

8 WEEKS
8 OUT

ULTIMATE MMA CONDITIONING

JOEL JAMIESON

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Preface

“Conditioning is the greatest hold”

- Karl Gotch

Perhaps more than any other sport, Mixed Martial Arts is a testament to the ultimate versatility of human performance. While other sports may require greater endurance or a higher level of raw strength, few test the sheer limits and capabilities of the body's different energy producing systems in such a grueling and violently unforgiving way.

If you're too tired to finish a marathon or you're not strong enough to lift a certain weight, for example, you might lose the competition, but you're not going to get punched, kicked, kned in the face, or suffer the humiliation of being knocked unconscious in front of friends and family as a result. It is because of the ultimate physical demands and harshly unforgiving nature that an MMA fighter's conditioning level represents the true limits of their performance and skill.

A fighter with phenomenal conditioning can use their skills explosively throughout a fight to impose their will and take advantage of their opponent's mistakes in the last round just as quickly and ferociously as they can in the first. A talented fighter who lacks conditioning, however, can easily be knocked out or submitted by a fighter with less talent and skill but superior conditioning as the battle wears on.

It is in this way that conditioning is really the great equalizer of Mixed Martial Arts. Those who have it are feared in the later rounds and those who don't are only dangerous until they run out of gas. Great conditioning can give you the ability to push the pace faster and more relentlessly than your opponent can handle until they mentally break. Poor conditioning, on the other hand, can leave you gassed, defenseless, and lying face down on the canvas.

This book and the principles and methods I am going to reveal to you will be your secret weapon in a fight. Whether you compete in a ring, in a cage, or on the mat, this book will give you the tools and the knowledge you need to push your body's performance past that of any opponent you may face. Even if you don't have any aspirations to fight and just train for recreation, this book will save you an endless amount of time and wasted energy by teaching you how to get in the best shape of your life in record time.

Where others will work hard, you will have an understanding of how to work smarter and more effectively. While others train generally and without organization or structure, you will train specifically and with a singular purpose. Where other conditioning programs produce limited and inconsistent results, the methods and principles you are about to learn will produce an explosive transformation of your physical capabilities that comes from a level of endless and ultimate conditioning.

My Story

A large percentage of the last ten years of my life has been consumed by an overwhelming drive to understand the true nature of human performance. Trying to unravel this complex web that spans a vast array of sciences ranging from biology to biomechanics has taken me across the country and around the world in search of the truth of performance.

I have spent countless hours talking to some of the world's leading experts in many different fields, foregone sleep to scan medical journals at all hours of the night, and subjected my athletes and myself to endless different methods and hair brained ideas (some of them proved much more successful than others).

Along the way in my relentless investigation, I have ended up coaching almost every level of athlete imaginable, from little leaguer to pro bowler, to World Champion fighter. I've also been just about everywhere, ranging from the sidelines of the NFL to the backstage of the Saitama Super Arena in Tokyo and MGM Grand in Las Vegas for world championship fights. I've seen athletes reach the heights of success and fall to the lowest depths of failure.

This journey has given me uniquely detailed insight into the inner workings and minute details of human performance, where hundreds of a second and fractions of an inch can shape the defining moments of an athlete's career. MMA is a particularly unforgiving sport often defined by its razor thin margin of error, where many fights are often won or lost in the blink of an eye.

I'll be the first to admit, however, that my journey into the world of MMA and conditioning had an unlikely beginning. In my own athletic career, my primary sports were football, skiing, shot put and discus. My success as an athlete was mostly due to my strength and explosiveness, conditioning was never particularly my strong point.

In my early years as a Strength & Conditioning Coach, I worked primarily with strength/power sports like football and spent some time working with the University of Washington and the Seattle Seahawks. I was aware of MMA and had seen a couple of the early UFCs on video, but before I began training my first MMA fighter, a guy named Ivan Salaverry, my knowledge of the sport was extremely limited.

Looking back, when I first began working with fighters I made a lot of mistakes. Because I didn't know a great deal about the unique demands of the sport and my background had been mostly working with strength and power athletes, my early inclination was to just try to make every fighter I worked with as strong and powerful as possible. At that point and time, conditioning to me was more of an afterthought than anything else and my approach to training it was not particularly scientific or well thought out.

Fortunately, this all began to change fairly quickly when I was soon asked by Matt "The Wizard" Hume, to begin working with all his pro fighters at AMC Pankration. Although I didn't even know it at the time, Matt is one of the true pioneers in MMA, both as a fighter and a coach.

Without a doubt, working closely with Matt to train his fighters gave me a very unique and precious insight into what it takes to get a fighter prepared to step in the ring or cage. I was able to learn what it takes mentally and physically to become a champion in the sport from a coach that I believe knows as much about the fight game as anyone else in the world. Very few strength and conditioning coaches ever have such a rare opportunity and it has certainly helped shape my perspective on training fighters and the sport in general.

It wasn't long after I first began working with Matt that there were fighters flying in from all over the world to train and get ready for fights. Matt was already working for Pride FC both as the head of judging and as their head trainer and largely because of his recommendation, they soon hired me as their official Strength and Conditioning Coach as well.

In order to truly understand the needs of the sport, I began taking the basic classes of MMA and started going through all the strength and conditioning workouts myself with the fighters. I have to say, those early days were some of the most fun times as coach that I've ever had. Back then, we had a wide range of fighters from Japan regularly training with us such as Akira Shoji, Hayato Sakurai, Yoon Dong Sik, Maurice Smith, Bob Sapp, and many more, as well as younger fighters like KJ Noons and Tyrone Glover, who were winners of the Pride Amateur auditions.

Once I began learning the basics of the sport myself and training with the fighters, I quickly had a whole new perspective on the importance and role of conditioning. Eager to learn everything I possibly could on energy system development and conditioning, I began studying everything there was to find on the subject. Most of what I read seemed incomplete or didn't relate very well to MMA, and so I searched for better information and read some more.

Always impatient to further my understanding and knowledge, I've spent roughly the last five years on this continued journey into the science of conditioning. Along the way, I've read books on the subject from all over the world, talked to various experts from many different fields of human performance, and experimented with countless different training methods. I've also used just about every piece of technology I could get my hands on to test, assess, and analyze all the fighters I've worked with to understand the real world physiology of conditioning.

The book you now have in your hands is the result of all this labor and is the insiders guide to all that I have learned in the last several years. Some of the knowledge I am about to share has come simply from reading endless books and research articles; much of it has come from being able to work on a daily basis with Matt Hume; and plenty has come from good old fashioned trial and error and the lessons learned along the way.

Since those early days working with the fighters from Pride FC, I've worked with over 20 top level fighters in the sport and helped them get in shape for fights. Guys like Rich Franklin, Spencer Fisher, Jens Pulver, Matt Brown, Chris Leben, Brock Larson, Niko Vitale, Pete Spratt, Tim Boetsch, and many more have all relied on me at one point or another to get them in shape and ready to fight. Whether you are a seasoned pro like them or just a beginner, this book was written to share all the knowledge I have learned in order to help you become a better fighter.

This book would not have been possible without the collective help, guidance, and support of countless friends, family, and colleagues along the way. I'd like to take this opportunity to express my sincerest gratitude to them all.

To begin with, I'd like to thank my mom for her many years of encouragement and support in anything and everything that I've decided to put my hopes and efforts into. She has always been there when I've needed her and always provided whatever help and guidance she possibly could. I would not be where I am without her endless support.

Next, I'd like to thank and acknowledge Matt "The Wizard" Hume for having the trust in me to give me the opportunity to work with his fighters. I truly do not believe there is a finer MMA Coach in the world today and it has been both a privilege and an honor to work alongside side him as a coach and as a friend. I will always be in debt for the doors he has opened and the incredible knowledge of the fight game that he has shared over the years.

There have also been many strength and conditioning professionals, teachers, scientists, etc. that I have learned a great deal from over the years as well. In no particular order, these trusted friends, colleagues, and noted authors and researchers include: Val Nsedkin, Bill Gillespie, Kent Johnston, Mel Siff PhD., John Gray, Mark McGlaughlin, Landon Evans, Yuri Verkhoshansky, Atko Viru, Carmelo Bosco PhD., Vladamir Zatsiorsky PhD., Ken Kinakin D.C., Robert Sapolski, Hans Selye M.D. PhD., Susan Kleiner PhD., Mike Seilo, Thomas Incledon MS, Lyle McDonald, along with countless others whose research and books I have read and learned from.

In addition, I'd also like to thank several others who have helped guide this book's development along the way including: Rich "Ace" Franklin, Tony "The Minority" Sablan, Chris "Magnum" Jamieson, Eric Williams, Curtis Schuster, Hayato "Mach" Sakurai, Matt Brown, my graphic designer Maria Wander, and anyone else who I may be forgetting at the moment that read early draft versions of this text or helped out in one way or another.

I cannot express enough my thanks to everyone who has helped make this book possible. I'd also like to say thank you to the readers of this book for investing your hard earned money, as well as your time and effort, into this book. I have done my best to thank everyone involved by putting together the most comprehensive guide to MMA Conditioning that I could. I can only hope you learn as much from reading it as I have from writing it. Finally, this book is dedicated in loving memory to my Grandma, Helen Jamieson, who passed away while I was writing it. She was an extraordinary woman who never gave up her and she left this world on her own terms.

Just like the sport of MMA itself, strength and conditioning for combat sports is also in many ways still in its infancy. While most other professional sports that are so heavily dependent on conditioning have relatively evolved methods of training built on a foundation of scientific reasoning and validity to them, MMA conditioning, and training in general, is largely based on a random assortment of fads, gimmicks, and marketing hype. Much of it seems without reason or a real understanding of human performance.

Even at the amateur level, most cyclists use heart rate monitors, GPS units, power meters, mileage logs, etc. to systematically and strategically develop their energy systems and improve their times. Lance Armstrong and his coaches could most likely give you a breakdown of his anaerobic threshold, VO2 max, power output, mileage per day, etc., over the course of most of his entire cycling career.

Most fighters, by contrast, don't even have a clue what their resting heart rate is or why it's important – very few even own a heart rate monitor, let alone know how to use it in their training! This includes even the majority of those at the very top of the sport.

The sad and yet undeniable truth is that a lot of fighters today are successful despite their training, not because of it. There are many wins that could have come in the first round rather than in the third; many losses that could have been victories, and a vast amount of untapped performances that never lived up to their potential.

The problem isn't that most fighters aren't willing to work hard, it's that they've never been taught how to train smart. Discussion forums, articles, books, websites, DVDs, etc., where most fighters turn to for conditioning advice, are all clogged with the same uninspiring and unintelligent approach to conditioning.

Until now there has not been a resource where combat athletes could learn the truth behind the science of conditioning and how to separate fact from all the training fiction and marketing hype that's out there. This book represents the next stage in the evolution of MMA training and is the most comprehensive guide to Mixed Martial Arts conditioning that has ever been written.

It is my hope that this book will ignite a revolution in the realm of MMA conditioning and that this revolution will begin with you. By the time you are done reading this book, you will come to appreciate that conditioning is not an abstract art that is painted at random but rather a precise and delicate science that requires careful monitoring and thoughtful strategic planning.

Throughout this book, you will learn the true nature of human performance and how it translates into the sport of mixed martial arts and other combat sports. What's more, you will not just be given some random mindless workout program to follow, but rather you will be taught the inner most workings of physiology and be given the tools to analyze, assess, and pinpoint exactly where your own conditioning weaknesses are and the knowledge of how to quickly turn them into your strengths.

What to Expect

As with most things in life, to get the most out of something it usually requires some effort and this book will be no different. If you were looking for another generic program to follow or an easy way to get in shape then you've picked up the wrong book. What I'm going to do is teach you the underlying principles, methods, and training techniques I've used to develop the conditioning of some of today's best mixed martial artists. Even more importantly, I'm going to show you how you can use these same principles in your own training to get dramatically better results than you ever have before.

Throughout this process, I'm going to get into the real science of conditioning for MMA in a way that has rarely been discussed before. Don't worry, I will do my best to convey complex concepts and topics in a way that makes sense and is relatively easy to understand. Without question, conditioning is one of the most complicated aspects of human performance because it relies on so many different complex biological systems, but it can also be broken down into a few simple parts that make it much more easily understood.

Along these lines, this book will be broken down into a few key sections. First, I am going to present you with an understanding of just what strength and conditioning is and how it relates to the big picture of performance of MMA. There has been a great deal of debate over the last few years about exactly what the role of strength and conditioning is in an athlete's overall training program. This topic has been a subject of particular debate as MMA has evolved in recent years, so I'm going to start by giving you my answer to this most common and always controversial question.

Next, I'm going to give you a broad overview of the basic principles of energy system development and give you a basic foundation from which to understand just how your body takes the food you eat and turns it into the power you need to punch, kick, elbow, etc. Laying this groundwork will help make sense of the many different principles to come and provide a much more complete picture of conditioning than ever before.

Once you have the big picture of energy production in mind, you will then get to the heart of what this book is all about and learn exactly how each of the body's energy systems work and more importantly, how to make them work dramatically better. There are three chapters, one for each of the major systems, and you'll learn the specific assessments and revolutionary training methods that make this book and my training system unique.

