "plyometrics" program wouldn't be a good idea at all.

RFD may be an issue, although it will generally be enhanced purely by making sure that you lift explosively with the resistance training exercises you perform. In other words, always strive to develop tension quickly and "smoke" weights.

- If you're a "mid-range static-spring" athlete, you're a hybrid of the former two classes of athletes. You'll want a good blend of maximal strength work and reactive training, and RFD is sure to come along for the ride if you're executing your movements properly in the weight room.

The static-spring continuum applies to virtually every athletic movement – whether it's jumping, sprinting, throwing, or any of a host of other activities. As such, it is imperative that we know how to test to find our position on the continuum and understand how to interpret the results we find.

The Static-Spring Tests

I have found two separate tests that are effective for assessing static-spring proficiency. While you could rig yourself up to an expensive Tendo unit and check your stats on a number of movements, the two assessments I outline should do just fine for figuring out where you stand cheaply, quickly, and effectively. Before going on, I must recognize my good friend and colleague Kelly Baggett (www.higher-faster-sports.com) for the influence he has had on me in this regard. Kelly and I have had several fantastic conversations over the years about physiological assessment of athletes, and the "fruits" of those discussions are reflected here to a significant degree.

We always start with the lower body; shorter, faster tests involving the most muscle mass should always come first in the testing session.

The Bounce Drop Jump/Countermovement Jump Test

You're going to need to be able to measure your vertical jump. Any number of implements can be used for this purpose, even just some chalk and the wall. You will also need a box 12" in height; depending on the test results, you may need higher boxes as well.

The first step is to test your regular countermovement jump (just a classic "down-and-up" vertical jump test). Drop fast to a self-selected depth – roughly a ¼ squat – and explode up for maximum height. Take a few trials with adequate rest between jumps, and record your best jump. The countermovement jump is a test of the long stretch-shortening cycle (greater than 250 ms ground contact time).

Next, grab that 12-inch box and place it on the ground about 6-8 inches away from your "takeoff" spot for the jumping tests. You're now going to do a bounce drop jump; this requires you to step – not jump – off the box, and upon landing, spring right up into the vertical jump test. The idea is to minimize ground contact time as much as possible; you really should "bounce" instead of just doing a "landing and jump." Attempt to use the energy you take in to facilitate the force you put out. This is a measure of the short stretch-shortening cycle (less than 250 ms ground contact time).

If your bounce drop jump from 12" is less than your countermovement jump, you can stop the test; it's a sign that you're using too much static and aren't able to use the spring

because you lack reactive ability. Your neuromuscular system isn't prepared to store and then release that elastic energy effectively to make you "sky."

However, if your bounce drop jump is equal to or greater than your countermovement jump, move to an 18-inch box and see what happens. If the jump height goes up, keep increasing the box height by six inches at a time until your jump height fails to improve. In doing so, you have not only established that you're very spring-proficient and need to train maximal strength more; you've also determined the optimal height for future depth jump training: the height that maximizes power output (jump height).

Interpreting Jumping Results

If you find that your bounce drop jump is less than or equal to your countermovement jump, you need to prioritize reactive ability; you're not able to efficiently take in energy and use it for subsequent force production. Most athletes in this situation respond best to starting with altitude landings and box jumps to work on landing mechanics and short-response plyometric activities to "get the feel" for the spring. Eventually, they can progress to more advanced reactive training exercises – including depth jumps – to really build spring-proficiency.

Maximal strength should at least be maintained with these individuals, although you'll find that many athletes can improve both maximal strength and reactive ability simultaneously. Just remember that reactive training takes priority for athletes in this category.

If your bounce drop jump – regardless of the box height you reached – is 20% or more than your countermovement jump, you need to prioritize maximal strength. A small volume of depth jumps from the height that maximized your jump height will enable you to maintain your reactive ability as you improve maximal strength and improve overall athleticism. In most cases, though, you won't even have to worry about it, as you'll be doing some light skill work on the field, court, or ice to maintain the spring proficiency.

If your bounce drop is 1-20% better than your countermovement jump, you need a mix of maximal strength

and reactive ability. The closer to 20% it is, the more maximal strength you need. The closer to 1%, the more reactive training you should do.

All this considered, if your vertical jumps aren't particularly good on either end of the spectrum, you'd be well-suited to doing some of everything to develop athletically in a general sense. In a male athlete over the age of 16, anything less than an 18-inch jump tells me that you're not prepared physically to really worry about advanced testing like this. Just focus on training correctly with a mix of strength and entry-level reactive training. Your body is ready to develop everything at once; enjoy it while it lasts!

The 5-Rep Bench for Speed Test

Now, it's time to check what's going on in the upper body. First, we'll need to establish a one-rep maximum (1RM) in the bench press; you should all be pretty familiar with how to do this, given that Monday, Wednesday, and Fridays are nationally-recognized "bench days!"

Pay close attention to the speed at which the 1RM is performed. If it's fast, chances are that you have great reactive ability. If it's slower, you're muscling it; you're a static-proficient athlete.

To confirm your suspicions, once you've established your 1RM, take a ten-minute rest, and then load 50% of your 1RM on the bar. Have a partner ready next to you with a timer. Get into position, and unrack the bar. When your partner shouts to begin and starts the stopwatch, do five bench presses as fast as possible (don't break your ribs, people). Record the time it takes you to complete the reps.

If it's less than five seconds, increase the weight to 60% of 1RM. If it's more than five seconds, drop the weight to 40% of 1RM. In either case, rest three minutes before repeating the test. Keep performing the tests until you find the heaviest weight at which you can perform all five reps in five seconds or less. When you're close to 5.00 seconds on the dot, shut it down.

Interpreting Benching Results

The 5-rep bench for speed test is a solid measure of how much of your upper body strength you're able to actually apply in sporting contexts. Generally, being able to do five reps with 70% or more of your 1RM in five seconds is very impressive from an athletic standpoint (assuming a good 1RM), and indicates that reactive ability is good. An individual in this situation would be well-served to prioritize maximal strength training.

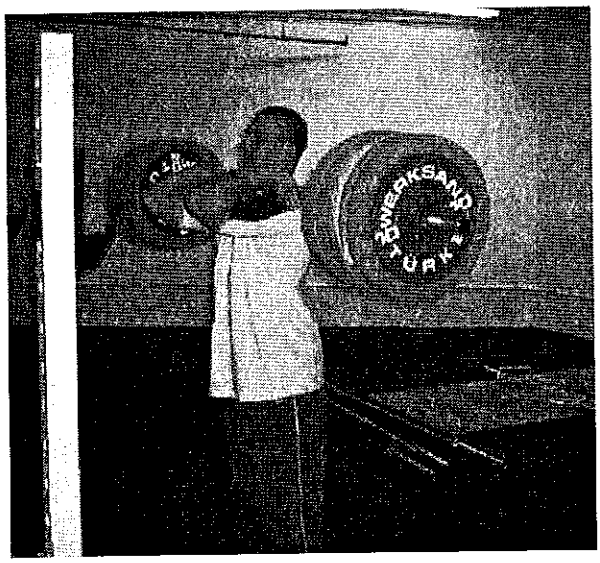
Anyone in the 55-65% range would be considered "middle of the pack," and needs a combination of maximal strength and reactive work. Again, this assumes a good 1RM showing.

Finally, if an individual is down in the 40-55% range for his five reps in five seconds, he's going to need to get a lot faster. The strength he has isn't going to be fully leveraged in athletic situations. A hearty dose of reactive training (e.g., speed benches, medicine ball throws, ballistic push-ups) and RFD work (any movement where tension is developed ***quickly***; I really like pin presses for this purpose) is warranted.

As a little aside, I've found that this test is of less utility in female athletes, presumably because they respond so well to maximal strength training in the upper body no matter how they test. Regardless of what you find, you need to make females stronger in the upper body; reactive training is just "bonus" in this regard.

You can use this same "five reps in five seconds" approach for the squat, although you shouldn't expect the percentage of 1RM used to be quite as high (50-60% for five reps in five seconds would be a very solid showing that indicates "usable strength").

Regardless, a take home message of these tests should be that while a 1RM alone tells you a lot about an athlete, the speed at which a 1RM is executed can tell you a lot, too. The faster the 1RM, the more maximal strength training you need. The slower the 1RM, the more reactive and RFD training you need.



Regardless of the exercise in question, the faster the 1RM is completed, the better. Everything else held equal, the athlete who can move heavy weights faster will always dominate.

A Note on Maximal Strength

At several points in this chapter, I have referenced "usable strength." That is, I'm implying that some athletes have good maximal strength, but it isn't usable because their RFD and reactive strength are lacking. I do not want to give the wrong message, though, and have people walk away from this manual thinking that getting stronger is going to hurt their performance.

The truth is that it'll still help them in the long run if they train correctly – but it might not help as much in the short-term. Athletes should always strive to be as strong as possible and move weights as fast as possible. Building strength "by accident" is a good problem for one to have to encounter; trust me.

In my experience, if you aren't squatting more than 300% of your body weight, your maximal strength isn't *hurting* you. That's 600 pounds for a 200-pound athlete – not a common feat. Most of you don't have to worry about getting "too strong;" you just may need to worry about making use of the strength you have while still working toward the 300% figure without even knowing it!

This 300% figure also explains why so many female athletes respond tremendously to simply getting stronger for the entire duration of their competitive careers. It's well established that, generally speaking, the female strength-to-bodyweight ratios are less than those of men. I can honestly

say that I've never seen a female athlete who has gotten too strong.

Testing Wrap-up

We've established that we need to consider:

1. Movement efficiency
2. Static-spring proficiency
3. Speed of 1RM execution (benches and squats, among others)

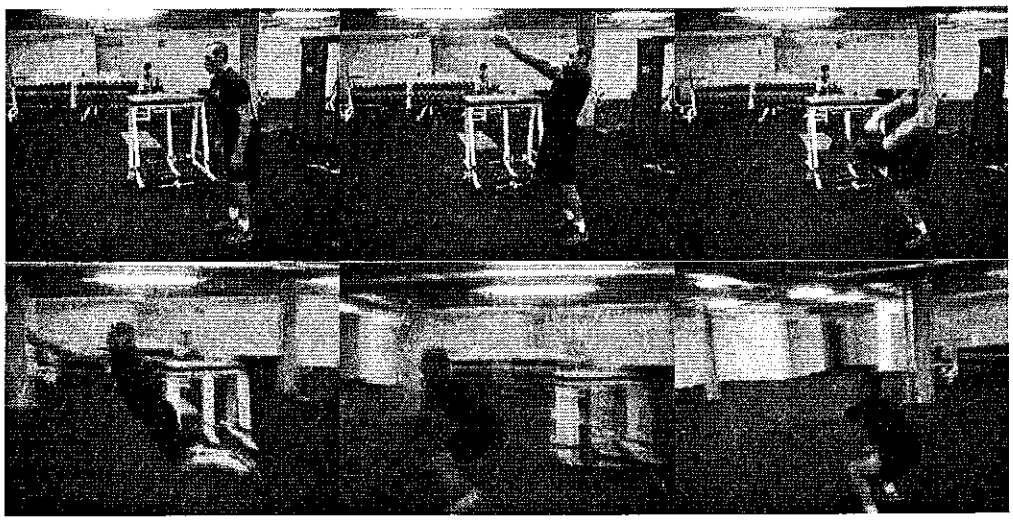
You're probably wondering if there are any other tests I like to use. Truth be told, it depends on the sport, but very commonly, yes, I will assess several more.

A classic chin-up test (3-rep max) is tough to beat when it comes to functional strength. I prioritize this test in overhead throwing athletes, tennis players, and swimmers. It tends to be safer for such athletes while allowing for a greater functional carryover to what they do. My good friend Joe DeFranco, a great performance enhancement coach in New Jersey, has spoken of how one's chin-up proficiency correlates very well with sprinting performance. I've found this to be true as well, although I never thought to look at it until Joe brought it to my attention.

The single-leg triple jump for distance is a good test as well. This test is simply used to determine if any marked side-to-side imbalances are present. If you notice that an individual

can jump more than 10% further with one leg than the other, chances are that you need to really emphasize the weaker side in subsequent training endeavors.

I always utilize the broad jump, especially when I'm limited on equipment. The broad jump is a good measure of posterior chain power, which offers valuable information in addition to the countermovement (vertical) jump, which is more quad dominant.



The broad jump is a great test of hip-dominant power, and can be used alongside the classic vertical jump assessment to attain a more complete picture of an athlete's lower-body power.

A 40-yard dash with various split times can tell you quite a bit about the athlete's performance and what needs to be trained. However, considerable research (8-10) has correlated various phases of the 40-yard dash to the jumping tests I

outlined earlier, and these correlations have been readily apparent in my observations of the athletes I've seen over the past few years. As such, I find that the jumping tests give me the best predictors. With that said, though, it never hurts to get out there and sprint – even if it's just to establish a baseline against which to measure future progress. Get a full-40 time and a 10-yard split time.