This will be the first time I have presented many of my training methods to anyone outside of my private clients and once you learn these secrets you'll quickly realize why they are so incredibly effective and how I've been able to produce such dramatic results time and time again.

In the final section of the book, I will present you with the model of conditioning performance that I've developed over the last five plus years and explain just how it works and what makes it so uniquely ground breaking and effective. There have been many theories put forth in recent years (most of them dead wrong) about what type of energy system development is needed in MMA and I will finally lay those theories to rest and give you the principles behind my ultimate training program.

This model is your key to radically transforming your conditioning and your MMA game from the inside out and is what will break the will of your opponents as you are able to relentless push past the point of their ultimate fatigue. By the time you are finished with this book, you will have all the tools you need to be more successful and a more powerfully destructive fighter than ever before.

Now let's get to work...

SECTION I: PRINCIPLES OF STRENGTH & CONDITIONING

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Ultimate Strength & Conditioning

Chapter One

The field of strength and conditioning is still in its relative infancy, in many ways, despite having existed in some form or another and been a part of training since the dawn of athletic competition. It is really only in the last 20-30 years, however, that it has emerged as a wholly separate entity from skill development. Even today, in many (or even most) countries around the world, there aren't any coaches who specialize solely in strength and conditioning.

In some ways, the distinct separation between skill development and strength and conditioning has proven effective for athletic development and performance. In other ways, however, it has served to confuse more issues than it has resolved and spawned entire training paradigms built more on the results of effective marketing principles than on sound training theories.

Interestingly enough, the current state of the field of strength and conditioning is a mirror of the early days in MMA, with many different "camps" each contending that their methods are the best and most effective for improving performance and/or preventing injuries. Unlike in MMA, however, it is much more difficult to test the validity of their various claims because an athlete's performance is the result of many different variables and it is often very difficult, if not impossible, to directly tie an athlete's performance solely to their strength and conditioning program.

Unfortunately, you can't simply put strength coaches who believe in different training theories in a cage and let them all fight it out to determine whose training ideas and methodologies are more effective – although this would be very entertaining if you ask me. It's also important to point out that there are no formal requirements or official governing body for the field of strength and conditioning, so anyone who wants to call themselves an expert in the field is free to do so and often does.

As a result of all this, strength and conditioning in the U.S. has essentially splintered into a few different groups over the last 10-15 years. Each of these groups has their own set of beliefs about what strength and conditioning should be and their own set of training principles and guidelines to go along with them. It's easy to see the influence of each of these groups at work in MMA just by looking at examples of the endless training programs and articles posted online.

In this chapter, I'm going to discuss some of the common mistakes I see fighters making in their training programs and then lay the foundation for understanding how you can avoid them. Once you see where most programs go wrong and what the role of strength and conditioning really is, you'll be well on your way to seeing a whole new way to put all the pieces of your training program together so you can finally get the results you've been looking for.

Mistake #1: Following a bodybuilding program

It wasn't really that long ago that people only associated lifting weights with bodybuilding. Legendary bodybuilding coach and supplement entrepreneur Joe Weider was the driving force behind the introduction of bodybuilding to the masses in the 70s and 80s and was largely responsible for an entire generation of guys who watched Pumping Iron and wanted to look like Arnold.

Although Weider deserves credit for inspiring the general public to get in the gym and workout, the endless number of "Weider principles" has done little to help athletes understand the difference between building bigger muscles and building muscles that can perform. MMA is not about how big your muscles are and generally speaking the more muscle mass you have the harder it is to have great conditioning. There is a reason the heavyweights will never have the kind of conditioning you see from the lightweights and if you look at many of the most heavily muscled fighters in the game, a lot of them have had relatively poor conditioning.

Your training program should revolve around increasing performance and training the same way a bodybuilder does will not help you become a better fighter and it will certainly not improve your conditioning. If your workouts are split by body part and you train biceps and chest twice a week with 3 sets of 10, chances are you need to rethink your training program.

Mistake #2: Trying to be a Powerlifter

Although this approach might be slightly better than trying to look like a bodybuilder, it's not necessarily a whole lot better. As you'll come to learn throughout this book, strength is lot more complicated than it might seem and in MMA strength and power are only as good as your ability to use them in a fight.

You could have the strength to squat or bench press a Mack truck, but it won't do you any good in the ring or cage if you can only do it for one rep. MMA requires more than pure raw strength; it requires the ability to maintain your strength and power for up to 15 or even 25 minutes or more at a time, while Powerlifters only need to use their strength for a few seconds per lift.

The other problem is that the volume of heavy lifting it requires to develop superhuman levels of max strength can take its toll on your joints. When combined with the punishment your body takes on a daily basis from MMA, a high volume of very heavy lifting can be a recipe for joint pain and injuries as you get older.

Maximum strength does serve a purpose and MMA fighters do need to have a fair amount of it, training only like a Powerlifter is better suited towards strength/power sports with lower endurance requirements – or better yet for those who just want to be Powerlifters. To be a great fighter you need well rounded development and strength is just one of many important qualities. There may be times when you use Powerlifting methods, but this should compromise only a relatively small part of your overall training program throughout the year.

Mistake #3: The “Functional Training” Fad

It's hard to pin down just how, where, or when the whole “functional training” fad began, but there's little debate that over the last few years it has rapidly spread across weight rooms and health clubs alike with a particularly relentless fervor. Many weight rooms have been redesigned to feature pulley systems instead of squat racks and stability balls instead of benches – not to mention the myriad of balance disks, wobble boards, bosu balls, etc. that seem to clutter just about every training facility these days.

Coaches and trainers who advocate “functional training” place a premium on the tiniest details of movement above all else and often dissect even the simplest of exercises into endless multi-step progressions – half the time including some sort of balance device along the way and all the time focusing on “feeling your core” as you move. Watching some of these “functional” workouts, it can be difficult to tell if someone is lifting weights, doing Pilates, or training to join the circus!

Without getting into great detail on the scientific inaccuracies and folly of the functional training paradigm, it's relatively easy to see that the methodology leaves a lot to be desired when it comes to athletic performance and especially the sport of MMA. While focusing on good technique and a solid foundation of overall joint mobility and stability is important and should be a part of all programs, when you get so caught up in tiniest of details it can be easy to lose sight of the big picture.

Recently, it seems the functional training movement is starting to lose some of its steam and people are finally realizing that methods born out of the realm of physical therapy and rehabilitation do not offer the most effective way to improve performance. If your goal is to go to SeaWorld and ride Shamu the Whale, then maybe you should spend your valuable training time working on “balance” by doing bosu ball single leg squats and one arm cable pulley presses while sucking in your abs. If you'd rather be a fighter, however, then you need to train like an athlete, not like a patient going through physical therapy.

You should always keep in mind that all your training should be functional in that everything you do should be serving the purpose of improving your performance as a fighter. The idea that training is only functional if it's done on an unstable surface or in three planes of motion or on one leg at a time is simply wrong. You cannot judge an exercise and place it into categories of either “functional” or “non-functional” based solely on it meeting some special criteria.

Also, more will be discussed on this later, but injury prevention is about much more than trying to have every joint in some kind of perfect balance and muscular symmetry. There is absolutely zero research to support the idea that spending half your training time performing exercises that are used to rehab specific injuries leads to a reduction in future injuries. If you are serious about your performance you must train like it. Preventing injuries is the result of an overall training strategy and programming within your limits of work capacity, not the result of doing endless “functional” exercises.

Mistake #4: Following a Generic Conditioning Program

Although there is no shortage of MMA conditioning programs floating around the internet and in various books and magazines, that doesn't mean you should be blindly following any of them. The best conditioning program is the one that meets your specific needs and a generic one size fits all program will never do that because it was written for everybody, not for you.

Just like you must focus on training MMA around developing skills that you lack the most while maximizing those that you are naturally best at, the fastest way to improve your conditioning is do the same. Far too many fighters these days are trying to copy some other fighter's conditioning program they saw on the internet rather than taking the time to develop their own. Following a random generic program will not address your specific weaknesses or take advantage of your specific strengths and is not the way to get the best results.

This book was written to teach you how to stop following generic programs and how to start individualizing your training to get better results than ever. Throughout the following chapters, and particularly in the last section on programming, you will learn the details of how to design your own programs around your own needs.

Mistake #5: The General Approach

Whether or not you've ever done a CrossFit style workout yourself or not, you have no doubt heard about it or read about it at some point. Over the last year or two, the CrossFit training methodology and philosophy has received a considerable amount of press in the media (largely because its effectiveness and safety are controversial) and it has been the subject of discussion on many MMA discussion boards alike.

Perhaps the best way to sum up what this training philosophy is all about is to look at their own description of their core training philosophy taken from the CrossFit website, "*We've used our same routines for elderly individuals with heart disease and cage fighters one month out from televised bouts. We scale load and intensity; we don't change programs. The needs of Olympic athletes and our grandparents differ by degree not kind.*" This simple statement cuts to the core of the entire "general rather than specific" philosophy and provides the context to their training methodology.

The notion that everyone needs the same type of fitness and that general training is superior to specific training because it develops a more "broad" fitness is not only incorrect, it's downright *naïve and ignorant*. It should seem obvious that if you're training to be a mixed martial artist then you probably shouldn't be on the same program as an "elderly individual with heart disease." This notion completely ignores how the body adapts to stress and what building work capacity is all about. You must train properly to prepare your body for increasing workloads and intensities over a long period of time and this requires specific and effective programming.

As you will come to learn throughout this book, developing effective programs is a precise process based around the specificity of individual needs, weakness, and goals. Great conditioning does not result from simply throwing a bunch of random methods together with no rhyme, reason, or organization. The incredible adaptability of our physiology defines the amazingly broad limits of our performance capabilities and uncovering the specific physiological requirements of various types of performance reveals just how individual our needs really are.

If you want to be the best fighter and have endless conditioning, you have to train specifically and with a precise and individualized focus. You wouldn't do very well driving a Top Fuel Dragster at the Daytona 500. Training to unlock the potential of human performance requires a much more specific and structured approach than an overly generalized program, or any other such related philosophy, is ever capable of offering.

Mistake #6: Not coordinating ALL of your training

The most effective programs are those that coordinate all aspects of skill training and strength and conditioning. Far too many fighters, these days, separate their MMA training completely from their strength and conditioning work, rather than seeing them as an extension of each other. This doesn't mean you should only use MMA training drills for conditioning or perform all of your conditioning at your MMA gym. What it does mean, though, is that you need to realize that training should be coordinated and integrated, not disjointed or separated.

If you are working on improving your aerobic conditioning, for example, your MMA training should include lower intensity training to learn new techniques as well. If you are working on explosive power and power-endurance, your MMA training should incorporate the same types of intervals you are using for conditioning outside the gym. The closer you get to a fight, the more your conditioning program should become a part of your MMA training and vice versa.

It's important to realize that any type of training you do has distinct effects on all the systems of your body and these effects need to be taken into consideration as a whole when designing your program. Your strength and conditioning program can dramatically help you improve as a fighter, or it can set you back and interfere with your technique.

Not properly coordinating all aspects of training is one of the biggest mistakes I see many fighters making today. Using a tightly coordinated training approach is the fastest way to dramatically improve your conditioning and make sure all your hard work will pay off where it matters most, in the ring or cage.

Mistake #7: Only working on conditioning before a fight

I've saved the most common mistake for last and this is without question the biggest mistake I see fighters making on a daily basis. It's also one that you absolutely cannot afford to make if you want to have the kind of conditioning that wins you fights. Typically, fighters don't think much about conditioning until a month or two out from an upcoming fight and then they

expect that in just a few weeks they can get in great fight shape. The inevitable problem with this line of thinking is that conditioning is about much more than just “getting in shape” and to develop it properly takes a great deal more time than just a few short weeks.

As you will learn through the later chapters in this book, conditioning is the result of finely tuned coordination and development of many of your body’s major systems. When even just one of these systems isn’t working as well as it needs to be, the entire energy system chain is compromised and your conditioning suffers.

Just as if you go into a fight with a glaring weakness in your skills, such as poor takedown defense or striking, you run the risk being exposed and losing the fight. The same principle also applies for conditioning as well.

You can have great strength and power, but without proper cardiovascular development and muscular endurance, you won’t have the energy you need to put your strength to good use as the fight wears on. Likewise, you might have great endurance and be able to run a marathon, but if you’re weak and have no explosive power, you can end up getting pushed around and controlled by a bigger, faster, and stronger opponent.

Conditioning that wins fights takes time and dedication to develop. You wouldn’t expect a few weeks of training to cause a dramatic difference in your MMA skill and you shouldn’t expect that in 3-4 weeks of time your conditioning will be dramatically different either.

If you want to improve your conditioning and turn it into a weapon then you must work on it year round. In this book, I will teach you the secrets to finding specific weaknesses in your own conditioning and the most effective methods to eliminating them. This is how you will develop ultimate MMA conditioning and how you will get the edge on any opponents you may face.

A Different Perspective

As I mentioned in the Introduction, my pursuit of the ultimate understanding of just what performance is and how it is most effectively improved has taken me both literally and figuratively around the world. Along the way, I’ve studied the philosophy and methodology of many different countries and tried to understand how they define human performance and how they go about maximizing it through specific training.

I quickly learned that while our culture of strength training and athletic development in the United States largely arose out of the world of bodybuilding and placed a premium on muscle growth and aesthetics first and foremost, in many other countries there was a much different focus and context by which training was defined and developed.

In countries such as the former U.S.S.R., Germany, Bulgaria, and other eastern bloc nations they didn’t care about how big an athlete’s biceps or pectorals were. The only thing that mattered to them was how the athlete performed in competitions, period.

To these countries, international athletic competition served as a platform to assert their alleged national superiority and to this end their state sponsored athletic development programs received millions of dollars in funding and represented the pride of their nations. Sports were about much more than simply winning and losing or the spirit of competition, they were about national pride and a belief in the superiority of their political ideals.

I give you this background because it's important to understand where the foundation and fundamentals of the training system I'm about to teach you came from. I don't claim to have invented some radical new approach to training or to have pulled it out of thin air. To do so would not only discredit the hard work the great pioneers I have learned from, it would also fail to recognize that the methodology I'm going to teach you has been proven effective over more than 50 years of national and international competition. Countless world records have fallen and world championships have been won using this same methodology.

The five strength and conditioning principles I'm about to share with you form the core of my training philosophy and entire training system. They represent my viewpoint of what strength and conditioning really is, the role it plays in athletic performance, how all types of training should be coordinated to achieve success, and which training methods are the most effective.

Whatever your goals in MMA may be, understanding these basic principles and philosophy will help you know when to use the right methods at the right time and is the key to achieving dramatically better results than ever before.

Principle #1: The Role of Strength & Conditioning

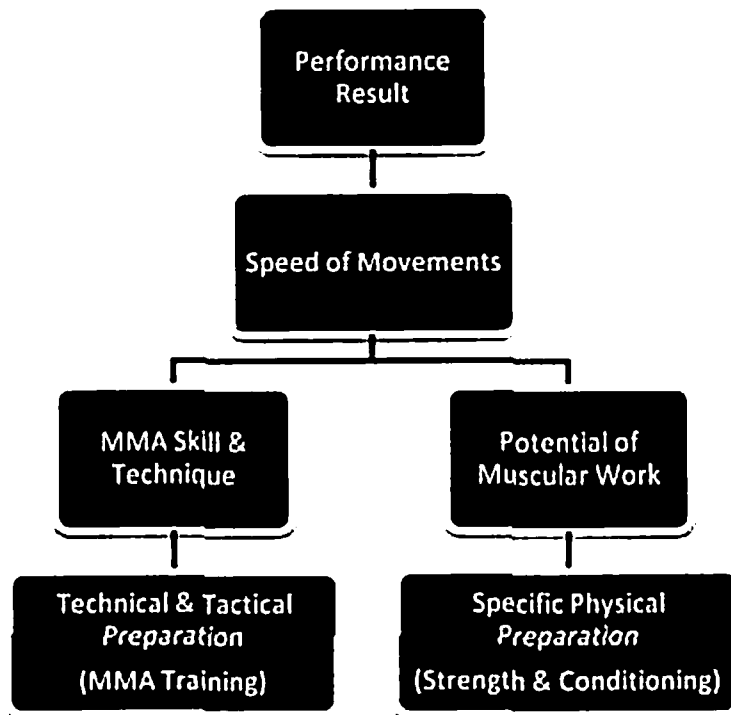
The precise role of strength and conditioning in the grand scheme of an athlete's development has been a subject of a great deal of debate and controversy over the years. Most of the disagreement comes from where the line should be drawn between strength and conditioning, skill development, and injury prevention/rehabilitation type methodologies.

In recent years, certain coaches within this industry have attempted to blur the line in their belief that training is only "functional" if it replicates the exact motor patterns and skills from the sport and/or has some component of instability to it. They argue that traditional strength training exercises and methods don't translate well into improved performance because they don't use the same movements that are part of an athlete's skill. To this end, they go through great efforts to try to simulate many of the intricate movements of various motor skills and make them more "challenging" by adding unstable surfaces, resistance, or both. They argue such efforts are necessary to make an exercise more "functional" to sports performance.

On the other side of the spectrum, you have the opposing argument that all strength is more or less equal and general in nature so strength and conditioning should just be about making an athlete as strong and as powerful as possible. They believe that the strength and power that an athlete develops in the weight room will naturally lead to improved performance regardless of the methods used to specifically develop them.

In my view and experience, the reality is that neither of these groups is correct in their *viewpoint and strength and conditioning is about much more than just strength or conditioning.* The true role of strength and conditioning (as depicted in fig. 1 below) is to **develop the physical preparation (motor work potential) necessary for an athlete to effectively utilize their skills as fast and as long as possible, plain and simple.**

The Role of Strength & Conditioning in Performance (fig. 1)



In MMA, this principle means that the purpose of strength and conditioning is to develop the physical capacities necessary to enable you to punch, kick, elbow, knee, arm bar, guillotine, etc. faster, more explosively, and for longer than anyone you will square up against. Developing these capacities will require you to spend a great deal of time and energy developing many different complex facets of physical preparation.

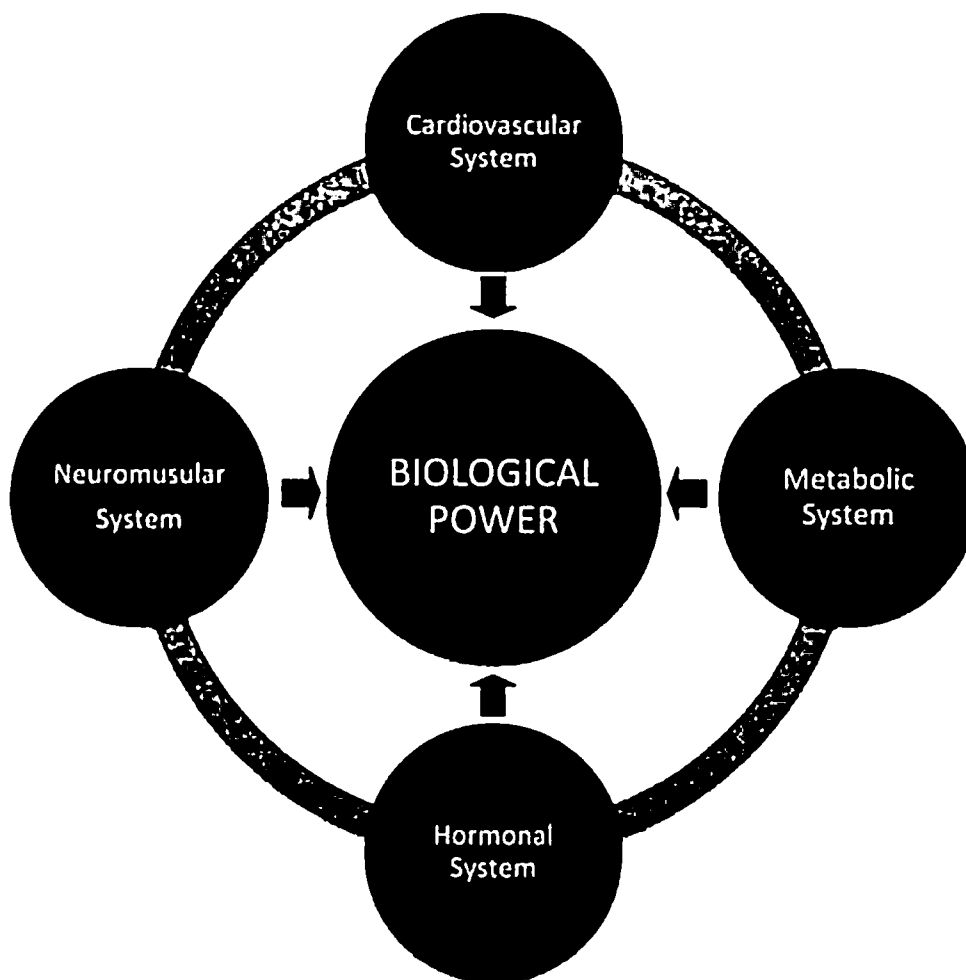
This means you will need to start by increasing your cardiovascular system's potential to supply oxygen throughout your body. Next, you will need to develop your neuromuscular system's ability to generate explosive power with minimal fatigue. To accomplish this, you will also have to develop the entire chain supporting systems that are involved in energy production.

This is no easy task by any means, but only in doing so can you truly increase your capacity for muscular work and thus raise the functional potential for your body to produce higher speeds of movement. On the other side, your level of skill development and technical and tactical preparation will dictate how well you can tap into and effectively utilize this motor potential.

Principle #2: Biological Power

Without question, one of the most important principles to learn if you really want to understand exactly what strength and conditioning is really all about and how it can help you be a better mixed martial artist is the concept of **biological power**. Most people associate power simply as the function of strength and speed, but in the case of biological power, it's much more than that and it is at the foundation of the entire training program and philosophy that you are about to learn. In fig. 2, you can see all the systems involved in biological power.

Model of Biological Power (fig. 2)



The easiest way to understand the concept of biological power is to think of your body as an engine capable of generating horsepower just like any other engine. This horsepower is what your body uses to do everything from walking to running, to generating power in a punch or kick. When you increase the amount of horsepower your body can generate, you then have more energy to do all these different activities. More importantly, you also have the potential to do them much faster and for much longer periods of time without fatigue.

Aside from the end result of increasing performance, biological power has vast implications in your training program as a whole. The greater biological power you are capable of, the higher your level of work capacity will be as a whole and the more training you are able to adapt positively to.

The reason for this is because it takes a lot of energy to adapt to the high level of physical and mental stress that your body goes through as a result of training. After each training session, your body must go through the difficult job of repair and recovery of many different tissues. Sugar stores have to be replenished, hormonal levels have to be restored to normal, muscle tissue needs to be repaired, etc.

In addition to just getting back to normal resting states after training, your body must then build new tissues and make changes to existing tissues if performance is going to increase. All of this work of repair and adaptation requires a tremendous amount of energy. The greater biological power you are capable of, the faster and more efficiently all these elaborate processes can take place.

It is in this way that biological power ultimately limits your work capacity, or put more simply, your ability to perform and adapt to a particular volume of work. In your case as a fighter, work means learning the art of mixed martial arts and all the training that is involved. A higher level of biological power means you can handle more training and improve as a fighter much faster.

Your level of biological power development is the result of your entire training program and strategy. Some programs are, of course, much more effective than others at putting together all the many complex pieces in the right order for dramatic improvements to be made. To truly develop your biological power and dramatically increase your capacity for work requires a systematic approach to physical preparation.

Principle 3: A Systematic Approach to Physical Preparation

In your car, the amount of horsepower the engine can generate comes from many different factors. These factors include the size of the engine, the type of fuel you use, how efficient the cooling system is, how well the car's computer regulates everything, etc. If you build a bigger engine, use higher octane fuel, increase air flow, reprogram the computer chip, etc., the car's horsepower increases and it can accelerate and reach higher speeds. This is actually very similar to how your body works, except that the systems your body relies on to generate horsepower are much more complicated and dynamic than the relatively simple ones in your car.

If you take a look back at fig. 2, you can see there are four primary systems that are responsible for the horsepower your body is capable of producing. These systems include the cardiovascular, neuromuscular, hormonal, and metabolic systems. The collective development of these four systems is largely what determines if you are a finely tuned and fiercely explosive fighter, capable of pushing a relentless pace from bell to bell, or if you're a fighter who gasses after the first round.

The training approach you will learn in the following chapters will teach you step by step how to assess how well each of these systems is specifically developed within you, and then how to make them capable of generating much more power. You will see how intimately connected these four systems are to your performance and just how precise the delicate the balancing act of their development really is.

If any of the four systems are not developed properly, your performance will suffer. It does you very little good to have tremendous neuromuscular development if you don't have the cardiovascular, hormonal, and metabolic systems to support the power your muscles are capable of. These systems must be developed to work together like a symphony in perfect harmony if you truly want to have devastating conditioning.

The training philosophy and program in this book is built around a systematic approach to developing the type of cohesiveness and biological power you need to be successful in MMA. The human body is an amazingly adaptable machine capable of extreme feats muscular strength, power, and endurance. The difference between having world class conditioning and gassing in the first round comes almost exclusively from how each of these four systems is specifically developed.

To develop the speed, power, explosiveness and endurance necessary to be a fighter who is feared as the fight wears on, you need each of these four systems to be developed in very specific ways and in a very specific order. You don't need to have the specific cardiovascular efficiency of a marathon runner or the raw neuromuscular strength development of a Powerlifter.

What you do need, however, is the ability to be fast and explosive for the entire fight and to have the quickness and energy to make your opponent pay for his mistakes whether he makes them in the first or in the last round. To do this, you will need to increase your body's biological horsepower and tune your engine in a very precise and specific way.

Physical Preparation

One of the most important principles to achieving this through your training program as effectively as possible is the principle of **physical preparation**. At the heart of this principle is that you must prepare your body for higher and higher workloads and intensities with specific types of training performed over a long period of time. This is what programming is all about.