An agility measure such as the pro-agility (5-10-5, or 20 yard shuttle) or T-test is also a valuable measure to have in your files. It never hurts to have some information on how your athletes move laterally. In fact, extra data of any sort will never hurt you; track progress meticulously!

And, speaking of tracking, I prefer to retest several of these markers at 12-week intervals during the general off-season to determine if training focus needs to be shifted. Likewise, you can test some markers (e.g., vertical jump, broad jump, pro-agility, various 1RMs) quite easily as part of your training sessions, so you have a built-in continuous progress monitoring system.

As you'll notice in the sample templates outlined later, my programs fluctuate on a daily, weekly, and monthly basis. However, the overall goals of the programs – as determined by our testing results – are addressed in 12-week blocks during the general off-season. I reassess things after twelve weeks to see if we need more reactive training or more maximal strength, for instance.

Chapter 11: The General Off-Season

*"Genius is one percent inspiration,
ninety-nine percent perspiration."*

-Thomas A. Edison

General Off-Season Goals

This is the fun stuff. Your prehabilitation and dynamic flexibility emphasis should continue as always (would you expect anything else from me?), but you can get back to addressing the athlete's specific anaerobic needs. This is the time to develop maximal strength, strength-speed, speed-strength, reactive ability, and effect desired functional changes in body composition.

Linear and lateral movement training sessions should be performed only once or twice per week unless an athlete is significantly deficient in these regards. As a general rule of thumb, many athletes can see dramatic improvements in both linear and lateral speed and agility without training these qualities directly with "traditional" drills.

Without a doubt, this "phenomenon" is most obvious when you take a quad-dominant athlete and hammer on his posterior chain and dynamic flexibility for the entire off-season. When he goes out and sprints full-throttle for the first time in a few months after such training, his eyes usually get as big as soccer balls and you'd think he's seen a ghost. Running mechanics magically improve as the athlete seems to just float down the field while relying on muscles that he didn't even realize he had. I like to refer to this as "general specificity."

Traditional linear and lateral movement drills *can* be valuable for those athletes with favorable strength qualities, muscular balance, and dynamic flexibility, but poor sprinting

speed and agility. If speed training sessions are used, full recovery should be utilized.

From a linear speed standpoint, utilize short (10-15 yard) starts from various positions (e.g., standing, falling, 3-point, Moye) and submaximal acceleration runs to teach sprinting mechanics. For lateral movement training, you have considerable wiggle room; just make sure that drill duration is less than 8-10 seconds (e.g., pro-agility, W-drill).

Above all, in this general off-season period, allow for complete or near-complete recovery between sets in all movement training. It is important to remember that such training – when performed with near-maximal or maximal effort – counts as a CNS-intensive effort, so these sessions should be consolidated within the given training phase to allow for sufficient recovery.

These speed and agility sessions can be paired with reactive/shock training methods (incorrectly referred to as "plyometrics" in the strength and conditioning world today) (11) and implemented before or during lifting sessions or as separate sessions altogether. As is the case with challenging movement training, it is important to remember that reactive/shock training movements can actually be more CNS-intensive than classic heavy resistance training.

Again, one must be careful to appropriately consolidate such methods in a training split to allow for sufficient recovery. An athlete may not perceive CNS fatigue as he or she would

with pure muscular fatigue, but that is not to say that it isn't present to a significant degree.

The best way to sense the presence of CNS fatigue is to simply test unloaded performance variables like the broad jump or vertical jump. If an athlete's performance is markedly down, chances are that he has some accumulated fatigue that mandates that you change the training plan (unless you're looking for intentional overreaching – something for which you'll see examples in the sample templates at the end of this manual).

As with the early off-season, dynamic flexibility warrants considerable attention; then again, it deserves a ton of attention year-round! Low-intensity tactical work is still encouraged in moderate volumes, and providing it isn't of marked stress or duration, some scrimmaging or comparable activity is acceptable 1-2 times per week. Examples of such competition include half-court pick-up games in basketball, short-field 5-on-5 non-contact football, and indoor soccer or lacrosse. Just don't go for hours upon hours.

Figure 11.1 depicts how all of this might break down in one general off-season set-up:

Figure 11.1: A General Off-Season Training Split for a "Well-Rounded" Athlete

	AM	PM
Sunday	Optional Regeneration	Off
Monday	UBT – Repetition/Iso	Off
Tuesday	Shock/Movement	LBT – Speed/Repetition/Iso
Wednesday	Off	Optional Regeneration
Thursday	UBT- Maximal	Shock/Movement
Friday	Optional Regeneration	Off
Saturday	Off	LBT - Maximal/Shock

Notes

1. UBT = Upper Body Training
   LBT = Lower Body Training
   Maximal = resistance training with loads greater than 90% 1RM
   Shock = Shock/Reactive Training (A.K.A. plyometrics, erroneously)
   Movement = Movement Training (may be linear, lateral, or both)
   Speed = Weight-training speed movements (e.g., pull, squat, bench, jerk, and throw variations)
   Iso = Isometric Training (various goals – may be classified as CNS-intensive in some cases)

2. You'll notice that CNS-intensive training is consolidated into three training days per week: Tuesday (shock training and potentially near maximal movement training along with substantial lower body volume), Thursday, and Saturday.

3. Three days per week are devoted purely to regeneration/recovery work. This is where low-intensity blood flow circuits, pool sessions, rehabilitation work, and the aforementioned light scrimmaging and skill work are included. Athletes should still strive to have one complete day of rest per week (some light recovery modalities may still be acceptable).

4. Shock and movement training is often not necessary in athletes who are naturally gifted or well-trained in reactive ability; most basketball and volleyball players are classic examples of this phenomenon. These sessions can be eliminated altogether, reduced in volume, used as part of warm-ups for the lifting session on the given day, or used as part of the session itself (i.e., complex training). Remember that the more shock and movement training you do, the less lifting you should do (and vice versa). Your body has a limited recovery capacity; allocate it wisely!

5. When movement training is included, it should be performed with complete recovery; at this time of year, we're especially focused on quality – not just quantity!

6. Remember that this is merely an ***example*** template; everything must be suited to the individual. Some athletes, for instance, won't be able to tolerate three CNS-intensive sessions per week; conversely, others will be so neurally inefficient that

they'll be able to handle four. Define your objectives, prioritize them, and plan accordingly.

7. This style of template typifies what you might see in a non-starter in the immediate post-season period. If there's an insufficient training stress during the season, there's no sense prolonging that period with recovery work; jump right into the good stuff with them!

A Note on Nutrition

Before we move on to discuss the parameters for the late off-season, it's important that we address one nutritional and body composition question that is sure to come up with this approach to programming. Coaches and athletes alike want to know: "Won't athletes get fat without significant metabolic conditioning in this long general off-season period?"

The answer, very simply, is: ***"Not if they don't eat to get fat."***

As long as energy intake is matched to energy expenditure and close attention is paid to nutrient timing and food selection, the athlete should actually see *favorable* changes in body composition during the general off-season. There is still a profound training stimulus occurring; just because an athlete isn't huffing and puffing all the time does not mean that they aren't burning calories and turning over a lot of tissue.

The general off-season is also a great time for athletes to add lean body mass if doing so is in line with their goals. Without a steady metabolic conditioning program, more calories can be devoted to muscle growth than pure energy expenditure, making lean body mass gain more easily attained in the off-season.

Chapter 12: The Late Off-Season

"Victory belongs to the most persevering."

-Napoleon Bonaparte

Late Off-Season Goals

As I type this, I can practically hear hundreds of frantic athletes and coaches screaming, "**When *Do* I Specialize, and How**?" You can rest at ease, folks; the time has come.

The late off-season is where we start to get a bit more sport-specific in terms of our metabolic conditioning. At this point, it's important for athletes to be at or near the body weight at which they intend to compete. All major changes along these lines should have taken place during the general off-season. As the athlete enters the late off-season, he should feel "in control" of his dietary practices and confident in his ability to use these practices to maintain his weight and muscle mass in spite of the increased volume of training at hand.

Although subtle differences exist in exercise selection and volume is reduced, the same motor qualities (e.g., maximal strength, RFD, speed-strength, strength-speed, reactive ability) are prioritized as in the general off-season. The main difference between the general off-season and the late off-season is the increase in sport-specific metabolic conditioning. Linear and lateral movement schemes are comparable, but incomplete recovery is introduced in the late off-season as we look to metabolically condition the athlete.

A great way to integrate such conditioning is to reduce between-set rest periods gradually each week (an approach known as diminished rest-interval training), as shown in Figure 12.1.

Figure 12.1: Eight-week diminished rest-interval set-up for a football player. The rest intervals to which the athlete is working reflect the 20-25 second average break between plays in football.

Week	Rest Interval	Training Volume
1	35s	High
2	30s	Medium
3	30s	Very High
4	25s	Low (Deload)
5	25s	High
6	20s	Medium
7	20s	Very High
8	20s	Low (Deload)

- Week 1 serves as an introduction to football-specific metabolic conditioning with a high – but not "punishing" – volume of work.

- In Week 2, the training volume is decreased, but the rest interval is decreased to maintain a continuous training progression.

- There is no drop in the rest interval in Week 3, but the athlete is forced to sustain the diminished interval from Week 2 for a higher volume of work.

- Week 4 serves as an opportunity for the athlete to deload on overall training stress while introducing the next five-second reduction in rest time between sets.

- This reduction in rest interval is introduced in higher volume in Week 5.

- The 20-second rest interval for which we're ultimately aiming is introduced in Week 6 in limited volume

- Volume at this final rest interval is amassed in Week 7.

- The deload in Week 8 provides for a chance to remove fatigue so that the athlete will be in position to display his metabolic fitness at the beginning of Week 9.

- This template may precede the preseason altogether in a completely deconditioned athlete, while it would span the late off-season and preseason phases in an athlete in better metabolic shape (or, that athlete may choose to shorten this phase to four weeks).

Open- vs. Closed-Loop Training

The late off-season is the ideal time to integrate open-loop drills aimed at training speed, agility, and quickness. The overwhelming majority of agility drills fall into the category of closed-loop drills; very simply, they're predictable tasks. Closed-loop drills are extremely valuable for teaching proper technique in sprinting, changes of direction, and other sport mechanics, and should therefore comprise the overwhelming majority of the drills utilized in the general off-season period.

These "conscious" efforts in the general off-season give rise to integration of appropriate mechanics subconsciously in the late off-season and in-season phases. By these phases, the athlete has become conditioned to act efficiently without thinking about how to react to a given stimulus. Ideally, this occurs completely prior to the integration of open-loop drills that challenge the athlete's ability to accommodate unpredictable external stimuli.

Eventually, both open- and closed-loop drills can be integrated into metabolic conditioning schemes to enhance sport-specific conditioning. We encounter both planned and unplanned movement challenges in athletics, so it is logical to prepare for both. Examples of open-loop movement training are mirror drills, 5-10-5 drills where the athlete moves in the direction that the coach points, and tennis ball drills (where the athlete races to retrieve a tennis ball a coach has thrown in an unannounced direction).

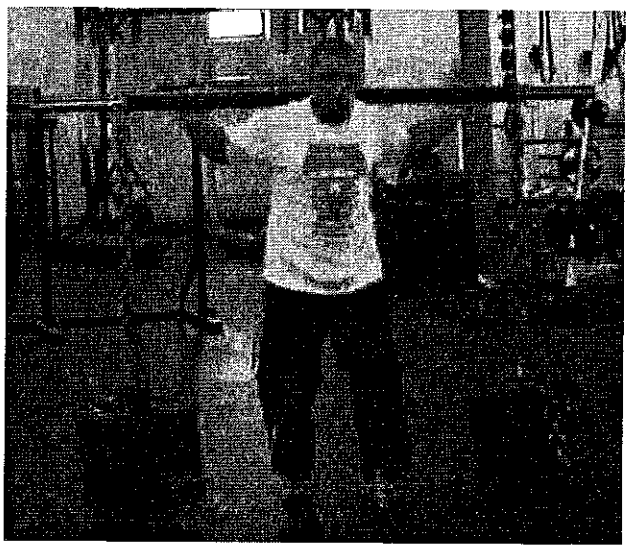
Resistance training has traditionally been comprised of closed-loop challenges; this underscores the need for significant variety in exercise selection when programming for athletes. For this reason – especially in the general off-season – coaches should use different bars, dumbbells, kettlebells, cables, medicine balls, body weight exercises, grip widths, ranges of motion, points of stability (e.g., lunges vs. squats), and other varying stimuli to expand athletes' overall motor pools through rich sensory environments.

Such variety is especially important when it comes to dealing with young athletes. The richer their proprioceptive environments, the better their overall development, and the easier they'll pick up complex challenges down the road.

Coaches should allow for enough repetition and frequency of a given drill to allow for adaptation, but at the same time look to insert variety to programming as often as possible. Beyond simply improving overall afferent (sensory) function, variety in exercise selection will also markedly reduce the risk of injury due to pattern overload, muscular imbalance, and movement dysfunction.