This process is very similar to how you need to learn your skills in MMA. First, you generally learn the very basics of striking and submission wrestling/BJJ such as footwork and positional control. As you become better with the fundamentals of these skills, you then build on them and add various aspects to your skill set.

Over time, your fighting abilities broaden as you learn more and more skills and become better and better at using them. This is how your MMA skills should be developed over your career.

Your physical preparation as a whole must also mirror this development. Just as you would not start out your first day learning MMA trying to get in the ring and spar, you should only use methods and loading appropriate to your given level of physical preparation.

Only over the course of your long-term development as a fighter, with a continuing increase in biological power and physical preparation, should you employ more advanced methods and higher levels of loading/intensity. The key point is that you must be physically prepared to adapt well to the general and specific kinds of stress you are putting your body through. If you are not, the most likely result will be a lack of improvement and poor performance at best and acute or chronic injuries at worst.

Injury Prevention

Although this is a book on conditioning and not injury prevention for MMA, this is an appropriate area to give a brief overview on the subject. As discussed earlier, it seems to be common these days to believe that the key to injury prevention lies in doing many different particular exercises. I've seen plenty of strength and conditioning programs built entirely around such exercises.

Most of these exercises come from physical therapy and have traditionally been used to rehab muscular injuries. Many of these exercises can offer value if you have a particular joint problem or suffer from a chronic injury. The reality, however, is that injury prevention is about more than looking at one specific joint, kinetic chain, or various movement patterns.

If you have glaring muscular imbalances and can't perform simple movements and motor skills without almost falling over, then without a doubt you should be working on such areas. Aside from that, the most important key to injury prevention is the principle of physical preparation as previously discussed and managing your entire training program correctly.

In my experience as a coach, the vast majority of injuries (outside of freak training accidents) happen because of either A) a lack of physical preparation, or B) a poorly managed training program. More often than not, these two are related and this is where chronic injuries tend to result over a period of time.

If you really want to prevent injuries, then you need to take into account your given level of physical preparation and make the necessary judgments in your overall training program. Problems invariably arise when athletes fail to do this and try to use more intense methods than they are physically ready for, or when they simply overtrain and perform a far greater volume than their body can adapt to.

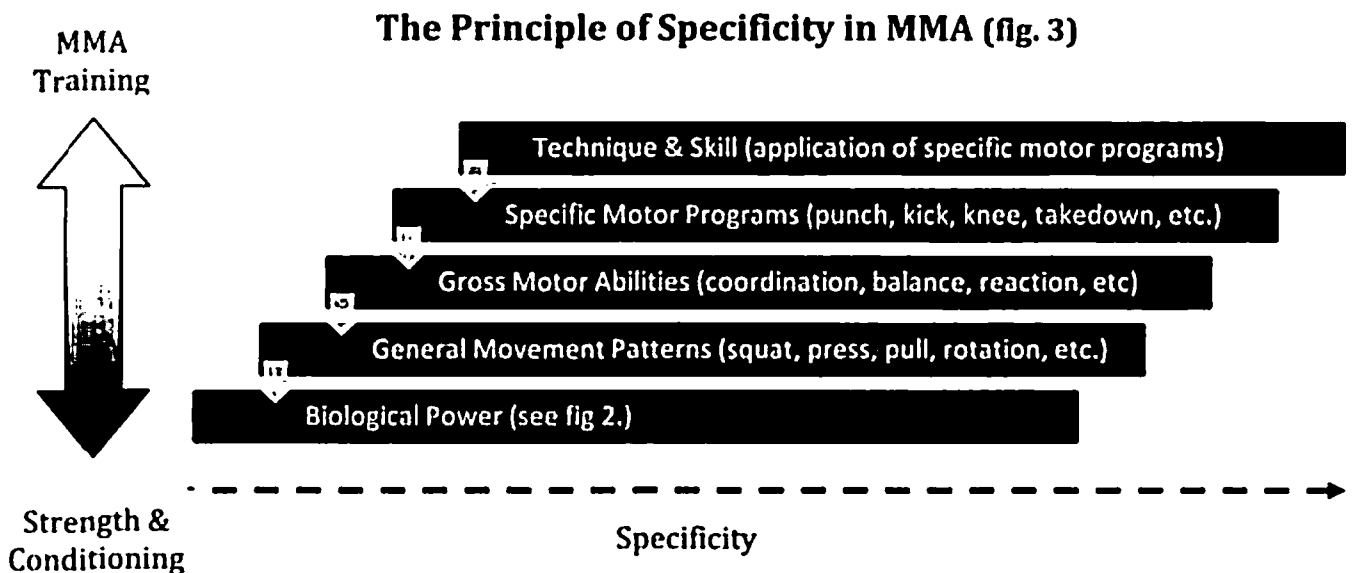
In either case, the end result is the same and the body is unable to adapt properly to the given training program and injuries ensue. All of the principles you will learn in this book are aimed at preventing this from happening. It is in this approach that I believe you will find the most success in staying healthy and improving performance at the same time.

Principle #4: Specificity of Adaptation

Without question, the principle of specificity is one of the most misunderstood and poorly applied principles in all of strength and conditioning. It's used by coaches from all perspectives to justify their training methods and yet very few really understand the concept or how it should be applied when it comes to developing training programs.

On the simplest level, specificity means that the body adapts in very specific ways to demands made upon it. In other words, if you run then your body gets better at running, if you do squats then your body gets better at squatting, etc. Somehow, this basic concept has become completely misconstrued in recent years to mean that the best way to improve performance is to train only using movements and exercises that are close to the skills of the sport as possible. Anything else is supposedly "non-specific" or "not functional" and should be avoided.

The biggest problem with this line of thought is that specificity is about much more than just the exercise or activity you are doing, it's about the adaptation you are stimulating. Just because your body adapts in specific ways to the type of training you do, this does not mean that these adaptations have no use or no transfer into anything. On the contrary, many exercises that look nothing like the skills of MMA can be very beneficial to your performance.



When it comes to Strength & Conditioning and MMA, the principle of specificity doesn't mean the only way to improve performance is to mimic the skills of the sport in the weight room. All it means is that you need to consider how your body will adapt to the exercises and training you choose to do. If these adaptations will help you punch, kick, knee, takedown, clinch, etc. faster, more explosively, or for longer duration, then that's what really matters. Exercising at a heart rate of 130-150 might seem slow and not specific to MMA, but if the adaptations result in an increase in aerobic fitness that helps improve your endurance, then it's specific to you.

Throughout the rest of this book, you will come to learn more about the nature of specificity and how it relates to strength and conditioning. You will learn that what really matters most is not the exercise you choose or the method you use, but rather the adaptations that result from using and applying them. There will be times in your training when you use exercises and methods that look similar to MMA and also times when they don't look even close. The most important thing is to understand how to apply the right methods at the right time. This is the *real* secret to unlocking your performance and finally getting the results you want.

Principle #5: General Adaptation Syndrome

Although “general adaptation syndrome” sounds like something you might end up in the doctor’s office for, it represents one of the most important medical revelations of the 20th century and was a monumental leap forward in our understanding of the human body. Coined by a groundbreaking pioneer named Dr. Hans Selye, general adaptation syndrome is a model for understanding how our body adapts in order to survive the endless physical and mental stress it is forced to deal with throughout our lives.

What Dr. Selye discovered through his research back in 1930s, was that no matter what the stress, whether it was extreme heat or cold, mental stress, physical exertion, etc. the body responded with essentially the same general pattern of reaction. He separated this patterned response into three distinct stages and called the entire process “general adaptation syndrome.”

At first glance, this might not seem like it has much relevance to strength and conditioning. In reality, general adaptation syndrome provides the cornerstone for understanding how our body adapts to working out, training, the stress of life in general. What Selye discovered, was that all types of stress have both a general and a specific effect on the body.

This means that working out, staying up late and not getting enough sleep, being mentally stressed from work, etc. all affect the body in a remarkably similar way and sets off the same chain of hormonal events that lead to adaptation. The adaptations that result can be beneficial, or they can be disastrous.

It’s vitally important to understand this concept because it means that when developing a training program, you need to look on a fundamental level at the entire picture of that stress it places on your body as a whole. Far too often, people look at pieces of their training program in isolation without looking at the big picture and this is what leads down the path of overtraining and poor performance/injuries.

Everything that you do, from what you eat to your level of mental stress at work, directly affects how your body adapts to your training and must to be taken into consideration when planning your training. The hormonal processes of general adaptation also need to be recognized when planning how much volume and intensity you should be using on a daily basis.

The human body is tremendously versatile and adaptable, but there are limits to its abilities in this regard and exceeding them is where overtraining and a great deal of poor health and disease stem from. Understanding General Adaptation Syndrome will help you train to the edge of performance without going over because it ties all the previously discussed training principles and performance together.

In the end, this entire book and all of training is about nothing more than stress. Your training program imposes a particular kind of stress on your body and it responds to this stress by adapting to it in both general and specific ways. When the right amount of stress is applied at the right times, the adaptations that result increase your biological power, raise your motor potential, and give you the ability to be a better fighter.

When you present the body with more stress than it can handle, or the wrong kinds of stress, the result is that the body is unable to meet the demands and negative adaptations and effects result. Everything else you are about to learn is essentially about how to **apply the right kind of stress at the right time in the right amounts** to progressively develop your physical preparation and improve your conditioning.

Summing it up

If you're reading this, it means you're looking for something different. Perhaps you're tired of the same old training programs and sick of not having the kind of conditioning you'd like to have. Whatever the case may be, the following chapters will present you with a revolutionary way to improve your conditioning from the inside out using a strategic blueprint I've spent many years developing, refining, and perfecting.

The truth is that most fighters take a shotgun approach to conditioning and believe that just working hard and doing some extra running or rounds of pad work and sparring is enough to get them in shape for fighting. They don't really understand the inner workings of conditioning well enough to know how to individualize their programs or figure out precisely what is holding their conditioning back. This is essentially the same as trying to learn MMA without having a coach or anyone to guide you, analyze your weaknesses, and instruct you along the way.

Although I can't be there in person to train you myself, I can teach you the same system I've used for many years with the sport's top pros and I can teach you how to apply it in your own training. In this chapter, I hope you've learned that conditioning is not a guessing game or the result of just working hard. The shotgun approach to training will only get you so far.

Whatever your goals may be, having the right training program will help you reach them much faster. Whether you're a professional fighter who has been in the game for many years, getting ready for your first fight or even if you just train recreationally, the following chapters will provide you with the knowledge of how to dramatically improve the effectiveness of your entire training program. Before you know it, you'll be well on the path to ultimate performance and achieving a level of conditioning you never thought possible.

SECTION II: PRINCIPLES OF ENERGY SYSTEM DEVELOPMENT

Joel Jamieson

Energy System Development 101

Chapter Two

Although this is a book about MMA conditioning, it's important to realize that strength and conditioning are intimately connected to one another when it comes to performance. In the sport of mixed martial arts, conditioning is really nothing more than how well you're able to maintain your strength, speed, and power over the course of a fight.

In this sense, your conditioning provides the fuel that your muscles need to contract and do the job of punching, kicking, elbowing, etc. your opponent as hard and as often as possible from bell to bell. The better your level of conditioning, the more fuel your muscles have and more power they're capable of generating, plain and simple.

Because your muscles are the end users of the fuel your conditioning provides, their specific development plays a key role in how much fuel they burn and how long they're able to do their job. Perhaps as much as any other system in your body, the neuromuscular system is incredibly versatile and able to adapt and change to meet the demands you place upon it through a large range of extremes.

On one hand, it is capable of developing the incredible fuel sparing efficiency necessary to compete in extreme endurance events such as marathons and triathlons that can require muscular work to be done for hours upon hours. On the other hand, it can be trained to generate an unbelievable amount of power in mere fractions of a second and propel an athlete 100 yards down the track in less than 10 seconds.

Although MMA does not require either one of these extremes of neuromuscular performance, it does require a delicate and demanding balance of both explosive power and muscular endurance. This demanding balance is rare and an extreme itself. Anyone who has even trained just one day in MMA, or any combat sport, knows exactly how challenging this extreme can be.

In this chapter, you will learn the basic principles of how the body is able to meet the extreme energy demands of MMA, as well as why it's important to understand this in the first place. Without this basic understanding, you are essentially just throwing darts at the wall when trying to develop a training program. Although the dart throwing strategy seems to be the approach many athletes often take, it is not the most effective way to take your conditioning to a whole new level.

By the end of this chapter, you will come to appreciate and understand the elegant beauty and complexity of the body's ultimate versatility. It is this inherent versatility and adaptability that gives you the opportunity to radically improve your conditioning level through specific training.

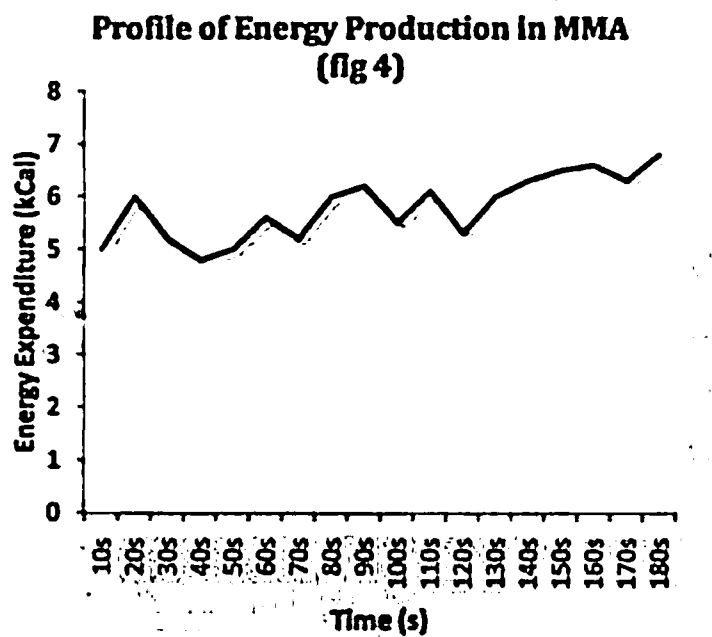
What is Conditioning?

Before we spend any more time talking about conditioning, it's important to understand exactly what conditioning is in the first place. Far too often, people use the words "conditioning" or "cardio" without really having a solid understanding or definition of what they actually mean. It's also common to hear people say that fighters are some of the best conditioned athletes there are, but is this really the case? What is conditioning really?

While I don't disagree that MMA requires a great deal of cardiovascular development and muscular endurance, among other things, the reality is that **conditioning is a measure of how well an athlete is able to meet the energy production demands of their sport.** A football player who is able to generate tremendous power for 10-12 seconds each play, over the course of an entire game, is just as well conditioned as a fighter who can last all five rounds of championship fight. Conditioning is also about much more than just "cardio."

Each sport requires a different combination of power (the ability to produce energy rapidly) and endurance (the ability to produce energy for a long period of time). Some sports require a great deal of power and low to moderate endurance, while others require the exact opposite. Most sports, however, tend to fall somewhere in between.

MMA is a brutal and mentally challenging sport in many ways because it demands a combination of high power and relatively high endurance at the same time. As I said in the introduction, there may be many sports that require more power and many that demand greater endurance, but very few that simultaneously require both in such an unpredictable and unforgiving fashion.



Fundamentals of Conditioning

If you look at the graph in fig. 4, it's easy to get a visual representation of what conditioning really is. On the vertical axis you have energy expenditure, measured in calories (a unit of heat energy) and on the horizontal axis you have time in seconds. The sudden changes you can see from the spikes represent drastic changes in activity level and power output such as when you go from a flurry of explosive punches and kicks to backing out and throwing some light jabs or circling.

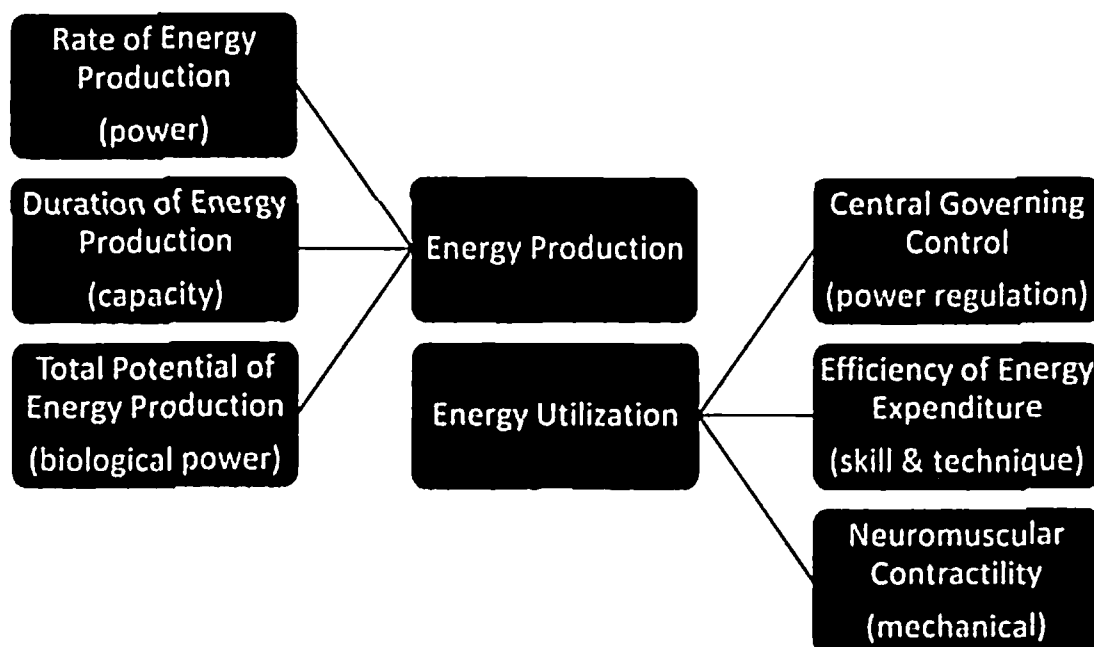
In order to use all your MMA skills through a 2-5 round fight, you have to produce power in a similar profile to that seen in the graph. At certain periods in the fight, you need higher power output as you throw a brutal combination of strikes, go for or defend takedowns and submissions, etc. At other times, you don't need as much energy because you're just circling or using footwork, waiting to improve position, throwing jabs for range, etc.

What all this means is that **conditioning is the result of how well the systems of your body are able to create the energy your muscles need to perform the skills of MMA throughout a fight.** If the systems involved in energy production can generate ATP (the fuel your muscles run on) fast enough and for long enough, then you have good conditioning. If they can't....well then you gas out. It's also worth noting that while the cardiovascular system is a very important piece of this puzzle, it's not the only piece and conditioning is not adequately described when it's used interchangeably with the term "cardio."

You can see in fig. 5 that there are six primary components that determine your conditioning level and how well your body can produce and utilize the energy necessary throughout a fight. These are the components that make up the two sides of the conditioning equation: energy production and energy utilization. How much energy you are capable of producing, how fast you are capable of producing it, and how effectively you can utilize it is what determines the difference between gassing out quick and being able to outlast your opponent from bell to bell.

Understanding this fundamental principle and how all of these pieces fit together in the grand scheme of things is very important and will give you a whole new perspective on how to develop your conditioning from the inside out.

Components of Conditioning (fig. 5)



What is Energy Production?

Before we get into more detail on the six components of conditioning listed in fig. 5, let's briefly talk about exactly what energy production really means in the first place. In the beginning of this chapter, I told you that conditioning provides the fuel your muscles need to do the job of punching, kicking, elbowing, etc. This is a pretty accurate and easy way to understand what energy production is and how it works.

Your skeletal muscles are living tissue and just like the rest of your body, they require constant energy to do their job of flexing and extending joints in a coordinated manner to move you around. Your cardiac muscle also requires energy to pump blood throughout your body. The more active you are, the more your muscles have to work, and thus the more fuel they require.

The fuel your muscles run on is a molecule called **Adenosine Triphosphate**, known as **ATP** for short. Through a chemical reaction that breaks down ATP into two smaller molecules (ADP + P) energy is released. It is this energy that is the fuel your muscles run on. In this way, ATP can be thought of as the **energy currency** of your body.

All the food you eat goes through chemical reactions that break the food down into ATP directly, or into sugars, fats, and proteins that are stored so they can later be turned into ATP as needed. The entire process of taking the food you eat and turning it into the ATP molecules that provide the biological energy your muscles run on is what energy production is all about.

Rate of Energy Production

As you can see in fig. 5, the energy production process can be broken down into three distinct components that collectively make up this side of the equation. The first component we'll discuss is the **rate of energy production**, also known as the **power** component. In physics, power is defined as "the rate of work being performed" but in the cage or ring power can be more easily understood when you see someone get a powerful takedown or connect on a vicious KO punch to end the fight.

In order to generate the kind of raw power it takes to hit someone so hard they barely remember the fight, your muscles need to be able to contract and relax with lightning fast speed. In order for them to do this, they need fuel to be provided at a very fast rate. The faster your systems of energy production can generate the energy your muscles need, the faster they can contract and relax and the more power they are able to generate.

Looking back at fig. 4, the rate of energy production can be seen by how steep the slope is during rapid changes in energy expenditure. A steeper slope represents greater energy system power and a greater necessity to rapidly generate the ATP your muscles need. Likewise, a more gradual slope indicates a lower rate of energy production and thus less power. As a mixed martial artist, it's important that you have the ability to produce energy as rapidly as possible if you want to be explosive and capable of getting the quick knockout or submission win.

Duration of Energy Production

The second component of conditioning that you need to understand if you want to dramatically improve it is the duration of energy production, also known as capacity. Just as the name implies, the capacity component is a measure of how long you're able to generate energy for. If you look back at fig. 4, you can see that the capacity of energy production is represented by the duration of the activity you're measuring. In the example provided the duration of energy production was only 3 minutes, or the length of one round of many amateur fights.

There are two things that are vitally important to understand when it comes to how long you can produce energy for. First, the duration of energy production is intimately connected to many of the other components of conditioning that we'll be covering. This should seem like common sense because how fast you burn through your fuel and the size of the gas tank obviously plays a large role in how long the fuel will last. In other words, if you increase the horsepower you can produce, then it takes more energy to run your engine. Unless you also increase the size of your gas tank, you will inevitably run out of fuel sooner rather than later.

The second thing you need to understand about capacity is that increasing it essentially comes down to two factors: increasing the size of the gas tank, i.e. total potential for energy production, or increasing the efficiency (economy) of energy expenditure. When you are capable of greater total energy production and/or you are able to spend your ATP currency with great mechanical efficiency then it lasts longer, plain and simple. This is really no different than upgrading to a car that has a bigger gas tank or improved fuel economy.

Total Potential of Energy Production

In the last chapter, I introduced you to the unique concept of biological power. It is this power that directly relates to the total potential of energy your body is capable of generating. Now that you understand a little more about energy production, it should be quite apparent just how important this component is when it comes to your performance.

Keeping in line with the car analogy, biological power can be visualized as a combination of the size and power of your engine, how much ATP fuel your gas tank can hold, and how well your computer systems govern and regulate everything. When you specifically improve the four primary systems of biological power: the cardiovascular, metabolic, hormonal, and neuromuscular systems, you increase the total amount of energy your body is capable of generating and raise your performance by increasing your potential for muscular work.

When you look at the difference between amateur and professional sports, the biggest differences are the level of technical skill and the speed at which those skills are executed. College football players going into the NFL often talk about how much faster the game is. If you've ever sparred with a top level pro fighter then you've probably experienced this speed differential for yourself. The basis for this increased speed of execution stems from an increase in biological power and your ultimate performance and conditioning depends on it.

Energy Utilization

The second half of the conditioning equation is energy utilization. In other words, how effectively you spend the ATP energy currency that your body produces. In many ways, the two sides of the equation are intimately connected as a change in one will almost certainly bring about a corresponding change in the other.

If you become more efficient in your technique, for example, your body won't need to produce as much energy to meet your muscles needs and so your capacity for energy production will increase because you can make it last longer. Likewise, if your total potential for energy production increases, the central governing mechanisms (something that will be more thoroughly discussed in later chapters) will take this into account and allow you to operate at a faster pace without fatigue.

Improving your energy utilization comes largely as the result of specific tactical and technical preparation. That is, learning, practicing, and improving the skills of mixed martial arts. Although one component, the contractility of muscle, is primarily area of focus in your strength and conditioning program, the best way to improve your energy utilization is through experience and training in MMA. This is where "specific conditioning" comes in as well and this will be discussed later in the section on programming.

Central Governing Control

Although this will be a topic discussed in later chapters on programming, the principle of central governing control is an important one to briefly touch on because of its role in energy utilization. First, let me make it clear that the entire process of how the central governor works is by no means fully understood or even accepted by all areas of academics. There is still a great deal of research going on in this area and plenty of research academic debate and discussion.

Having said that, I do believe that there are central governing factors that come into play when it comes to conditioning and it's an important area to understand and take into consideration. This view is based on my own research and experience over the years working with athletes and there is plenty of evidence and research to support the general working theory.

Explained briefly, the theory of a central governor states that rather than the muscles themselves, it is your brain's regulation of energy output that is the ultimate cause of fatigue and limiting factor in performance. Traditionally, working models of energy production have been built on the belief that when your muscles run low on energy or have a buildup of byproducts that interfere with contraction, you end up fatigued and unable to continue at the same level of power output.

The research on the central governing model, however, suggests that the muscles themselves *never* really run completely low on energy, but rather their power output is "turned down" by the brain as a protective mechanism. *More will be discussed* on this in subsequent chapters.

Efficiency of Energy Expenditure

Although this is not a book about improving your MMA skills, it is important to acknowledge that skill and technique play a distinct role in your conditioning. This can be seen in the efficiency of energy expenditure component. Your body works hard to generate the ATP your muscles need, but how effectively and economically your muscles utilize this energy to punch, knee, takedown, elbow, etc., largely comes down to your MMA technique and skill.