Strongman Training: The Next Frontier?

Only recently have some of the brighter minds in the strength and conditioning world come to realize that coaches can actually apply open-loop training in strength training scenarios. Certain strongman implements (e.g., kegs partially filled with water or sand, yokes with chain-suspended resistance, sandbags), asymmetrically loaded barbells, resistance bands attached to barbells, and partner-assisted perturbations to balance can make resistance training an open-loop challenge. These additions are tremendously valuable in the transition from the off-season to the in-season period, as they prepare athletes for the chaos they'll encounter on the field, court, or ice.



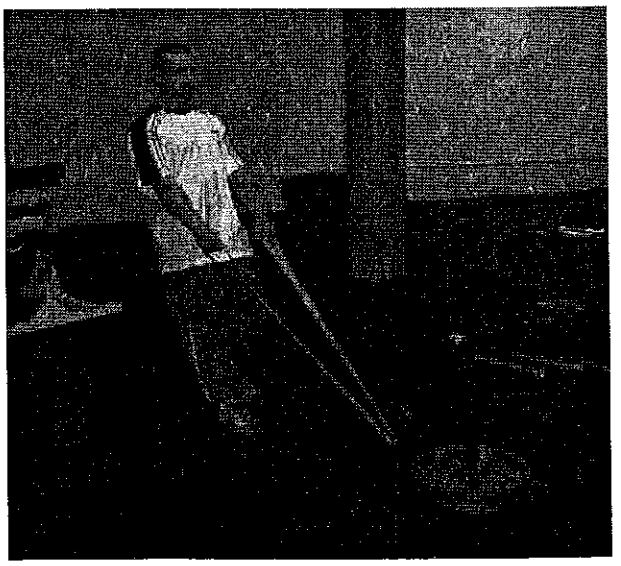
As strongman John Sullivan shows, training with the chain-suspended yoke can make resistance training an open-loop challenge.

The late off-season is also an excellent time to make use of medleys of strongman implements, including kegs, yokes, sandbags, farmer's walk handles, and dragging sleds. These medleys are advantageous for several reasons:

1. They allow an athlete to train both strength and metabolic conditioning qualities simultaneously.

2. They train multi-joint movements, allowing for a more systemic effect and a greater functional carryover to sporting tasks.

3. In a broad sense, the awkward nature of many of the implements mirrors the unpredictability of the sporting world. They effectively blur the line between closed- and open-loop challenges.



Reverse sled dragging is a simple, yet highly effective addition to a strongman medley.

4. They're great for building mental toughness; this can be very challenging stuff!

5. They are a lot of fun for athletes – especially when compared to basic sprinting and agility drills. In the preseason – a time generally characterized by high training volume and rigorous challenges – the value of making hard work feel enjoyable cannot be overstated.

6. Competitions within the medleys can help to build important team unity in the preseason period.

7. Believe it or not, they can actually be performed without considerable expenditures for equipment. Many of the implements in question – including tires, kegs, stones, and sandbags – can be acquired free of charge.

Knowing When to Start the Late Off-Season

The decision of when to start the "official" late off-season period is dependent on three factors:

1. The sport itself

2. The individual athlete's proficiency with metabolic conditioning specific to that sport

3. The date of the first contest for that sport

For our first factor, as a general rule of thumb, the further to the left your sport is on the aerobic-anaerobic continuum, the sooner you need to initiate pre-season conditioning. So, as an example, a soccer player would need to get to work on his energy systems training sooner than a football player, but not as soon as a middle-distance swimmer.

Figure 12.2 relates the relative contributions of aerobic and anaerobic energy systems in the "Black Hole" sports. Remember, the more your sport relies on aerobic energy systems, the sooner you need to start getting sport-specific with your metabolic conditioning. For the sake of this discussion, I've organized these sports in order from most anaerobic to most aerobic (top to bottom, respectively).

Figure 12.2: The Predominant Energy Systems for Selected Black Hole Sports

% Contribution by Energy System

Sport	ATP-PC	Glycolysis	Aerobic
100m sprint	98	2	-
50 meter swim	95	5	-
Football	90	10	-
Gymnastics	90	10	-
Volleyball	90	10	-
Baseball	80	15	5
100m swim	80	15	5
Basketball	80	10	10
Soccer backs, strikers	80	20	-
Ice Hockey forward/defense	80	20	-
Tennis (singles)	70	20	10
Field Hockey	60	20	20
Soccer midfielders	60	20	20
Wrestling	45	55	-
400m sprint	40	55	5
200m swim	30	65	5
400m swim	20	40	40
Rowing	20	30	50
1,500m swim	10	20	70
800m sprint	10	60	30
1,500m run	5	35	60

Adapted from Powers and Hawley, 2001 (1).

For our second factor, an individual with a poor history of metabolic conditioning would need to start the late off-season sooner than an athlete who is known to "play his way into shape." If I have an athlete who lacks sufficient strength and power, I'm going to hold off as long as possible on starting metabolic conditioning in order to prioritize these weak links.

Conversely, if I've got a really strong and powerful athlete who is known as a slow-starter, we're going to get his late off-season going a bit sooner. That way, he can hit the ground running (pun intended) with the first game of the season.

Finally, for our third factor, those athletes with short preseasons prior to their first competitions will need to prioritize metabolic conditioning sooner than those who have extended preseasons without competitions. Traditionally, professional sports have more prolonged preseasons than collegiate and high school sports, so you can hold off a bit longer on the metabolic conditioning with professional athletes.

This is an important time to reiterate the importance of communication between strength and conditioning specialists and sports coaches. Many sports coaches will push to have their athletes ready from the get-go in the preseason. If the strength and conditioning coach is not persistent in adhering to his planned progression, crucial training time may be lost in the late off-season.

If you are a performance enhancement coach in this position, it is imperative that you discuss the physiological rationale for your programming with the sports coach. If you

relate your intentions in rational, scientific terms, he'll likely concede to you – or at the very least meet you halfway.

In terms of individualizing this start-up point, you just have to rely on the athlete's feedback to you with the given programming. If he's someone who always requires long rest periods to catch his breath regardless of the activity, you'll need to kick start things sooner than later.

As a little frame of reference, with football guys, I've started diminished rest interval training as early as eight weeks out from preseason. This scenario is what you typically see with those who are trying out for a team and need to come in completely game-ready to impress coaches. Conversely, there are others who can actually do only 2-3 weeks and then just jump in and hit the ground running with normal preseason rigors. Most do well with right about four weeks.

Obviously, the late off-season is followed by the true preseason, a time period that is as sport-specific as it comes in terms of both tactical and metabolic conditioning (this, of course, assumes that the coach actually knows what kind of metabolic conditioning is specific to the sport). At this point, your resistance training modalities – although still important – take the backseat to applying the physical preparedness you've attained in a sport-specific context.

This phase is characterized by much less volume in the weight room and a lot more on the field, court, or ice. Effectively, unless someone is really out of shape, you use the

late off-season as a primer for the hellish preseason that everyone expects and dreads.

You might be wondering why one should wait so long to employ metabolic conditioning when that is what's to be expected with the "typical" preseason. The answer is actually quite simple: metabolic conditioning is more easily attained than neuromuscular efficiency qualities such as strength, power, and technical prowess.

Would you rather start "de-prioritizing" these key qualities 4-6 weeks earlier when you know that they must sustain your overall athleticism throughout the entire duration of the competitive season? You know that you'll play your way into shape once the season rolls around, so why not use the off-season to address what won't come easily in-season?

With all that said, Figure 12.3 depicts a template I used this past August with a college strong safety as he prepared for preseason. We spent the entire off-season prioritizing posterior chain recruitment, frontal plane stability (single-leg proficiency), various isometric holds, reactive/shock training methods, and sprinting mechanics to teach him to move more efficiently. All of this work required full recovery, so as preseason approached, we needed to jack up his metabolic conditioning efforts.

To do so, over the last eight weeks of his conditioning, we gradually reduced rest intervals between movement training sets (as noted earlier in the diminishing rest-interval training example). So, while the goal was still to enhance movement

efficiency, we were equally as focused on getting his metabolic conditioning (and mental toughness, for that matter) ready for the rigors of preseason.

Figure 12.3: Sample Late Off-Season Training Split for a College Football Player

	AM	PM
Sunday	Off	UBT - Speed/Rep
Monday	LBT – Maximal	Lateral Movement
Tuesday	Rest/Recovery Modalities	Off
Wednesday	Linear & Lateral Movement	Off
Thursday	Off	UBT – Maximal
Friday	Linear Movement, LBT – Speed/Rep	Off
Saturday	Rest/Recovery Modalities	Off

Notes:

1. Although the athlete was still lifting four times per week, it was actually more like 3 ¼, as the lower body training session on Friday was very short in duration and integrated into the linear movement training work.

2. There are three "true" CNS-intensive days in the week. The Sunday PM and Monday AM sessions can collectively be considered one CNS-intensive effort, as can the Thursday PM and Friday AM sessions. The Wednesday AM movement training session accounts for the third. In my experience, lateral movement training sessions alone do not comprise a

sufficient stress to the central nervous system to warrant consideration as a CNS-intensive stressor alone. Furthermore, while some coaches may disagree with me on this assertion, given the goal of this program (metabolic conditioning), such inclusion may be a "necessary evil."

3. Essentially, metabolic conditioning "takes over" for weight room work as the general preparation phase ends and the specific preparation phase begins; specificity increases further as the athlete officially enters preseason with his teammates and coaches.

4. This is just one ***example***: this split was based on the athlete's schedule and his specific needs. Other athletes will obviously require unique training splits and acute program variables.

5. Movement training sessions "doubled" as metabolic/energy-system training sessions.

6. While volume of shock training was markedly reduced in light of the highly plyometric nature of movement training, some shock training exercises were incorporated in movement/metabolic conditioning sessions.

Chapter 13: Pulling It All Together

"The person who makes a success of living is the one who sees his goal steadily and aims for it unswervingly. That is dedication."

-Cecil B. DeMille

Ten Keys for Off-Season Success

I have thrown a lot of information your way in the past 12 chapters, so I think it's important that we take a few moments now to step back and look at the big picture rather than just its constituent parts. Before we move on to the sample programming, let's recap the ten keys to success in the "Black Hole of Athleticism."

1. If you're a young athlete who is not ready to specialize, be very careful to take the correct message from this manual. While it may come handy down the road if you find that you're ready to prioritize one sport above all the others, for now, you need to put this information on the back burner. In the meantime, go out and work hard, but most importantly, ***have fun***.

2. When you've decided that you're ready to specialize in a particular sport, begin to pay attention to points 3-10. Regardless, recognize the value of general physical preparedness. Enhancing your physical abilities and work capacity in a broad sense will make it easier for you to succeed in sports as a whole – even if you are participating in a different activity in each season.

Work on becoming a better all-around athlete instead of specializing in one sport exclusively. You'll find that it'll actually make you a more successful athlete in your chosen sport in the long run.

Along these same lines, recognize that maximal strength is one of an athlete's single-most precious commodities. Insufficient maximal strength limits the development of power, agility, speed, and endurance. Getting stronger is a crucial component of building a solid foundation of athleticism. Remember the 300% number, and don't forget: it'll never hurt to make a female athlete stronger!

Additionally, use the tests outlined in Chapter 10 to determine where you stack up on the static-spring proficiency curve. Provided you have a reasonable amount of training experience, they'll help you assess what you need to do to become a better athlete – regardless of whether you're ready to specialize or not.

3. Athletes with long competitive seasons and frequent matches should also approach things differently; these athletes are perpetually riding two horses with one saddle. As such, they respond best to training with conjugated and undulating periodization set-ups that enable them to maintain (and hopefully improve) the strength and metabolic qualities their sports demand year-round. These athletes include golfers, tennis players, and even ultra-endurance event competitors.

4. When you're positive that you've reached the point at which you're ready to specialize, do so only during the season and in the immediate preseason period.

5. At the end of the competitive season, immediately assess the athlete's physiological status. The athlete may be perfectly fine, over-reached, or in rare instances, suffering from

overtraining syndrome (OTS). This first step is absolutely crucial to setting the stage for an effective off-season.

6. In the early off-season, one should begin to address imbalances caused by sport participation. Football lineman, for instance, can benefit immensely from significant horizontal pulling volume. This is not to say, however, that there are not tremendous benefits to focusing on prehabilitation needs year-round.

The last few days of the early off-season period are a fantastic time to test key predictors of performance (e.g., vertical jump, pro-agility) as a baseline against which to measure subsequent changes. The tests are also tremendously valuable in planning for your off-season training.

7. "Black Hole" athletes should aim to shift their position on the aerobic-anaerobic continuum up and to the right in the early and general off-season as they improve total fitness qualities (besides aerobic capacity).

Using our Average Joe example, this is depicted in Figure 13.1.