This principle is especially important for fighters with less experience who tend to try to overcompensate for a lack of skill by throwing as hard and as fast as possible until they ultimately end up gassing out – which typically is right around the end of the first round. If you've ever rolled or sparring against a very experienced fighter, you've no doubt seen just how much of a difference technique and skill can make when it comes to conditioning. It can often seem like you're working your ass off while they are barely breaking a sweat and yet somehow you're the one who keeps tapping out or getting punched in the face.

Part of improving your conditioning needs to come from learning how to utilize the energy you produce as effectively as possible through efficient technique. Fighters who are always tense and try to throw everything they have into every punch or kick are also the same ones who typically have conditioning problems.

In other words, all the conditioning in the world isn't going to help you much if you waste it with poor technique and strategy. Fortunately, as you become a more experienced fighter you will inevitably get better at utilizing the energy you're able to create. Just like everything else, this is an area you must spend conscious effort and work for it to dramatically improve.

Muscle Contractility

The specific contractile properties of your muscle are another important area of energy utilization and they also play a role on the energy production side of the equation as well. The property of contractility basically just describes how fast your muscles are capable of contracting and relaxing. When people typically think of power, they often only consider the contraction speed without realizing the importance of the relaxation speed as well.

What's important to know is that these mechanical properties are intimately tied to the metabolic properties of the muscle, but they can also be improved and changed independently of one another to a certain extent as well. For example, your fast twitch fibers will always be capable of contracting and relaxing faster and will require a higher rate of energy production to sustain their power output than slow twitch fibers, but it is also possible to improve their endurance without slowing them down.

The goal of training is to increase how fast your muscles can contract and relax (power) while also simultaneously improving their ability to do so for prolonged periods of time. Contractility plays a big role in determining how much external power results from your energy production.

Energy Production Summary

By now, you probably understand that energy production and conditioning is not simple. When people often ask me, "What do I need to do improve my conditioning?" my answer usually takes them by surprise when I tell them that I have no idea.

Now don't get me wrong, with the right tests and assessments I can certainly give them the right answer and provide a plan that will dramatically improve their conditioning. The problem, however, is that without knowing anything about why someone's conditioning is poor or what their level of physical preparation is to begin with, it is next to impossible to give any real meaningful answers to such an open ended question.

Just like the sport itself, energy production and conditioning come from many different abilities. As you learned from the discussion above, conditioning is about how fast you can produce energy, how long you can produce it for, how much total energy you're capable of generating, and of course, how efficiently you use it.

On a fundamental level, all of these different components are responsible for determining if you're an explosive fighter who can last bell to bell or a fighter who gasses out and gets beat by fighters with less skill. So what is it that gives you the ability to produce more energy, produce it faster, and produce it longer? Let's look at the answer.

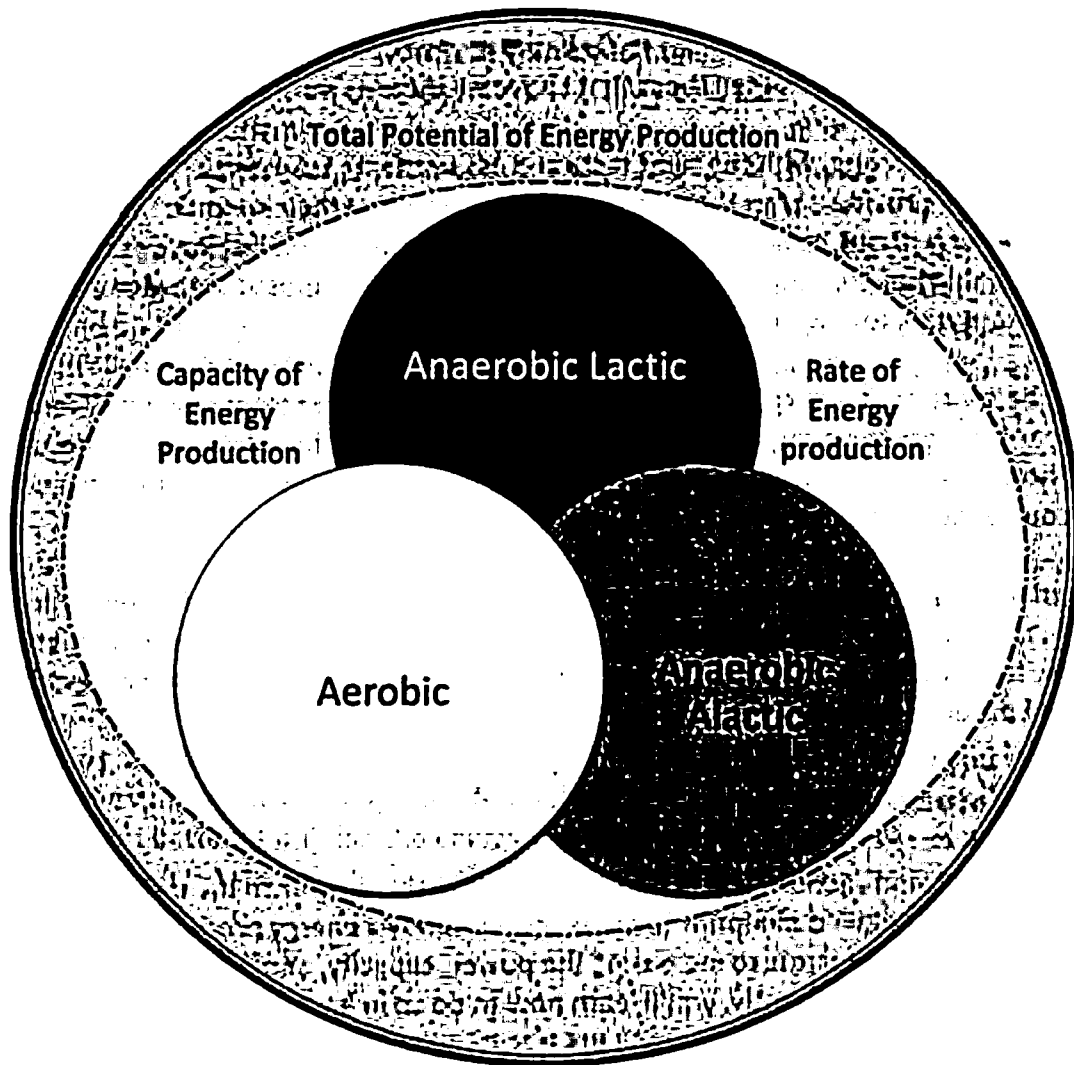
Energy Systems Overview

The next chapters and sections in this book will give you the answer to the question above and provide you with a detailed blueprint to crank up your body's energy production like never before. You'll learn the secrets to increasing the power, capacity, and total potential of energy production and most importantly, you'll learn how to do so in a way that will specifically improve your performance as a fighter.

Before I give you the answers you've been waiting for and the secrets to my entire training program, however, I need to give you a little more detailed view of what exactly determines the different components of conditioning in the first place. Understanding this simple principle and the model of energy production below is one of the real keys to unlocking the mysteries of conditioning and developing a program that's based specifically on your own needs.

If you look at the center of the circle in fig. 6, you'll see there are three main circles. These three circles represent the body's three different energy systems and their specific development is what determines what kind of conditioning you have. It's important to think of them as three independent and yet overlapping systems, each of them with differing energy production capabilities. Ultimate conditioning is about creating precisely the right balance of development between all of them and how they work together. This is the real secret of conditioning that most fighters, and even most coaches, don't truly understand.

Model of Energy Production Overview (Fig. 6)



Two of these systems, the anaerobic-lactic and anaerobic-alactic, are capable of tremendously powerful energy production because they don't rely on oxygen and use relatively few chemical reactions to produce ATP. They are the systems that give you the power to knockout and finish your opponent, but the downside is that they can only produce energy for a relatively short period before inducing fatigue. The use of the high powered anaerobic-lactic system in particular, comes at a high price and the more you rely on it, the faster you will start to gas.

The aerobic energy system, on the other hand, relies on oxygen for ATP regeneration and is not capable of nearly the same rate of energy production as the anaerobic systems. The real benefit, however, is that it's able to produce energy for very long periods of time without fatigue. This tremendous capacity means that sports that last more than a couple of minutes invariably rely on aerobic energy production and it's also the system you rely on to fuel your muscles and vital organs in everyday activities and at rest. Later, you'll see that over the last few years the aerobic system has gotten a very bad rap that it does not deserve.

The next three chapters will give you the behind the scenes view of each of these systems. You'll learn how they work and you'll learn the most effective methods to improving them.

What I'm going to show you is that performance is not about using a hundred different methods, it is about using the most effective ones at the right times. I'm going to teach you how to assess and analyze each of these systems and then provide you with my top secret blueprint for turning your conditioning weaknesses into your strengths.

Whether you're a fighter who has never have even heard of these systems before, or a coach who has studied them for years, the next three chapters will teach you my view on how to properly develop them for MMA from the inside out. What you're going to come to learn is that it takes much more than the random approach most fighters employ when it comes to conditioning to get to achieve real results and real success.

Ultimate conditioning and performance comes from a specific and strategic system designed to develop each energy system in precisely the right way by using the right methods at the right time. The following two sections will teach you this system and how to apply it to your training program.

The Aerobic Energy System

Chapter Three

If you've been reading many articles on training lately, it would be easy to think that the only athletes who need to train aerobically are marathon runners. Over the last three to four years in particular, it's become in vogue to bash aerobic training in favor of higher intensity methods and talk about the dangers of doing too much aerobic training and how you'll lose strength, power, and muscle mass.

From the way many strength and conditioning coaches make it sound, if you're training aerobically, then you might as well be in an aerobics class because real men only do intervals! After all, why go for a 3 mile run when all you really have to do is 4 minute of high intensity intervals? At least that's how their argument typically goes.

As with all fitness trends and fads, I'm sure that sooner or later the anti-aerobic training bandwagon will sooner or later lose some steam. For now, though, it seems to be making its way across the internet and fitness magazines alike. The reality, however, is that this is a very unfortunate and inaccurate view of the aerobic system, not to mention one that it does not deserve.

As a fighter, you absolutely must rely on your aerobic development if you want to perform at the highest levels. Fighting is not just an anaerobic sport, as you may have been led to believe, but instead it uses all three energy systems to various degrees depending on the situation. The longer your fight goes, the more important the aerobic energy system becomes.

Now don't get me wrong, you need anaerobic development as well, but many fighters do not have the conditioning they are capable of simply because they've bought into the anti-aerobic mantra hook line and sinker. Because of this, they've neglected to develop their aerobic energy system properly.

In this chapter, I'm going to get started with what you've been waiting for and finally show you the insider secrets to Ultimate MMA Conditioning. Some of what I'm going to teach you probably goes against what you may have read online or been told by your friend whose cousin knows a guy who is friends with a girl whose brother knows "Coach X" who you heard trains some guy in the UFC, but what I'm going to teach is not based on hype but on real science.

There are literally thousands of studies published each year in exercise physiology, biomechanics, nutrition, biology, neurology, etc. and the truth is that some are very well done and provide useful information. More often than not, however, coaches and trainers extrapolate a single study far beyond its original implications and this has especially been true in the case of the aerobic system. Now let's get started down the path to aerobic power.

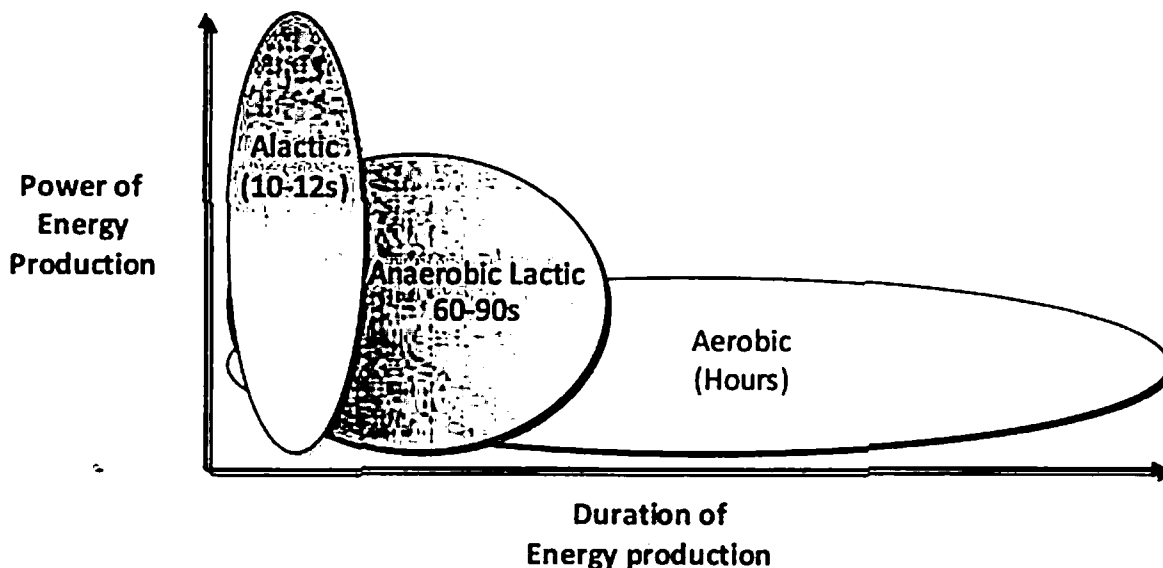
Aerobic Energy Production

As you are probably already well aware, the aerobic energy system utilizes oxygen to produce ATP and is the system responsible for long term energy production. It's also the system that generates the vast majority of the ATP our trillions of cells need to function throughout our daily lives and is the only system that can utilize and break down fats to produce ATP as well as sugars. This is an important distinction because fats provide more than twice the energy at approximately 9 calories per gram than sugars, which only provide around 4 calories per gram.