Figure 13.1: Physical Readiness Revisited

Fitness										
10										
9									Where a	
8									Good Off-	
7									Season	
6									Program	
5									Puts You.	
4							OS	EIS		
3							LIS			
2										
1										
0	10	20	30	40	50	60	70	80	90	100

% Anaerobic

OS = Off-Season
EIS = Early In-Season
LIS = Late In-Season

8. Participate in your sport only on a maintenance level (1-2 times per week) in the off-season and, if possible, do so in a "less comprehensive" manner. If you're a basketball player, just participate in shooting and footwork drills. If you're a wide receiver, just play catch and run easy routes. Play shorter duration pick-up games with smaller field/court/ice dimensions. Whenever possible, separate these sessions from your non-tactical training sessions.

9. Use the off-season to focus on primarily anaerobic qualities such as maximal strength, reactive strength, explosive strength, strength-speed, speed-strength, agility, dynamic flexibility, and (if necessary) hypertrophy. Metabolic conditioning is more easily attained than these qualities; otherwise, you wouldn't see so many athletes "playing their way into shape."

10. Don't get caught up in truly specific metabolic conditioning and full-contact participation until you absolutely must: the late off-season and preseason, in most cases. The more aerobic your sport, and the poorer your history of metabolic conditioning, the sooner you should initiate specific metabolic conditioning.

Closing Thoughts

All this information may have seemed overwhelming at times, so take some time to think it over and allow it to digest. I encourage you to sit down and write out your specific goals for the off-season.

Next, prioritize these goals and plan your training accordingly in light of the guidelines I've outlined. If you're a "Black Hole" athlete who is truly ready to specialize, try adhering to these counterintuitive guidelines.

As with any facet of the world of performance enhancement training, there is no single "right" or "wrong" way to do things. However, there are general guidelines to which we must adhere to frame our specific recommendations.

My experience and scientifically backed intuition both tell me that the guidelines I've outlined in this manual will give you the framework you need for planning your annual training schedule for many years to come. Perhaps more impressive than the plan, though, are the results. I can say without hesitation that these guidelines, when applied correctly, will take you to all new levels of performance.

Chapter 14: Sample Off-Season Templates

"Success is not the result of spontaneous combustion.
You must set yourself on fire."

-Reggie Leach

An Important Preamble

Below, you'll find several sample templates for off-season programs. First, however, I feel that it's important that I make clear that it is not my intent for you to simply go out and do these programs or hand them to your athletes.

Please keep in mind that these are merely **examples** of what I might do with an athlete with ***considerable training experience***. It is my sincere hope that the importance of individualization is a theme that has resounded through this entire manual.

If you're not as familiar with weight-training and/or reactive training, you'll need to gradually build up to this level. These templates do not take into account your personal injury history, strengths and weaknesses, or particular sport. They're simply meant to serve as examples of how a complete plan might come together.

Please consider them in light of the plan that you've already begun to formulate that is right for ***you*** or ***your athletes***.

The Early Off-Season

First, let's take a look at a typical early off-season template that progresses from the rest and recovery stage to the specific performance tests that will set the stage for what we'll do in the general off-season. For the sake of this discussion, we'll assume that we've determined that a two-week early off-season will be sufficient for this basketball player whose season ended on a Saturday. Here is a sample breakdown:

Week 1

Sunday-Thursday: Complete Rest, optional recovery sessions, no on-court work

Friday: Total-Body Training

Foam Rolling and Dynamic Flexibility Warm-up (see General Off-Season templates for examples.)

A1) Barbell Stiff Legged Deadlift	3x8
A2) Elevated Push-up Isometric Hold	3x45s
B1) Elevated Split Squat Isometric Hold	3x45s/side
B2) One-Arm DB Row	3x10/side
C1) Side Bridge	3x30s/side
C2) Low-Pulley External Rotation	3x15/side

As you can see, it's just a bloodflow day designed to get the athletes back in the swing of things and prepare their joints for the loading that will follow in the general off-season.

Saturday: "Cardio Confusion" Circuit (see Appendix A for ideas.)

Sunday: Complete Rest

Monday: Total-Body Training

Foam Rolling and Dynamic Flexibility Warm-up (see General Off-Season templates for examples.)

A1) Front Squat	4x6
A2) Neutral Grip DB Bench Press	4x6
B1) Chin-up	4x6
B2) Reverse Crunch	3x12
C1) Glute-Emphasis Pull-Through	3x12
C2) Prone Trap Raise	3x15

Tuesday: "Cardio Confusion" Circuit or some activity other than basketball (e.g., racquetball, touch football, easy swimming, dodgeball)

Wednesday: Total-Body Training

Foam Rolling and Dynamic Flexibility Warm-up (see General Off-Season templates for examples.)

A1) Face Pull	4x6
A2) Elevated Split Squat Isometric Hold	2x60s/side
B1) Side Bridge	3x30s/side
B2) L-Lateral Raise	3x12
C) X-Band Walk	3x12/side

Thursday: Complete Rest/Regeneration

Friday: Performance Testing, as outlined in Chapter 10

The general off-season phase begins on Sunday/Monday. The programming for this phase is based on the results attained in this testing session.

The General Off-Season

Now, let's move on to the general off-season: the meat and potatoes of our off-season experience. Think back to our bounce drop jump vs. countermovement jump and 5-rep bench press tests; they were designed to tell us where we existed on the static-spring proficiency continuum.

We learned that if an athlete is spring-proficient, he needs to focus more on maximal strength (and possibly rate of force development) to be successful by "making his glass bigger." Conversely, if we recognized a static-proficient athlete, we knew that we needed to spend more time addressing reactive ability and RFD to be successful by "adding fluid to his glass." As such, I've included three months of programming for a typical athlete in both the static- and spring-proficient categories.

I should mention that you will find plenty of athletes who fall in the middle of the road; they're neither static-proficient nor spring-proficient. In those cases, you'll just want to borrow a bit from each camp, essentially making a hybrid from two programs similar to the ones I outline below. You can go with a middle-of-the road approach for the long haul, or shift back and forth between static-emphasis and spring-emphasis programs for the duration of the off-season. There is no one right way to do things, so be creative with it and see what works for you or your athletes.

If you line the training programs up side-by-side for each four-week phase, you'll see that while exercise selection is roughly 80% similar, we can change our emphasis by tinkering with acute loading parameters. A knowledge of how to make subtle adjustments like these for individual athletes' needs can make it easy to modify programming for an entire team without disrupting the continuity of group training sessions. You can train static-proficient and spring-proficient athletes – and everyone in between the two – at the same time!

The dynamic flexibility warm-ups for the three phases can be the same for the two groups; we all know that both athletes need mobility and soft-tissue work.

Phase I General Off-Season Warm-ups

Lower Body Days		**Upper Body Days**	
Foam Rolling:		*Foam Rolling:*	
-IT Band/Tensor Fasciae Latae			
-Quads		As needed (many athletes will be fine	
-Hip Flexors		with only two sessions per week,	
-Hamstrings		although extra will never hurt the	
-Adductors		cause)	
-Thoracic Extension			
Seated 90/90 Static Stretch	15s/side	Seated 90/90 Static Stretch	15s/side
Warrior Lunge Static Stretch	15s/side	Warrior Lunge Static Stretch	15s/side
Supine Bridge	1x12	Supine Bridge	1x12
Birddog	8/side	X-band Walk	12/side
Calf Mobilization	8/side	Side-to-Side Leg Swing	10/side
Hip Correction	12/side	Anterior-Posterior Leg Swing	10/side
Pull-Back Butt Kick	5/side	Walking Spiderman	5/side
Cradle Walk	5/side	Reverse Lunge w/Twist	5/side
Squat-to-Stand	1x8	Levator Scapulae/Upper Trap Stretch	15s/side
Alternating Lateral Lunge Walk	5/side	Scap Pushup	1x15
Overhead Lunge Walk	5/side	Overhead Broomstick Dislocation	1x10

Phase II General Off-Season Warm-ups

Lower Body Days		**Upper Body Days**	
Foam Rolling:		*Foam Rolling:*	
-IT Band/Tensor Fasciae Latae			
-Quads		As needed (many athletes will be fine	
-Hip Flexors		with only two sessions per week,	
-Hamstrings		although extra will never hurt the	
-Adductors		cause)	
-Thoracic Extension			
Seated 90/90 Static Stretch	15s/side	Seated 90/90 Static Stretch	15s/side
Warrior Lunge Static Stretch	15s/side	Warrior Lunge Static Stretch	15s/side
Supine Bridge	1x12	Supine Bridge	1x12
Birddog	8/side	X-band Walk	12/side
Calf Mobilization	8/side	Supine Leg-Whip	8/side
Mini-Band Reverse Monster Walk	12/side	Anterior-Posterior Leg Swing	10/side
Pull-Back Butt Kick	5/side	Walking Spiderman	5/side
Cradle Walk	5/side	Overhead Cross-Behind Lunge	5/side
Broomstick Overhead Squat	1x8	Levator Scapulae/Upper Trap Stretch	15s/side
Toy Soldier	5/side	Scap Pushup-Scap Pullup	10 each
Windmills	8/side	Behind-the-Neck Band Pulldown	1x10

Phase III General Off-Season Warm-ups

Lower Body Days		**Upper Body Days**	
Foam Rolling:		*Foam Rolling:*	
-IT Band/Tensor Fasciae Latae			
-Quads		As needed (many athletes will be fine	
-Hip Flexors		with only two sessions per week,	
-Hamstrings		although extra will never hurt the	
-Adductors		cause)	
-Thoracic Extension			
Seated 90/90 Static Stretch	15s/side	Seated 90/90 Static Stretch	15s/side
Warrior Lunge Static Stretch	15s/side	Warrior Lunge Static Stretch	15s/side
Supine Bridge	1x12	Single-Leg Supine Bridge	8/side
Birddog	8/side	X-band Walk	12/side
Calf Mobilization	8/side	*Hurdle Drills:*	
Fire Hydrants	8/side	Duck Under	5/side
Pull-Back Butt Kick	5/side	Lateral Step-over	5/side
Clock Rotational Lunge Series	3/direction	Under-Over	5/side
Deep Wideout Drop	1x8	Anterior-Posterior Step-over	5/side
One-leg SLDL Walk	5/side	Hurdle Duck Under to Warrior Lunge	5/side
High Knee Skip	5/side	Band Pullapart	1x10
Levator Scapulae/Upper Trap Stretch	15s/side	Supine DB Protraction	1x15

Static-Proficient Athlete
General Off-Season Phase I

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Sunday: Regeneration or Complete Rest, no scrimmaging				
Monday: Lower Body - Maximal Strength/RFD Emphasis				
Reflexive Ankle Jump Altitude Landing – squat stance	4x30 5x8	3x30 4x6 (higher box)	4x30 5x8	Omit both
A) Trap Bar Deadlift (Wks. 1, 2) Front Squat (Wks. 3,4)	3x3	4 singles over 90%	4x3	3x5 (should be easy)
B) DB Bulgarian Split Squat	3x8/side	3x8/side	4x8/side	2x8/side (easy)
C1) Glute-Ham Raise (natural, if necessary)	3x8	3x8	3x8	2x8 (easy)
C2) Reverse Crunch	3x12	3x12	3x12	3x12
D) Side Bridge	3x30s/side	3x30s/side	3x30s/side	3x30s/side
Tuesday: Regeneration and/or skill work, no scrimmaging				
Wednesday*: Upper Body - Maximal Strength/RFD Emphasis				
Power Skipping High Box Jump (jumps onto a box)	4x25 yards 4x8	4x25 yards 4x6 (higher box)	5x25 yards 6x6	Omit both
A) 45-degree Incline Press (Wk. 1-2) Close Grip 2-Board Press (Wks. 3,4)	3x3	4 singles over 90%	4x3	3x5 (should be easy)
B1) Neutral Grip DB Bench Press	3x8	3x8	3x8	2x8 (easy)
B2) Chest-Supported Row - Pronated Grip	4x8	3x8	4x8	2x8 (easy)
C1) One-Arm Face Pull	3x12/side	3x12/side	3x12/side	3x12/side
C2) Supine 1-Arm DB Protraction	3x15/side	3x15/side	3x15/side	3x15/side
D) Full Contact Twist	3x8/side	2x8/side	4x8/side	2x8/side

***Note: Wednesday reactive training may be performed separately from resistance training.**

Static-Proficient Athlete
General Off-Season Phase I (Continued)

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Thursday: Skill work, light scrimmaging				
Friday: Lower Body - Strength-Speed, Rep Emphasis				**Pre-lift Test: Vertical Jump**
Single-leg Lateral Box Jump (onto a box)	4x8/side	3x6/side (higher box)	4x8/side	Omit
Altitude Landing - split stance*	4x8/side	4x6/side (higher box)	5x8/side	Omit
A) Box Squat vs. Chains	8x2@45% 1RM	6x2@50%	10x2@55%	6x2@40%
B) Rack Pull from Mid-Shin	3x5	3x5	4x5	3x5
C) Barbell Reverse Lunge-Front Squat Grip	3x6/side	3x5/side	4x6/side	2x4/side
D) Elevated Split Squat Iso Hold	3x35s	2x45s	3x50s	1x60s
E1) Side Bridge	3x30s/side	3x30s/side	3x30s/side	3x30s/side
Saturday: Upper Body - Strength-Speed, Rep Emphasis				
A) Speed Bench Press – No Pause on Chest	8x2@45% 1RM	6x2@50%	10x2@55%	6x2@40%
B1) Neutral Grip One-Arm DB Push Press	4x5/side	3x5/side	5x5/side	3x5/side
B2) Close Grip Chin-up	4x5	3x5	5x5	3x5
C1) Push-up Iso Hold off 4" steps	3x35s	2x45s	3x50s	1x60s
C2) Elbow-Supported External Rotation	3x12/side	3x12/side	3x12/side	3x12/side
***Light scrimmaging separate from session is okay.**				

Note: All Altitude landings and box jumps should be done with a box height that allows the athlete to stick the landing perfectly. Only then is height increased.

Static-Proficient Athlete
General Off-Season Phase II

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Sunday: Regeneration or Complete Rest, no scrimmaging				
Monday: Lower Body - Maximal Strength/RFD Emphasis				
Low Hurdle Lateral Hop Alternating Split-Squat Cycle Jump	4x10/side 4x6/side	3x10/side 3x6/side	4x10/side 5x6/side	Omit both
A) Wide Stance Anderson Squat from Parallel Pins (Wks. 1,2) Snatch Grip Deadlift (Wks. 3,4)	3RM test + 2x3 backoff	4 singles over 90%	5 singles over 90%	3x3 (should be easy)
B) Barbell Reverse Lunge	4x6/side	3x5/side, front foot elevated	4x7/side, front foot elevated	2x6/side, front foot on floor
C) Stiff-Legged Deadlift	3x6	2x6	3x6	2x6 (easy)
D1) Dragon Flag	3x12	3x12	4x12	3x12
D2) DB Windmill	3x8/side	3x6/side	4x8/side	2x8/side
Tuesday: Regeneration and/or skill work, light scrimmaging				
Wednesday: Upper Body - Maximal Strength/RFD Emphasis				
Broad Jumps	5x5	4x5	6x5	Omit
10-yard Acceleration: Standing and 3-Point	4 sets each	3 sets each	5 sets each	Omit
A) Thick Bar Bench Press (Wks. 1,2) Barbell Floor Press (Wks. 3,4)	3RM test + 2x3 backoff	4 singles over 90%	5 singles over 90%	3x3 (should be easy)
B1) Alternating Incline DB Press	3x6	3x5	3x6	2x6 (easy)
B2) One-Arm DB Row	3x6/side	3x5/side	3x6/side	2x6/side (easy)
C1) Medium, Neutral Grip Seated Cable Row	3x10	3x8	3x10	2x8/side
C2) Cable Woodchop at Hip Height	3x10side	2x8/side	3x10/side	2x8/side

Static-Proficient Athlete
General Off-Season Phase II (Continued)

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Thursday: Skill work, light scrimmaging				
Friday: Lower Body - Strength-Speed Emphasis				**Pre-lift: Vertical Jump**
5-Star Drill	5/direction	4/direction	6/direction	Omit
A) Barbell Jump Squat	6x4@32% of 1RM squat	4x4@35%	8x4@38%	Omit
B) Speed Deadlift	6x2@55% of 1RM deadlift	6x2@60%	8x2@65%	8x2@50%
C) Walking DB Lunge	4x5 steps/side	3x5 steps/side	5x5 steps/side	2x5 steps/side
D1) Pull-Through	3x10	2x10	3x10	2x10
D2) Bar Rollout - Knees Elevated 4"	3x10	2x10	3x10	2x10
Saturday: Upper Body - Strength-Speed Emphasis				
A) Push Jerk	4x2@60%, 4x2@70%	3x2@65%, 3x2@75%	4x2@70%, 4x2@80%	**5-rep Speed Bench Test Instead**
B1) Decline Close Grip Bench Press	4x4	3x4	5x4	2x5
B2) (Weighted) Neutral Grip Pull-up	4x4	3x4	5x4	3RM test + 2x5
C1) Prone Trap Raise	3x12	3x12	3x12	3x12
C2) DB Cuban Press	3x10	3x10	3x10	3x10
C3) Prone Internal Rotation	3x15	3x15	3x15	3x15
***Light scrimmaging separate from session is okay.**				

Static-Proficient Athlete
General Off-Season Phase III

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Sunday: Regeneration or Complete Rest, no scrimmaging				
Monday: Lower Body - Maximal Strength/RFD Emphasis				
Zig-Zag Hurdle Hop (Five 12" Hurdles, Forward and Back)	6x2 laps	5x2 laps	8x2 laps	OMIT
Bounding	5x6/side	4x6/side	5x6/side	
A) Full Back Squat (Wks 1,2), Conventional Deficit Deadlift (standing on 3" step) (Wk. 3)	3RM test + 2 singles over 90%	4 singles over 90%	5 singles over 90%	OMIT
B) Pistol Squat	4x8	3x7	4x8	3x7 (easy)
C1) Incline Glute-Ham Raise	2x8	2x7	3x8	2x7 (easy)
C2) Swiss Ball Prone Bridge	3x30s	3x30s	3x30s	3x30s
D2) Suitcase Deadlift	3x8/side	3x8/side	4x8/side	3x8/side
Tuesday: Regeneration and/or skill work, light scrimmaging				
Wednesday: Upper Body - Maximal Strength/RFD Emphasis				
Pro-Agility (5-10-5 Drill)	5/direction	4/direction	6/direction	OMIT
A) Reverse Band Press (Wks. 1,2) 3-Board Press (Wk. 3) Stability Ball DB Bench Press (Wk. 4)	3RM test + 2 singles over 90%	4 singles over 90%	5 singles over 90%	2x20 (easy bloodflow work)
B1) Low Incline DB Press	4x8	3x7	4x8	OMIT
B2) (Weighted) Thick Handle Pull-up	4x8	3x7	4x8	3x6 (easy)
C1) Fixed Bar Suspended Extension	2x10	2x10	2x10	OMIT
C2) Face Pull	3x10	3x10	3x10	3x10
D) Low-to-High Cable Woodchop	2x10	2x10	3x10	2x10

Static-Proficient Athlete
General Off-Season Phase III (Continued)

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Thursday: Skill work, light scrimmaging				
Friday: Lower Body - Speed-Strength and Strength-Speed Emphasis				**Lower Body Tests****
Bounce Drop Jump - Find box height that maximizes jump height.	5x6	4x6	6x6	**OMIT**
A) Box Squat vs. Bands	6x2@43% of 1RM squat	5x2@48% + 2 singles >90%	6x2@53%	No bands: 1RM attempt only
B) Speed Deadlift vs. mini-bands	6x2@50% of 1RM deadlift	5x2@55%	6x2@60%	No bands: 8x2@50%
B) Safety Squat Bar Dynamic Lunge	4,4,6,6/side	3x5/side	5,5,7,7/side	2x5/side
D1) Glute-Emphasis Back Extension	3x10	3x10	3x10	OMIT
D2) Side Bridge	3x30s/side	3x30s/side	3x30s/side	3x30s/side
Saturday: Upper Body - Strength-Speed, Rep Emphasis				
A) Speed Bench vs. mini-bands – No Pause on Chest	8x2@45% of 1RM bench	6x2@50% + 2 singles >90% w/out bands	10x2@55% w/out bands	**Bench Press Tests****
B1) Close Grip Bench Press	4,4,6,6	3x5	5,5,7,7	OMIT
B2) Wide, Pronated Grip Chest Supported Row	4,4,6,6	4x5	5,5,7,7	3x6
C1) Seated DB Clean	3x12	2x12	3x12	OMIT
C2) Inverted Row	3x12	2x12	3x12	3x10
C3) Scap Pushup	3x20	2x20	3x20	3x15
***Light scrimmaging separate from session is okay.**				

****Lower Body tests include Bounce Drop Jump vs. Countermovement Jump Assessment, broad jump, and single-leg triple jump. Bench Press tests include 1RM and 5-rep speed bench tests. These results determine the training focus for the next 2-3 months of the general off-season.**

Spring-Proficient Athlete
General Off-Season Phase I

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Sunday: Regeneration or Complete Rest, no scrimmaging				
Monday: Lower Body - Maximal Strength/RFD Emphasis				
A) Trap Bar Deadlift (Wks. 1, 2), Front Squat (Wks. 3,4)	4x4	5 singles over 90%	6x3	3x5 (should be easy)
B) DB Bulgarian Split Squat	4x8/side	3x8/side	4x8/side	2x8/side (easy)
C1) Glute-Ham Raise (natural, if necessary)	4x8	3x8	4x8	2x8 (easy)
C2) Reverse Crunch	3x12	3x12	3x12	3x12
D) Side Bridge	3x30s/side	3x30s/side	3x30s/side	3x30s/side
E) Wrist Roller	3x30s	3x30s	3x30s	3x30s
Tuesday: Regeneration and/or easy skill work, no scrimmaging				
Wednesday: Upper Body - Maximal Strength/RFD Emphasis				
A) 45-degree Incline Press (Wks. 1,2), Close Grip 2-Board Press (Wks. 3,4)	4x4	5 singles over 90%	6x3	3x5 (should be easy)
B1) Neutral Grip DB Bench Press	4x8	3x8	4x8	2x8 (easy)
B2) Chest-Supported Row - Pronated Grip	4x8	3x8	4x8	2x8 (easy)
C1) One-Arm Face Pull	3x12/side	3x12/side	3x12/side	3x12/side
C2) Supine 1-Arm DB Protraction	3x15/side	3x15/side	3x15/side	3x15/side
D) Full Contact Twist	3x8/side	2x8/side	4x8/side	2x8/side

Spring-Proficient Athlete
General Off-Season Phase I (Continued)

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Thursday: Skill work, light scrimmaging				
Friday: Lower Body - Strength-Speed, Rep Emphasis				**Pre-lift: Test Broad Jump**
A) Box Squat	8x2@50% 1RM	6x2@55%	10x2@60%	4x2@45% + 2x3 heavy
B) Rack Pull from Mid-Shin	4x5	3x5	5x5	3x5
C) Barbell Reverse Lunge-Front Squat Grip	3x6/side	3x5/side	4x6/side	2x4/side
D) Elevated Split Squat Iso Hold	3x35s	2x45s	3x50s	1x60s
E1) Side Bridge	3x30s/side	3x30s/side	3x30s/side	3x30s/side
E2) Plate Pinch	3x30s	3x30s	3x30s	3x30s
Saturday: Upper Body - Strength-Speed, Rep Emphasis				
A) Speed Bench Press - Pause on Chest	8x2@50% 1RM	6x2@55%	10x2@60%	4x2, 45% + 1RM test
B1) Neutral Grip One-Arm DB Push Press	4x5/side	3x5/side	5x5/side	3x5/side
B2) (Weighted) Close Grip Chin-up	4x5	3x5	5x5	3x5
C1) Push-up Iso Hold off 4" steps	3x35s	2x45s	3x50s	1x60s
C2) Elbow-Supported External Rotation	3x12/side	3x12/side	3x12/side	3x12/side
***Light scrimmaging separate from session is okay.**				

Spring-Proficient Athlete
General Off-Season Phase II

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Sunday: Regeneration or Complete Rest, no scrimmaging				
Monday: Lower Body - Maximal Strength/RFD Emphasis				
A) Wide Stance Anderson Squat from Parallel Pins (Wks. 1,2) Snatch Grip Deadlift (Wks. 3,4)	3RM test + 3x3 backoff	6 singles over 90%	3 singles over 90% + 3x4	3x3 (should be easy)
B) Barbell Reverse Lunge	4x6/side	3x5/side - front foot elevated	4x7/side - front foot elevated	2x6/side - front foot on floor
C) Stiff-Legged Deadlift	4x6	3x6	4x6	2x6 (easy)
D1) Dragon Flag	3x12	3x12	4x12	3x12
D2) DB Windmill	3x8/side	3x6/side	4x8/side	2x8/side
Tuesday: Regeneration and/or skill work, light scrimmaging				
Wednesday: Upper Body - Maximal Strength/RFD Emphasis				
A) Thick Bar Bench Press (Wks. 1,2) Barbell Floor Press (Wks. 3,4)	3RM test + 3x3 backoff	6 singles over 90%	3 singles over 90% + 3x4	3x3 (should be easy)
B1) Alternating Incline DB Press	4x6	3x6	4x6	2x6 (easy)
B2) One-Arm DB Row	4x6/side	3x6/side	4x6/side	2x6/side (easy)
C1) Medium, Neutral Grip Seated Cable Row	3x10	3x10	4x10	2x10/side
C2) Cable Woodchop at Hip Height	3x10side	2x10/side	3x10/side	2x8/side

Spring-Proficient Athlete
General Off-Season Phase II (Continued)