Because of this, the aerobic system has tremendous capacity of energy production and provides more than 98% of the ATP that's needed in extreme endurance events such as marathons. The downside, of course, is that this capacity comes at the expense of power and the aerobic system simply cannot generate ATP at nearly the same rate as the anaerobic systems. This is the case because A) it is dependent on oxygen supply and B) there are many more chemical steps that take place when ATP is produced aerobically versus anaerobically.

If you take a look at fig. 7 below, you can see that during maximal exercise the aerobic system begins to provide the majority of energy supply even within just the first couple of minutes. The production of energy through anaerobic metabolism is far more limited and leads to much more rapid fatigue than the aerobic system.

Energy Production Comparison (fig. 7)



The only byproducts of aerobic metabolism, however, are CO₂ and water and thus aerobic energy production is limited only by oxygen supply from the cardiovascular and cardio respiratory systems, oxygen utilization by the muscles themselves, and substrate and enzyme availability. It is the adaptability of these areas that presents the opportunity to train and specifically develop the aerobic energy system to increase how much energy it can produce.

Aerobic Power & MMA

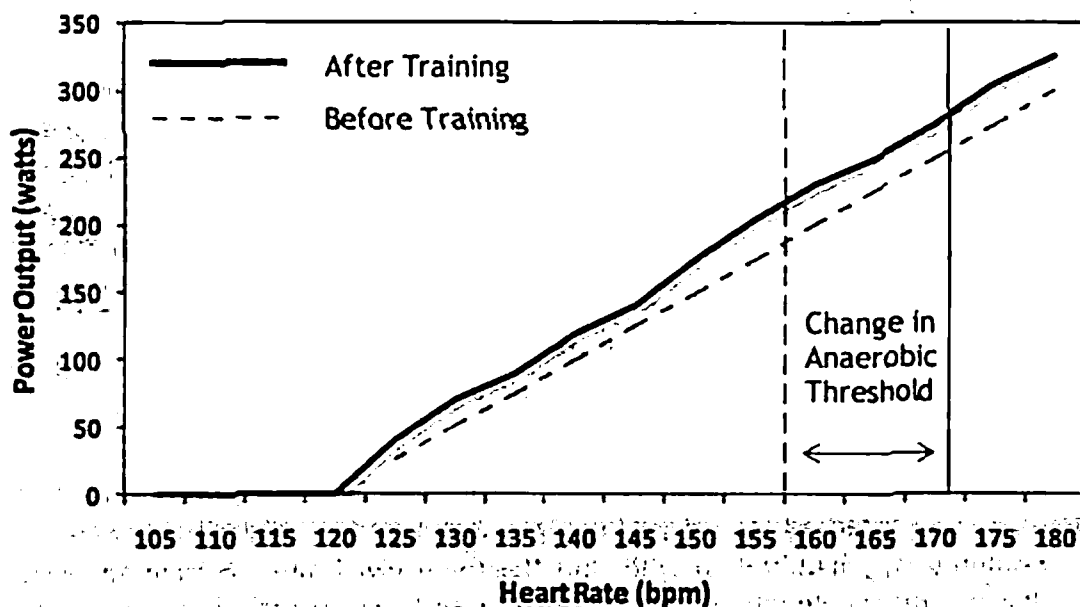
MMA is a sport that requires a very high rate of energy production because it's so fast paced and unpredictable. Because of this, fighters often turn their attention to anaerobic development without realizing the underlying importance of the aerobic system at all levels of power. Aside from providing the majority of the ATP that your muscles need throughout a typical fight, the aerobic system also serves the role of "refueling" the anaerobic systems.

As discussed earlier, the more you use your anaerobic systems, the more metabolic byproducts you produce and the faster you fatigue. Once this happens, your body relies on aerobic processes to clear out these byproducts and restock the mechanisms of anaerobic metabolism. This means that without a well developed aerobic system, your body's anaerobic systems are also limited because it takes much longer before they are capable of producing energy again.

In a fight, the faster your aerobic system can produce ATP, the less you have to rely on the anaerobic systems and the better your conditioning becomes. Not only that, but more aerobic power means that the anaerobic systems can recharge much faster so they can contribute more power when you need them to. This is one of the real keys to developing the kind of conditioning that wins fights and is an area where many fighters simply are lacking.

Although I'm sure that you recall that we've already discussed that the aerobic system isn't capable of producing energy as fast as the anaerobic systems are, that doesn't mean that you can't significantly improve how much power the aerobic system is capable of producing. In fig. 8, you can see a visual representation of what it looks like to increase your aerobic power.

Improvement in Aerobic Power (fig. 8)



It's important to notice there are two distinct components to the improvement in aerobic power seen above. First, you'll notice that the line marking the anaerobic threshold has increased. This threshold, typically marked by a specific heart rate, represents the outer limits of your capacity for aerobic energy production and thus marks the range where your body will begin to experience fatigue because anaerobic processes start to come increasingly into play. Obviously, the more you can delay this from happening, the better your conditioning will be.

Endurance athletes at the highest levels typically have anaerobic thresholds that are a very high percentage of their max heart rate. This gives them the ability to produce high aerobic power and rarely have to tap into their anaerobic system to generate the energy they need. This key ability is a big part of the reason why they have such great endurance in the first place.

Part of increasing your aerobic power means raising this threshold and doing so means a higher percentage of your total energy production will come from the aerobic energy system. As you can see in the chart, much less energy has to come from the anaerobic systems if the aerobic system is producing more power. Before training, the athlete was only producing a little less than 200 watts at anaerobic threshold. After training, however, this increased to almost 300.

Next, you should also notice that the entire line marking power output has shifted up as a result of improved aerobic power. This change reflects an increase in the total amount of energy produced over the course of the time period and greater muscular contractility. In simple terms, it means an increase in the total amount of ATP your body is able to produce aerobically, as well as how effectively your muscles can utilize that ATP to generate external power.

As you recall from the first section, this overall increase in energy production is the result of greater biological power. When your cardiac system, neuromuscular system, hormonal system, and metabolic systems are all developed properly, your body is capable of generating much more total energy.

Such an increase in overall biological power, along with an increase in the specific components of the aerobic system – namely oxygen supply from the cardiovascular system and oxygen utilization of the working muscles – combines for a dramatic improvement in aerobic power and performance in MMA.

Over the next several pages, I'm going to teach you the most effective methods to crank up your aerobic power production like never before. Many fighters lack conditioning because their aerobic system has never been developed properly and it's just not capable of generating nearly enough power so they are forced to rely on their anaerobic systems far too much.

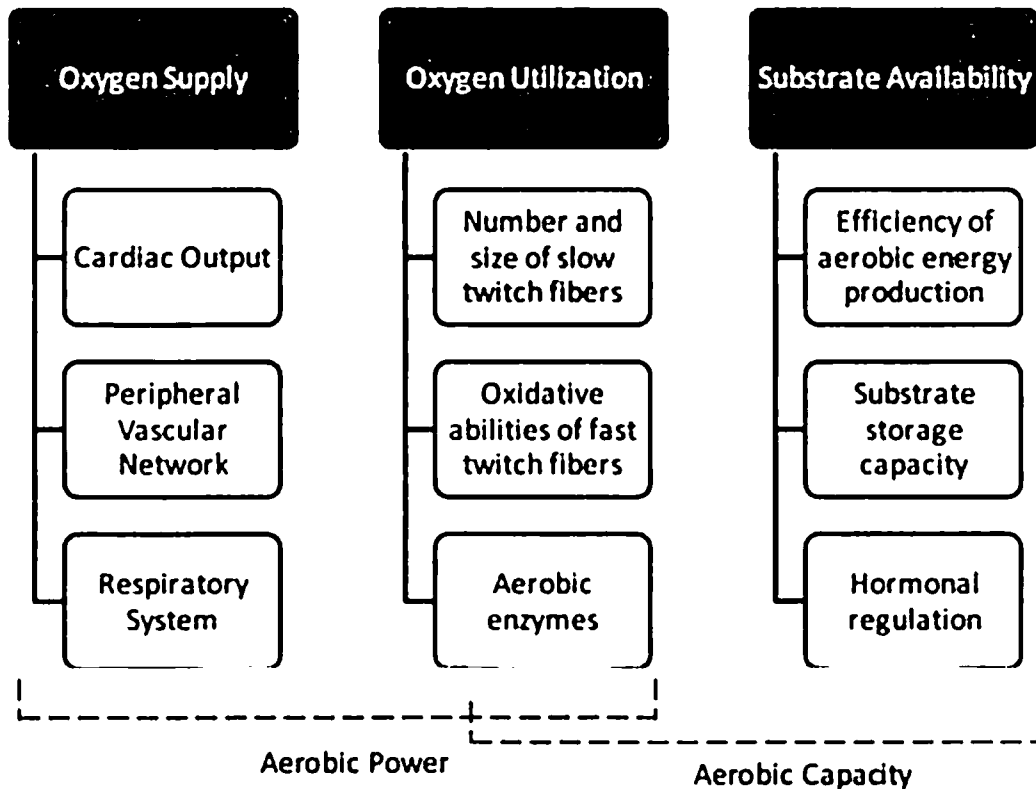
The methods in this chapter are incredibly powerful at increasing aerobic power because they work on each and every aspect of aerobic energy production and focus in on the specific areas that must be developed. Many different facets of the aerobic energy chain all have to be improved if you really want to see results. Neglecting to properly develop any one area will result in decreased aerobic power and a lower level of conditioning.

Aerobic System Adaptations

Even fighters that understand the importance of the aerobic system in MMA typically don't understand very well what needs to happen under the surface for aerobic performance to improve. People often associate the aerobic system with "cardio" and think purely in terms of the heart and cardiovascular system. The reality is that the muscles are the end users of the ATP and where it is produced in the first place so your muscular system development also plays a huge role in aerobic energy production.

As you can see from fig. 9, aerobic development essentially has three pieces to the puzzle. First, your heart and cardiovascular system has to be able to **supply oxygenated blood** to the working muscles as well as transport deoxygenated blood away. Second, your muscles have to be able to draw the oxygen out of the blood and utilize it to combust with sugars and fats to generate ATP. Third, you need to have a large supply of stored sugars and fats (substrates) to draw from.

Components of Aerobic Energy Production (fig. 9)



In order to dramatically improve your aerobic system of energy production, you have to either A) increase oxygen supply to the working muscles B) increase how much oxygen the muscles themselves can use or C) increase the supply raw materials your body uses to produce energy aerobically. If you can accomplish any or all of these things, then your aerobic energy production improves.

If you look back at figure 9, you can see a blueprint for exactly how we can go about improving all three components of aerobic development. On the oxygen supply side, we need to improve cardiac output, how much oxygenated blood your heart can pump with each beat, as well as develop the vascular network to carry more oxygen to the working muscles.

The first two methods in the next section will focus on doing exactly that by increasing the size of the chambers of the heart that pump blood and by increasing just how hard the heart can squeeze with each beat (contractility). When either one or both of these things happen, the cardiovascular system is capable of delivering substantially more oxygen to the working muscles and your aerobic performance improves.

Next, in order to improve how well your muscles can utilize this extra oxygen we need to concentrate on the muscle fibers themselves. As you probably are already aware, your muscle fibers can be broken down into two general categories: fast twitch and slow twitch. Fast twitch fibers are capable of using either aerobic or anaerobic metabolism to generate ATP, while slow twitch fibers almost exclusively rely on oxygen and the aerobic energy system.

Although the fast twitch fibers don't possess the same outer limits of capacity for aerobic metabolism as slow twitch fibers, we can still significantly improve how well they can utilize oxygen and thus dramatically alter their endurance properties. This is a very important concept to understand because even though you are essentially born with a genetically determined ratio of fast twitch to slow twitch fibers, you can still alter their metabolic properties in favor of increased endurance in addition to making them bigger, stronger, and more powerful.

By training to increase the amount of mitochondria (think of them as little oxygen power plants within the muscle cells) and to increase the number of enzymes that are used in aerobic metabolism, we can greatly increase how much of the supplied oxygen your muscles are able to utilize to generate ATP. There are several highly effective methods you need to know in order to accomplish these all important goals and crank up the oxygen producing horsepower within the muscles themselves.

The last piece of the aerobic puzzle that can be specifically developed through training is substrate availability. As I mentioned earlier, the aerobic metabolism relies on stores sugars and fats to combust with oxygen in the ATP generation process. If you run out of stored sugars and/or fats to burn then ultimately your aerobic energy production grinds to a halt. The larger your capacity to store these substrates and the more efficiently you use them, the bigger aerobic gas tank you'll have and the longer you'll be able to rely on aerobic metabolism.