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Thursday: Skill work, light scrimmaging				
Friday: Lower Body - Speed-Strength and Strength-Speed Emphasis				**Pre-Lift: Test Vertical Jump**
A) Reactive Squat	6x4@42% of 1RM squat	4x4@45%	8x4@48%	Omit
B) Speed Deadlift	8x2@55% of 1RM deadlift	6x2@60% + 2x1@90%	10x2@65%	8x2@50% + 2x1@93%
C) Walking DB Lunge	4x5 steps/side	3x5 steps/side	5x5 steps/side	2x5 steps/side
D1) Pull-Through	3x10	2x10	3x10	2x10
D2) Bar Rollout - Knees Elevated 4"	3x10	2x10	3x10	2x10
Saturday: Upper Body - Strength-Speed, Rep Emphasis				
A) Push Jerk	4x2@60%, 4x2@70%	4x2@65%, 2x2@90%	4x2@70%, 4x2@80%	**5-rep Speed Bench Test Instead**
B1) Decline Close Grip Bench Press	4x4	3x4	5x4	2x5
B2) (Weighted) Neutral Grip Pull-up	4x4	3x4	5x4	3RM test, then 2x5
C1) Prone Trap Raise	3x12	3x12	3x12	3x12
C2) DB Cuban Press	3x10	3x10	3x10	3x10
C3) Prone Internal Rotation	3x15	3x15	3x15	3x15
***Light scrimmaging separate from session is okay.**				

Spring-Proficient Athlete
General Off-Season Phase III

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Sunday: Regeneration or Complete Rest, no scrimmaging				
Monday: Lower Body - Maximal Strength/RFD Emphasis				
A) Full Back Squat (Wks 1,2) Conventional Deficit Deadlift (standing on 3" step) (Wk. 3)	3RM test + 5 singles over 90%	5 singles over 90%	8 singles over 90%	OMIT
B) Pistol Squat	4x8	3x7	4x8	3x7 (easy)
C1) Incline Glute-Ham Raise	3x8	3x7	4x8	3x7 (easy)
C2) Swiss Ball Prone Bridge	3x30s	3x30s	3x30s	3x30s
D2) Suitcase Deadlift	3x8/side	3x8/side	4x8/side	3x8/side
Tuesday: Regeneration and/or skill work, light scrimmaging				
Wednesday: Upper Body - Maximal Strength/RFD Emphasis				
A) Reverse Band Press (Wks. 1,2) 3-Board Press (Wk. 3) Stability Ball DB Bench Press (Wk. 4)	3RM test + 5 singles over 90%	5 singles over 90%	8 singles over 90%	2x20 (easy bloodflow work)
B1) Low Incline DB Press	5x8	4x7	5x8	OMIT
B2) (Weighted) Thick Handle Pull-up	5x8	4x7	5x8	3x6 (easy)
C1) Fixed Bar Suspended Extension	3x10	2x10	3x10	OMIT
C2) Face Pull	3x10	3x10	3x10	3x10
D) Low-to-High Cable Woodchop	2x10	2x10	3x10	2x10

Spring-Proficient Athlete
General Off-Season Phase III (Continued)

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Thursday: Skill work, light scrimmaging				
Friday: Lower Body - Speed-Strength and Strength-Speed Emphasis				**Lower Body Tests***
A) Box Squat	6x2@55% of 1RM squat	5x2@58% + 2 singles >90%	6x2@61%	1RM attempt only
B) Speed Deadlift vs. mini-bands	6x2@55% of 1RM deadlift	5x2@60%	6x2@65%	No bands: 8x2@50%
B) Safety Squat Bar Dynamic Lunge	4,4,4,6,6/side	3x5/side	5,5,5,7,7/side	2x5/side
D1) Glute-Emphasis Back Extension	3x10	3x10	3x10	OMIT
D2) Side Bridge	3x30s/side	3x30s/side	3x30s/side	3x30s/side
Saturday: Upper Body - Strength-Speed, Rep Emphasis				
A) Speed Bench – Pause on Chest	8x2@55% of 1RM bench	6x2@58% + 2 singles >90%	10x2@61%	**Bench Press Tests****
B1) Close Grip Bench Press	4,4,4,6,6	3x5	5,5,5,7,7	OMIT
B2) Wide, Pronated Grip Chest Supported Row	4,4,4,6,6	4x5	5,5,5,7,7	3x6
C1) Seated DB Clean	3x12	2x12	3x12	OMIT
C2) Inverted Row	3x12	2x12	3x12	3x10
C3) Scap Pushup	3x20	2x20	3x20	3x15
***Light scrimmaging separate from session is okay.**				

****Lower Body tests include Bounce Drop Jump vs. Countermovement Jump Assessment, broad jump, and single-leg triple jump. Bench Press tests include 1RM and 5-rep speed bench tests. These results determine the training focus for the next 2-3 months of the general off-season.**

The Late Off-Season

In the late off-season, we're going to continue with building strength and power, but we're going to have to sacrifice a bit of this emphasis in order to start to give metabolic conditioning the attention it finally deserves.

Keep in mind that the late off-season is meant to be a "warm-up" to the preseason, which is when the truly rigorous metabolic conditioning begins. We know that preseason is even more stressful than in-season in terms of overall volume of training, so it's certainly not a time to be amassing lots of volume of resistance training and reactive training exercises.

Preseason is more about maintenance of what the athlete has built in the off-season as he transforms general physical potential into true athletic prowess. The great resistance training researcher and author Vladimir Zatsiorsky defines this process as ***delayed transmutation*** – "the time period needed to transform acquired motor potential into athletic performance" (12).

The more experienced you are in a given sport, the less time it will take for you to transform this newfound strength and power into sporting contexts. And, going back to our closed- vs. open-loop challenges discussion, using open-loop variations in the late off-season can make this transformation go even more smoothly.

With the rigors of the preseason ahead in mind, it should come as no surprise that we want to do whatever we can to

build every last ounce of strength and power going into this period. As such, the late off-season is about continuing the general off-season, but being willing to compromise a bit to get the ball rolling on metabolic conditioning.

Finally, keep in mind that sprinting and agility movements are reactive training methods in themselves, so one doesn't want to be doing a lot of challenging reactive training on top of this metabolic conditioning. In other words, the weightroom aspect of the late off-season should largely focus on maximal strength and strength-speed. All the linear and lateral movement training and actual gameplay take care of the absolute speed (body weight only) and speed-strength (anything up to roughly 40% of 1RM) work an athlete needs.

The pages that follow feature sample one-month late off-season plans for both a static- and spring-proficient individual. As you'll notice, I'm a huge fan of consolidating the most CNS-intensive training sessions into 24-hour blocks, thus allowing for 2-3 windows of complete recovery from anything significantly taxing each week. Also, the dynamic flexibility templates from the general off-season should be applied here as well; you can mix and match drills from those templates to complement the movement training warm-ups outlined here.

Static-Proficient Athlete
Late Off-Season

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Sunday: Regeneration or Complete Rest, no scrimmaging				
Monday AM: Lower Body - Maximal Strength/RFD Emphasis				
A) Close Stance Low Box Squat (Wks 1,2), Trap Bar Deadlift (Wks. 3,4)	4x2@50% + 2x2 heavy	4x2@55% + 1 single over 90%	6x2@60% + 1x3 heavy backoff	4x2@65%
B) DB Reverse Lunge - Front Foot Elevated	4x6/side	3x6/side	4x7/side	3x6/side (easy)
C1) Pull-Through	3x10	3x10	3x10	2x10
C2) Decline Dragon Flag	3x10	3x10	3x10	2x10
Monday PM: Lateral Movement Training				No Session
Extended Warm-up: High Knee Jog, Buttkick, Side Shuffle, High Knee Skip, Straight Leg Sprint, Carioca, Backpedal	25 yards each	25 yards each	25 yards each	OMIT
3-yard Sprint/Shuffle/Backpedal Weave	5/direction 30s rest interval	4/direction 25s rest interval	6/direction 25s rest interval	OMIT
Backpedal into 5-10-5 + Sprint (Modified T Drill) - Respond on fly to coach's direction command	6 sets 30s rest interval	4 sets 25s rest interval	8 sets 25s rest interval	OMIT
Tuesday: Regeneration and/or skill work, light scrimmaging/aerobic work				

Static-Proficient Athlete
Late Off-Season (Continued)

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Wednesday AM: Upper Body - Maximal Strength/RFD Emphasis				
A) Push Press (Wks. 1,2) Bench Press (Wks. 3,4)	4x2@60% + 2x2 heavy	4x2@65% + 1 single over 90%	6x2@60% + 1x3 heavy backoff	4x2@65%
B1) Neutral Grip DB Floor Press	3x6	2x6	3x7	OMIT
B2) Corner Rows	4x6	3x6	4x7	4x6 (easy)
C1) Cable Scarecrows	2x15	2x15	2x15	2x15
C2) Straight-Arm Lat Pulldowns	2x15	2x15	2x15	2x15
Wednesday PM: Linear Movement Training				**No Session**
Extended Warm-up: High Knee Jog, Buttkick, Side Shuffle, High Knee Skip, Straight Leg Sprint, Carioca, Backpedal	25 yards each	25 yards each	25 yards each	OMIT
Anterolateral Bounding	3x6/side Full Recovery	2x6/side Full Recovery	4x6/side Full Recovery	OMIT
10-yard get-up and go	5 sets 30s rest interval	4 sets 25s rest interval	6 sets 25s rest interval	OMIT
20-yard standing start	4 sets 30s rest interval	3 sets 25s rest interval	5 sets 25s rest interval	OMIT
Thursday: Skill work, light scrimmaging				

Static-Proficient Athlete
Late Off-Season (Continued)

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Friday PM: Strongman Training**	Full Recovery	90% Recovery	80% Recovery	**Competition Day**
Extended Warm-up: Acceleration Runs	4 sets 60 yards to 80%	3 sets 50 yards to 80%	5 sets 50 yards to 80%	Timed Pro-Agility and 40-yard dash
A) Tire Flip	4x4 flips	3x4 flips	5x4 flips	Max Flips
B) Overhead Keg Walking Lunge	4x6/side	3x6/side	4x6/side	Medley among last three
C) One-Arm Farmer's Walk	3x25 yards/side	2x25 yards/side	3x25 yards/side	25 yards each
D) Reverse Sled Dragging	3x35 yards	2x35 yards	3x35 yards	No rest
Saturday: Upper Body - Rep Emphasis				
A1) DB Bench Press	4x8	4x8	5x8	3x6 (easy)
A2) One-Arm DB Row	4x8	4x8	5x8	3x6 (easy)
B1) Close, Neutral Grip Seated Row	3x10	2x10	3x10	2x10
B2) DB Cuban Press	3x10	2x10	3x10	2x10
C) Side Bridge	3x30s/side	3x30s/side	3x30s/side	3x30s/side
***Light scrimmaging separate from session is okay.**				

**Note: If an athlete lacks access to strongman equipment, he can easily make substitutions with common free-weight implements on this session. Acceptable substitutions might include:

- Tire Flip: Power Clean, High Pull, Clean Pull, Dynamic Low Box Squat, Speed Deadlift
- Overhead Keg Walking Lunge: Overhead DB Walking Lunge
- One-Arm Farmer's Walk: Can be performed with a heavy dumbbell
- Reverse Sled Dragging: Stadium Sprints, Step-ups

Spring-Proficient Athlete
Late Off-Season

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Sunday: Regeneration or Complete Rest, no scrimmaging				
Monday AM: Lower Body - Maximal Strength/RFD Emphasis				
A) Close Stance Low Box Squat (Wks 1,2) Trap Bar Deadlift (Wks. 3,4)	4x3	2 singles over 90% + 2x3	5x5	3x5 (easy)
B) DB Reverse Lunge - Front Foot Elevated	4x6/side	3x6/side	4x7/side	3x6/side (easy)
C1) Pull-Through	3x10	3x10	3x10	2x10
C2) Decline Dragon Flag	3x10	3x10	3x10	2x10
Monday PM: Lateral Movement Training				**No Session**
Extended Warm-up: High Knee Jog, Buttkick, Side Shuffle, High Knee Skip, Straight Leg Sprint, Carioca, Backpedal	25 yards each	25 yards each	25 yards each	OMIT
3-yard Sprint/Shuffle/Backpedal Weave	5/direction 30s rest interval	4/direction 25s rest interval	6/direction 25s rest interval	OMIT
Backpedal into 5-10-5 + Sprint (Modified T Drill) - Respond on fly to coach's direction command	6 sets 30s rest interval	4 sets 25s rest interval	8 sets 25s rest interval	OMIT
Tuesday: Regeneration and/or skill work, light scrimmaging/aerobic work				

Spring-Proficient Athlete
Late Off-Season (Continued)

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Wednesday AM: Upper Body - Maximal Strength/RFD Emphasis				
A) Push Press (Wks. 1,2) Bench Press (Wks. 3,4)	4x3	2 singles over 90% + 2x3	5x5	3x5 (easy)
B1) Neutral Grip DB Floor Press	4x6	3x6	4x7	OMIT
B2) Corner Rows	4x6	4x6	5x7	4x6 (easy)
C1) Cable Scarecrows	2x15	2x15	2x15	2x15
C2) Straight-Arm Lat Pulldowns	2x15	2x15	2x15	2x15
Wednesday PM: Linear Movement Training				**No Session**
Extended Warm-up: High Knee Jog, Buttkick, Side Shuffle, High Knee Skip, Straight Leg Sprint, Carioca, Backpedal	25 yards each	25 yards each	25 yards each	OMIT
10-yard get-up and go	5 sets 30s rest interval	4 sets 25s rest interval	6 sets 25s rest interval	OMIT
20-yard standing start	4 sets 30s rest interval	3 sets 25s rest interval	5 sets 25s rest interval	OMIT
Thursday: Skill work, light scrimmaging				

Spring-Proficient Athlete
Late Off-Season (Continued)

	Week 1 High	Week 2 Medium	Week 3 Very High	Week 4 Low
Friday PM: Strongman Training**	Full Recovery	90% Recovery	80% Recovery	**Competition Day**
Extended Warm-up: Acceleration Runs	3 sets 60 yards to 80%	2 sets 50 yards to 80%	4 sets 50 yards to 80%	Timed Pro-Agility and 40-yard dash
A) Tire Flip	4x4 flips	3x4 flips	5x4 flips	Max Flips
B) Overhead Keg Walking Lunge	4x6/side	3x6/side	4x6/side	Medley among last three 25 yards each No rest
C) One-Arm Farmer's Walk	3x25 yards/side	2x25 yards/side	3x25 yards/side	
D) Reverse Sled Dragging	3x35 yards	2x35 yards	3x35 yards	
Saturday: Upper Body - Rep Emphasis				
A1) DB Bench Press	4x8	4x8	5x8	3x6 (easy)
A2) One-Arm DB Row	4x8	4x8	5x8	3x6 (easy)
B1) Close, Neutral Grip Seated Row	3x10	2x10	3x10	2x10
B2) DB Cuban Press	3x10	2x10	3x10	2x10
C) Side Bridge	3x30s/side	3x30s/side	3x30s/side	3x30s/side
***Light scrimmaging separate from session is okay.**				

**Note: If an athlete lacks access to strongman equipment, he can easily make substitutions with common free-weight implements on this session. Acceptable substitutions might include:

- Tire Flip: Power Clean, High Pull, Clean Pull, Dynamic Low Box Squat, Speed Deadlift
- Overhead Keg Walking Lunge: Overhead DB Walking Lunge
- One-Arm Farmer's Walk: Can be performed with a heavy dumbbell
- Reverse Sled Dragging: Stadium Sprints, Step-ups

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Appendix A

Cardio Confusion: Implications for Strength and Power Athletes

By: Eric Cressey

Originally featured at T-Nation.com, January 20, 2005.

When it comes to training purely for strength and power, it's become vogue to vehemently oppose "cardio." In light of the traditional connotation of "cardio" and "endurance training" — rubbing your ass raw on a bike for an hour — the individuals bashing such initiatives certainly have justification for their views. However, "cardio" is a very general term. These individuals need to qualify their recommendations on a variety of fronts.

Science Mumbo Jumbo

All practical applications are based on a foundation of scientific knowledge, so it's important that we briefly discuss energy systems and skeletal muscle fiber types. Let's start with the energy systems. You'll find four stops on the Energy System Tour. Please keep your arms and legs inside the bus at all times, and don't give change to the hobo in the backseat who's sitting in his own urine.

The continuum includes ATP-Creatine Phosphate, Anaerobic Glycolysis, Aerobic Glycolysis, and the Krebs Cycle. The former two are anaerobic and the latter two aerobic. As duration increases, there's increased contribution of aerobic energy systems. As intensity increases, the anaerobic energy systems are utilized more.

As you might imagine, resistance training (RT) is almost exclusively anaerobic, whereas very low-intensity endurance training (ET) and non-exercise scenarios (i.e., rest) rely on aerobic metabolism. Carbohydrates are the primary fuel source for the first two, whereas fat becomes increasingly important for aerobic mechanisms.

An important takeaway from this info is that the word "cardio" doesn't tell us much. We're *training*, not just *working out*, so it's important to determine ahead of time which energy systems we want to challenge with a particular exercise intervention. Fellow T-Nation contributor Christian Thibaudeau wisely conjured up the term "energy systems training" to encompass all of these activities. Within this classification, one can specify which energy system is being trained by a given activity. Gold star for Christian! Preach on, brother!

Skeletal muscle has specific contractile and morphological properties that are closely related to this metabolic continuum. We'll keep this relatively simple: Type I muscle fibers are slow-twitch (ST), Type IIb are fast-twitch (FT), and IIa are the middle-of-the-road fibers. This table illustrates the differences among the three fiber types (1):

Property	I	IIa	IIb/x
Other name	Oxidative	Oxidative-Glycolytic	Glycolytic
Fiber Color	Red	White	White
Motor Neuron Size	Small	Large	Largest
Z- and M-line Thickness	Thick	Thin	Thinnest
Sarcoplasmic Reticulum Development	Low	High	Highest
CaATPase isoform	Slow	Fast	Fastest
Force Output	Low	High	Highest
Contractile Speed	Slow	Fast	Fastest
Myosin Heavy Chain isoform predominance	Slow	Fast	Fastest
Time to Peak Tension	Slow	Fast	Fastest
Time to Relaxation	Slow	Fast	Fastest
Oxidative Capacity	High	Medium	Low
Myoglobin Content	Highest	High	Low

Glycolytic Capacity	Low	High	Highest
Succinate Dehydrogenase Activity	High	Medium	Low
Phosphofructokinase Activity	Low	Medium	High
Glycogen Content	Low	High	High
Capillary Density	High	High	Low
Mitochondrial Volume	High	Medium	Low

Suffice it to say that ST fibers are better suited to low intensities, aerobic metabolism and endurance activities. FT fibers, on the other hand, are beneficial in terms of high intensities, anaerobic energy production and shorter duration events.

In terms of specific time periods, the ATP-CP system predominates in 0-10 second duration events, with 20 seconds as the upper limit. Anaerobic glycolysis is most active in the 15-30 second range; the aerobic/oxidative systems come into play almost exclusively once the work period is greater than one minute (and at rest). This assumes, however, that you're busting your butt to maintain the intensity.

Obviously, there's always going to be some overlap with the "changeover" from one energy system to another during an extended effort. According to the summation principle, if you're going to recruit FT fibers with a maximal effort, you need to recruit all the ST fibers first. No big deal. In fact, it's a good thing, as we want to be able to take advantage of as many motor units as possible for maximal efforts.

Conversely, the problem that's specific to this argument occurs when the available FT fibers are called upon to perform ST duties. In other words, intensity of endurance exercise gets too high, so these high-force, high-velocity fibers must become cardio bunnies — at least in the short term.
Over time, this scenario can lead to fiber shifts toward a more ST phenotype (more type I and IIa), characterized by upregulation of oxidative enzymes, increased myoglobin content, increased mitochondrial density, etc. Essentially, everything shifts to the left in the table I presented. These fiber shifts make

strength and power athletes perform more like marathoners than the explosive, mighty beasts that they are.

What the Literature Says

It's well established that performing RT and endurance training ET concurrently attenuates the improvements observed when one modality is employed exclusively (2,3). In consideration of this attenuation, many athletes who must prioritize maximal strength and power (e.g., powerlifters, weightlifters, track and field throwers) have limited or altogether avoided ET in order to maximize the returns on their metabolic and neuromuscular-specific RT programs.

I can't say I blame them. This avoidance is completely understandable in light of what the scientific body of knowledge and anecdotal evidence has reported. But, in studies of concurrent RT and ET, researchers have typically utilized ET protocols geared toward improving VO_2max (2,3). As such, the ET was in many cases performed at high enough intensities to require contribution of fast-twitch fibers to perform "slow-twitch duties."

Broadly speaking, the American College of Sports Medicine asserts that "those who are already physically active require exercise intensities at the high end of the intensity continuum to further augment their cardiorespiratory fitness. For most individuals, intensities within the range of 70-85% HRmax or 60-80% HRR (heart rate- reserve) are sufficient to achieve improvements in cardiorespiratory fitness, when combined with an appropriate frequency and duration of training" (4).

Conversely, "low-fit or deconditioned individuals (read: some strength and power athletes who do no supplemental work at all) may demonstrate increases in cardiorespiratory fitness with exercise intensities of only 40 to 49% HRR or 55-64% HRmax" (4). Kind of makes you wonder what would happen if the investigators for these RT + ET studies just backed off the intensity on the endurance training, huh?

Go figure, McCarthy et al. did just that. These researchers found that in a combined RT and ET protocol where ET was performed at *only* 70% HRR, untrained subjects in the combined training group experienced similar improvements in both peak VO_2 and strength performance as the ET-only and RT-only groups, respectively (5).

Sure, these subjects were untrained, but so were the participants in some of the other studies that found decrements in strength with combined training protocols.

Why Even Bother with Aerobic Training?

It's a legitimate question. As a lifter who's always looking to get stronger, I know I asked it at one time myself. Let's look at some potential benefits (according to both anecdotal and scientific evidence) of lower-intensity exercise, which I'll define as less than 70% heart rate reserve or 40% 1RM. Keep in mind that I don't include sprinters in this category of strength and power athletes, as sprinters fall more toward the power-endurance end of the spectrum. "Light-exercise" will mean something completely different for them. So, here are a few mechanisms by which light exercise may in fact facilitate RT progress:

1) Indirect cardiac adaptations such as short-term increases in cardiac output and longer-term increases in capillary density of type I fibers (6). Collectively, these adaptations may promote blood flow to soft tissues and, in turn, nutrient delivery (7) and clearance of metabolic wastes (8). Obviously, the ability to generate and maintain body heat as a result of greater capillary density can also prove highly beneficial for strength and power athletes as well.

2) Reduced delayed onset muscle soreness (DOMS) (8), possibly related in part to the aforementioned improvements in nutrient delivery and clearance of metabolic wastes.

Ever wonder why baseball pitchers often go for long, slow jogs on the day or two after they throw? Strength and power work does little to improve circulation, so this work is welcomed relief from rigorous 120-pitch outings.

3) An opportunity to practice crucial movement patterns when the exercise chosen in competition-specific (e.g., light squats, benches or deadlifts for a powerlifter).

4) Enhancement of psychological well-being (9).

5) Improved insulin sensitivity (10), allowing for more efficient utilization of dietary carbohydrates in restoring glycogen and stimulation of protein synthesis.

6) General physical preparedness (GPP), defined by Verkhoshansky as "conditioning exercises designed to enhance an athlete's general, non-specific work capacity" (10). As an athlete's work capacity increases, so too does his ability to adapt to increases in imposed volume demands.

Just as importantly, for athletes and non-athletes alike, endurance exercise offers numerous health benefits, including increased arterial compliance, decreased blood pressure, improved insulin sensitivity, improved glycemic control, and decreased body fat content (10,12-16).

Sure, many of these benefits may be geared toward untrained, sedentary populations. However, given that many strength and power athletes seek absolute (rather than relative) strength and therefore may be "overweight" by general health standards, these health improvements would be highly beneficial for such athletes. In support of this notion, we learned in T-Nation's interview with Gary Homann that getting at least some aerobic exercise each week is related to an increased likelihood of being happy with one's weight (17). I know that correlation doesn't necessarily equate to causation, but if you don't *feel* fat, I'm guessing that you're less likely to actually *be* fat.

Just to tie things together, it's quite well established that traditional ET interferes with gains in maximal strength and power — through fast to slow twitch muscle fiber shifts (18,19) — and, as such, is often avoided by the strength and power athletes. It follows that individuals who employ RT as their sole exercise modality may actually be at greater risk of chronic, preventable disease (19), possibly due in part to the exclusion of ET. I'm not trying to scare you, I swear!

So What the Heck Do I Do?

I'm pretty sure that all of you really big guys out there are already composing nasty emails to me about how much you hate cardio, so I'll get to the point. This isn't something to be dreaded, as you a) have a lot of room for variety and b) should intentionally avoid working hard. Call it managed fatigue or structured slacking, if it makes you feel any better.

You see, every one of you does "aerobic activity." Hell, reading this article is aerobic. We need to can the stereotypes, talk a little science, and in the end quit bastardizing the word "aerobic." Instead, it's time to start qualifying the energy system work one does as appropriate or inappropriate.

What's the first thing you did when you got out of bed this morning? You *walked* to the bathroom to relieve yourself. Then, you *walked* to the kitchen to make yourself breakfast. Then, you *walked* to the shower to get clean. Then, you *walked* to your bedroom closet to get dressed. If you're not noticing a pattern here, then perhaps you'd be better off with a coloring book than a T-Nation article...

You walk all day long. Walking — just like the vast majority of things you do in your everyday life — is almost completely aerobic in nature. Traditionally, cardiovascular training has been synonymous with aerobic training, the end goal being optimization of endurance performance. Now, this is all well and good if you're an endurance athlete, but what are the implications for strength and power athletes?

Simply stated, low-intensity aerobic work can be completely handled by the slow-twitch motor units (neuron and the fibers it innervates). It's fair to assume that strength and power athletes who aren't endurance trained are still probably in better shape than the untrained subjects in McCarthy's study, so the 70% heart rate reserve threshold carries over without much problem.

Likewise, 40% of 1RM isn't all that challenging. You ought to be able to pump out 40 or 50-rep sets with this weight. Just to be safe, though, I recommend sticking in the 60% heart rate reserve and 30% 1RM range for the low-intensity interventions I'll suggest.

The timing of these sessions is just as important as intensity. I encourage you to *not* perform them after lifting unless your lifting takes you less than 40 minutes, and you're only planning on doing a brief (ten minute) low-intensity session. We're not looking to perform marathon sessions or call upon the FT fibers to "get their aerobics on" once the ST fibers are more fatigued. Rather, they should be used on non-lifting days or several hours separated from a lifting session.

With the latter set-up, an ideal scenario would be to lift earlier in the day and do this blood flow work roughly six hours later. By the way, don't do this stuff first thing in the morning on an empty stomach. That silly practice has been beaten to death by bodybuilders already. I prefer that we not encounter such a hopeless intervention in strength and power athletes, too.

Here are some options. Feel free to combine a few of them in the same session to keep things interesting:

1. Traditional steady-state "cardio": Walking with or without incline (preferably outdoors) is good for those with very low tolerance to aerobic exercise. Others may be able to handle light jogging. Be cognizant of orthopedic stress, though; some people are just too heavy for impact exercise. Swimming, treading water and underwater jogging are great alternatives as well.

Elliptical machines can be used too, although I'd rather not see athletes on cardio machines (especially cycles) at all because of the restricted range of motion and potential for pattern overload. Then again, they're better than nothing. Getting it done is more important than how you do it, as we're looking for a systemic — not just muscular — effect. As I mentioned above, keep your intensity at roughly 60% of your age-predicted maximum heart rate ([220-age] x .6). Twenty minutes is plenty.

2. Strongman implements: Assuming the implements are kept somewhat lighter than normal, these choices are excellent recovery tools (as opposed to heavier use, which characterizes more sport-specific energy system training for various athletes). Wheelbarrow walks and farmer's walks are great choices, and you can always flip "smaller oversize" tires. Sled dragging takes the cake, though. There are a ton of different variations you can do to enhance your work capacity.

3. Dynamic Flexibility Circuits: This one is a favorite of mine, as you're actually improving your range of motion while improving your work capacity. Simply take body weight exercises like overhead lunge walks, lateral squats, knee-to-chests, scorpions, butt-kicks, etc., and work on getting your heart rate up a bit. Go in bouts of 30 seconds at a brisk, but deliberate pace.

4. Low-intensity Resistance Exercise: Pick 8-12 exercises, approximate 30% of your estimated 1RM for these exercises, and cycle through them. Do 20 reps

per set and keep your rest time as short as possible between sets. With each week, add a little volume until your work capacity has improved to an admirable level.

Generally, I'll choose one from each of the following categories: hip dominant movement, single-leg movement (typically quad dominant), horizontal push, horizontal pull, hip abduction, trunk flexion, trunk rotation or lateral flexion, elbow extension, elbow flexion, and humeral external rotation.

These selections are by no means set in stone; for instance, I may include vertical pushing and pulling exercises, depending on one's weaknesses and work capacity. These sessions are fantastic times to emphasize prehabilitation and neural activation work to get often-dormant muscles (e.g., all three glutes, serratus anterior, VMO) into their grooves.

Below you'll find a few sample circuits to get you on the right track. I encourage you to simply use them as templates from which to design your own individualized circuits. I try to alternate among upper body, lower body, and core exercises to allow for more complete recovery. Pick a circuit and repeat it 2-3 times.

Circuit A

Reverse Hypers
Dumbbell Bench Presses
Mini-band Sidesteps
Seated Cable Rows
Pulldown Abs
Pressdowns
Walking Dumbbell Lunges
Dumbbell Hammer Curls
Side Hip Thrusts
Dumbbell Cuban Presses

Circuit B

Face Pulls
Pull-throughs
Push-ups
Dumbbell Step-ups
Low-Pulley External Rotation
Stability Ball Crunches
Supinated Grip Pulldowns (substituted for elbow flexion)
Body weight box squats with mini-bands around knees (abduction emphasis)
Cable Woodchops
Lying Dumbbell Extension

5. High-Rep Band Work: This follows the same general template as #4, but bands can be a great change of pace and especially valuable because you can take them anywhere. Be creative, from good mornings with the band under your feet and looped over your neck, to band woodchops, to pull-aparts, to pull-throughs, the sky's the limit!

You might note the remarkable similarity of these recommendations to the GPP advocated by many Westside-influenced powerlifters. It makes sense, as these individuals are strength and power athletes. If you peruse the training logs of Elite lifters, you'll even find that several of them regularly incorporate traditional "cardio" at low intensities. Paul Childress, a man who's already squatted over 1,100 pounds, immediately comes to mind.

Professional strongman Brad Cardoza utilizes similar protocols as well. According to Brad, "I personally love these workouts, I'll go to the gym on a day off and do four to six supersets (2 x 25 on each exercise). It's just enough weight to get a pump, but not enough to actually fatigue the muscle. It took me a while to get used to doing these extra workouts, but now I hit them at least once a week and usually feel great the next day."

Likewise, Jesse Burdick, who'll be squattin' a grand in no time, notes the following:

"After gaining close to 80 pounds in a year due to training on a traditional Westside protocol and eating everything in sight, my numbers went crazy, but

my conditioning went the way of the toilet. After trying to just add in some GPP pre-workout and that not working, I knew it was time to try something else.

"Paul Childress told me about his walking, but I wasn't convinced because it was cardio and he was a powerlifter. Cressey reiterated what Paul had said and offered the scientific rationale for it. I wasn't necessarily just interested in losing weight; I just wanted to feel better, get stronger, be healthy, and be able to walk up stairs without the need for a burrito break. He recommended the walking and the 'light' circuit to me. I haven't died yet, or started to wear leg warmers, but I have been feeling better. My back is a little looser and it's easier for me to stretch.

"On Wednesday and Friday, I walk at a 5% grade at a speed of 3.0 for 15 minutes, keeping my heart rate no higher than 115. I then head over to the weight area and pick the first eight exercises that I think of to address my weaknesses and do two sets of them at a high-rep, low-weight protocol. It works for me."

Any takers for arguing with any of these giants about the value of supplemental low-intensity work? I didn't think so.

If these individuals didn't think that these interventions were helping to make them stronger and healthier, would they be doing them? I've used this strategy myself over the past year with great success, too, so don't think that I'm just theorizing about all this.

Answering the Critics

Many people will be quick to jump all over me about the unfavorable endocrine response associated with ET. Since I'm such a nice guy, I'll do them the courtesy of making their argument for them. My counterarguments follow:

Point: "Basal serum total Testosterone and free Testosterone concentrations were lower in elite amateur cyclists than in age-matched weightlifters or untrained individuals" (20). This data is consistent with previous research regarding endurance training and basal Testosterone concentrations (22,23).

Counterpoint: Elite cyclists utilize much longer durations and higher intensities than I'm recommending. This drop in reading T concentrations could also be

psychological; after all, they do wear goofy suits (although this goofiness is closely rivaled by those baggy bodybuilder pants).

Interestingly, in a study comparing acute hormonal responses of resistance-exercise and endurance exercise at only 50-55% VO2max, Tremblay et al found that "the endogenous hormone profile of men is more dependent on exercise mode or intensity than exercise volume as measured by caloric expenditure. The relatively catabolic environment observed during the resistance session may indicate an intensity rather than a mode-dependent response" (24).

Yes, folks, cortisol was higher and Testosterone was lower in the RT group. Why? It's because the endurance exercise wasn't all that intense; 50% VO2max is actually a warm-up in many moderate-intensity endurance training protocols (25)! The body had no need to get catabolic or (presumably) call upon a ton of FT fibers.

Think of this ET intensity as being closer to walking around the house than completing a triathlon. Unless you need a forklift to "briskly move" from Point A to Point B, this "vigorous" activity shouldn't push you into a muscle-wasting, catabolic coma. Then again, if you're in the forklift crowd, you have bigger concerns (pun intended).

A Final Reiteration

Sprinter-like low-intensity work may actually have deleterious effects on a powerlifter's performance. Likewise, most sprinters probably couldn't handle a powerlifter's GPP. Toss endurance athletes in there and you've got an overworked, maladapted athlete casserole.

In other words, you really have to match the supplemental low-intensity work to the athlete. Integrate it gradually, doing it only once per week initially. Over time, you should be able to work up to three sessions per week (or possibly more, if shorter in duration).

Once you've attained your desired level of conditioning, don't worry anymore about increasing the frequency or duration of sessions; this conditioning is more easily maintained than it is built in the first place.
Oh, and please keep the hate mail to a minimum. This "cardio" ain't that bad!

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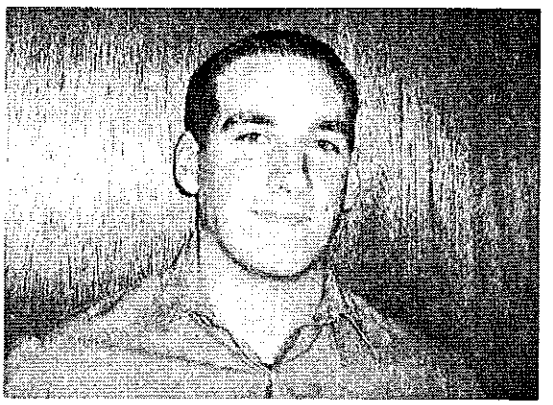
About the Author



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Eric has helped athletes of all levels – from youth sports to the professional and Olympic ranks – achieve their highest levels of performance. Although prepared in several bodies of knowledge, Cressey specializes in applied kinesiology and biomechanics as they relate to program design and injury rehabilitation, maximal relative strength development, and athletic performance enhancement. He is a highly sought-after coach for healthy and injured athletes alike.

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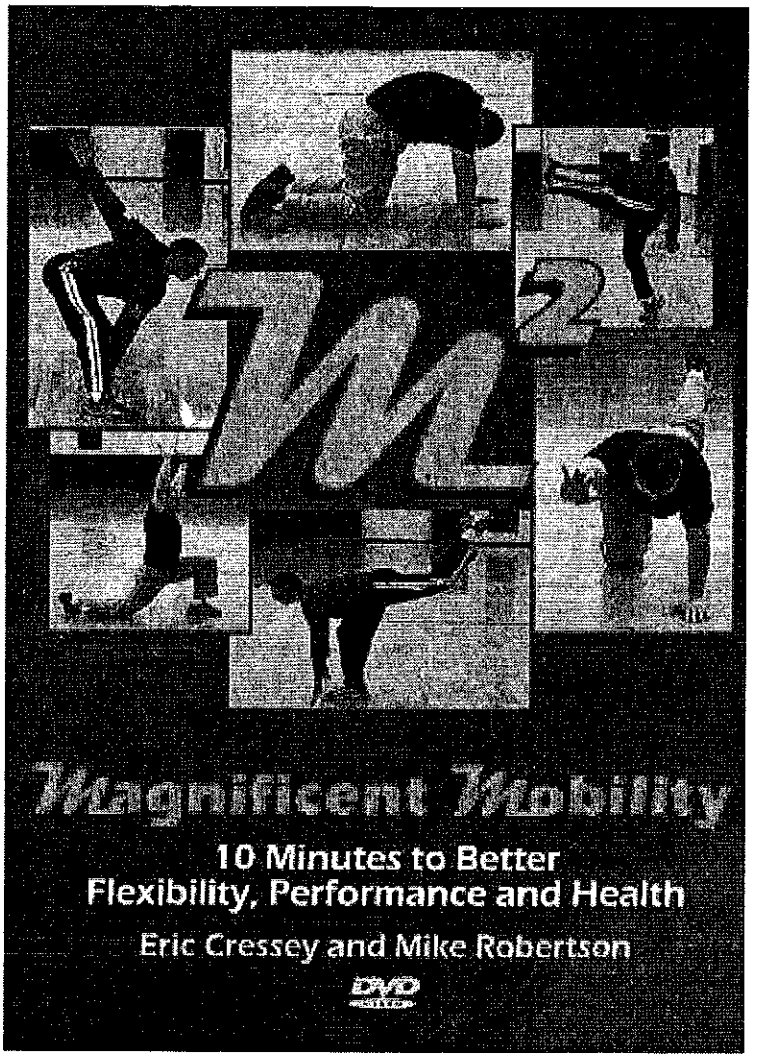

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