This type of development is not as important in MMA as it is in more pure endurance based sports because it's highly unlikely that you'll run low on these energy substrates in a single fight. MMA is not as much about aerobic capacity as it is aerobic power, the ability to generate ATP as rapidly as possible using the aerobic energy system. In the next section, it's time to finally discuss all the most effective training methods that you'll need to know and use in order to crank up your aerobic power and transform your MMA conditioning.

Aerobic System Training Methods

In this section, we're finally going to get to what you've been waiting for and cover the most effective training methods to use to dramatically increase how much power your aerobic system can generate. I'm going to give you the training plan I've developed over many years and teach you the absolute fastest way to get results.

You don't need 100 different methods to improve your aerobic power, you just need the ones that are based on real science and proven to be the most effective. Far too often I see coaches advocating various training methods they claim will improve x, y, or z but they can't even really explain exactly *how* or *why* their methods will supposedly work. This is not the case with my system, however, and I'll explain why my methods are highly effective and precisely how they work.

Method #1: Cardiac Output

Your cardiovascular system is the power plant of aerobic energy production. It does the job of pumping blood throughout the many miles of blood vessels that make up the vascular network and delivering oxygenated blood to working muscles while transporting deoxygenated blood back to the lungs. Aside from oxygen, blood also transports vital nutrients, hormones, metabolites, gases, waste, etc. throughout the body so how well your cardiovascular system is developed obviously plays a very large role in not just performance, but your general health.

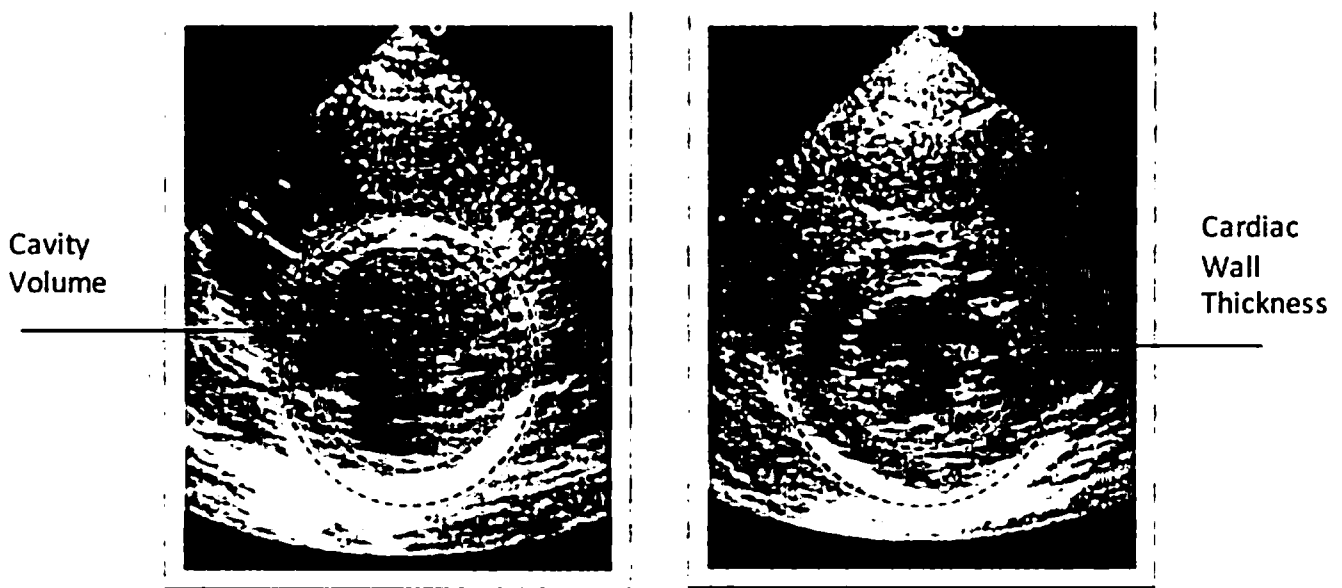
The **cardiac output method** is a highly effective method for improving how much blood your heart can pump with each beat. This method has been around for centuries in endurance training and has been used in boxing and combat sport circles for many years in the form of "road work" or long slow runs (LSD). In recent years, this type of training has gotten a bad rap and people have shunned it in favor of higher intensity intervals, but this is a mistake because it develops the heart and vascular network in a way that higher intensity intervals simply do not.

As I briefly touched on before, you can essentially increase how much blood your heart can pump in different ways and through different methods. Longer slower training works to increase stroke volume (the volume of blood pumped out with each beat) primarily by increasing the size of the left ventricle of the heart. Think of a balloon constantly filled with water, over time it will stretch and become bigger. The same thing happens with the heart when you fill its chambers with a large volume of blood and force it to work for an extended period of time.

Through training, the heart adapts to this stimulus by stretching and thus you end up with a larger left ventricular cavity capable of pumping out more blood with each beat. This is known as **eccentric cardiac hypertrophy**. The result is a lower resting heart rate, lower working heart rates, and greater cardiac efficiency. The less work your heart has to do to pump blood the better your aerobic energy production will be because more oxygen can get to your muscles.

Higher intensity training methods tend to lead to a different kind of cardiac adaptation known as **concentric hypertrophy** but many have mistakenly failed to realize the important distinction between the two. Training methods that dramatically increase blood pressure, such as strength training and wrestling, place a different kind of stress on the heart and thus lead to different adaptations altogether. Rather than stretching, the heart walls instead increase in size and become thicker. As you can see from the photos below in fig. 10, there is a dramatic difference in the types of adaptations these methods stimulate in the heart itself

Eccentric vs. Concentric Cardiac Hypertrophy (fig. 10)



Unfortunately, over the last few years, many so called fitness experts have taken little pieces of research here and there comparing longer slower cardio with higher intensity intervals and extrapolated it well beyond its limitations. This has mistakenly led many to believe that you can accomplish the same type of improvement in cardiac output with less time by using higher intensity intervals and/or strength training.

This is not true, however, because of the differences in adaptation that are stimulated by higher and lower intensity methods. Once your heart rate goes above a certain threshold, typically around 150bpm or so, the contractions become too fast for there to be enough time for the chambers of the heart to fill full of blood. The result is that you don't get the same eccentric overload stimulus and resulting adaptations. Lower intensity methods also stimulate your vascular network to develop as well and thus increase oxygen transport to the working muscles.

It takes a fairly large volume of work to stimulate the heart to increase in size and doing just 15-20 minutes of intervals simply won't get the same job done. Typically, it takes at least 30 minutes, and 60-90 minutes is even better, to provide the necessary stimulus for the left ventricular cavity to increase in size. In other words, despite what you've probably read, there is a very important purpose for longer slower distance training and it does serve a role in training.

Higher intensity methods are important for overall cardiac development as well, but you can't replace the cardiac output method with 10-20 minutes of intervals and expect to get the same results and benefits. Both higher and lower intensity methods must be used at varying times.

Cardiac Output Method Guidelines

To use the cardiac output method, all you have to do is train with a constant heart rate in the 120-150 range for a reasonable duration. If you're older, mid 30s and above, you can work towards the lower end of this range and if you're younger you should work to keep it in the higher end. For maximum effectiveness, this method can be used 1-3 times per week for 45-90 minutes per session, or more, when your training goal is an increase in cardiac output.

Just about any exercise of low to moderate intensity with low resistance that lets you keep a constant heart rate in the correct range will work. Personally, I like to use a variety of different MMA specific exercises, each for 5-15 minutes at a time, when doing this type of training.

You can do exercises like jogging and basic calisthenics, jump rope, ride a bike, do low intensity medicine ball drills, swim, etc. or even better, you can also incorporate more specific MMA type work and include shadow boxing and footwork drills, low intensity bag work, various technique drills, etc. The key is to use relatively low resistance and keep your heart rate in the right range for the duration of the training session.

As we'll talk about later in the sections on testing and programming, if your resting heart rate is in the 60s or 70s, you will benefit by working on aerobic development and should regularly include the cardiac method in your training program. Those who are new to training or just getting back into a workout routine should also start with this lower intensity type of cardiovascular development work.

Cardiac Output Method	
<p>Why is it important?</p> <p>Helps improve oxygen supply by increasing how effectively the heart can deliver oxygen and develops the peripheral vascular network.</p>	<p>How does it work?</p> <p>Stimulates eccentric cardiac hypertrophy through volume overload of cardiac fibers thus causing them to stretch. This leads to an increase in left ventricular cavity volume.</p>
<p>Exercises:</p> <p>Any low intensity, low pressure exercise such as jogging, biking, swimming, jumping rope, pad and bag work, etc. will work fine as long as heart rate is in correct range.</p>	<p>Guidelines:</p> <ul style="list-style-type: none"> ● Heart rate should be 130-150. ● Each session should last 30-90 minutes ● Increase volume over time. ● Can be used 1-3 times per week in total.

Method #2: Cardiac Power Intervals

Keeping in line with the cardiac system and the heart itself, cardiac power intervals are designed to increase the strength and contractile abilities of the cardiac muscle tissue through high intensity work. Although the heart is composed of a slightly different type of muscle tissue than that of your skeletal muscles, it still a muscle nonetheless and capable of becoming stronger. As you saw in the fig. on eccentric and concentric hypertrophy, the heart is capable of different adaptations depending on the training methods used.

The primary goal of cardiac power intervals is similar to that of the cardiac output method, namely an increase in how much blood the heart can pump, but it achieves it not by increasing the size of the left ventricular cavity so much as by increasing how forcefully the heart can contract (contractility) with each beat. There is also a corresponding increase in mitochondria in the heart itself and this improves the heart's endurance abilities at high heart rates.

These adaptations of increased contractile strength and endurance at high heart rates become more important as the heart rate and intensity increase. During periods of lower heart rates, the overall strength of the heart is not as important because oxygen supply is not the limiting factor. As you work harder and harder, however, the demand for oxygen grows and the more important the strength of the heart becomes. A stronger heart with more mitochondria means it's less likely to fatigue at higher heart rates and it's capable of delivering more oxygen.

For MMA, it's important to have a heart that is strong and capable of sustaining contractions as long as possible at high heart rates. This type of cardiac development should complement and follow the eccentric adaptations that are achieved with the cardiac output method previously covered. To use the cardiac power interval method you simply need to do maximum intensity intervals of **60-120 seconds** with fairly long rest intervals (2-5 minutes or a heart rate recovery of 120-130). The goal should be to keep your heart rate as high as possible in each rep.

Cardiac Power Intervals	
<p>Why is it important?</p> <p>Helps improve oxygen supply at higher intensities and improves the power endurance of the cardiac muscle.</p>	<p>How does it work?</p> <p>Stimulates an increase in the contractile strength of the cardiac fibers along with a corresponding increase in mitochondria.</p>
<p>Exercises:</p> <p>Any high intensity exercise that maximally elevates the heart rate such as sprinting as well as various high intensity MMA drills can be used.</p>	<p>Guidelines:</p> <ul style="list-style-type: none"> • Heart rate should be maximal in each rep • Rest 2-5 minutes or HR 120-130 between • 4-12 reps per session • 1-2 sessions per week

Method #3: The Tempo Method

Unlike the first two methods, the tempo method is not designed to increase oxygen supply but rather oxygen utilization by the working muscles. In particular, this method focuses on the development of the slow twitch fibers, which we've already discussed have the highest capacity for aerobic energy production in the first place. Because of their inherent aerobic abilities, the best way to increase their ability to use oxygen is to increase their cross sectional area, i.e. make them bigger.

Although it is true that they generally don't possess the same capacity for growth as the fast twitch fibers, slow twitch fibers can still become larger and thus contribute to greater oxygen utilization. Much of the research showing that slow twitch fibers are small was also done on surface level muscle tissue. There have been other studies that have shown the slow twitch fibers that lie deep in the muscle belly to be just as large as their fast twitch counterparts and capable of quite a bit of growth. Endurance athletes typically have slow twitch fibers equal or even greater in size to their fast twitch fibers.

You might be wondering just why you'd want bigger slow twitch fibers if they are less powerful than the fast twitch fibers, after all MMA is a sport that requires a lot of power. The biggest reason is that slow twitch fibers indirectly improve the endurance abilities of the fast twitch fibers because they play a role in preventing fatigue from anaerobic metabolism. Slow twitch fibers are where a great deal of the energy substrate lactate gets oxidized and converted into ATP (the details of this are covered in chapter 4). This process allows for prolonged anaerobic endurance and improves how long you're able to maintain your power.

To use the tempo method each rep should be 4 seconds with no rest pauses and constant breathing. Use major exercises for 3-5 sets x 8-10 reps and 6-8 minutes active rest between sets. Typically, you should use 3-4 core exercises per workout for one session per week.

<i>The Tempo Method</i>	
<p>Why is it important?</p> <p>Larger slow twitch fibers contribute to both aerobic and anaerobic endurance and play a role in static strength as well.</p>	<p>How does it work?</p> <p>Stimulates hypertrophy of the slow twitch fibers by causing localized hypoxia to the working muscles through the specific tempo.</p>
<p>Exercises:</p> <p>Any major compound multi joint movement can be used such as squats, bench press, deadlifts and RDL, Pull-ups/pulldowns, bent over rows, etc.</p>	<p>Guidelines:</p> <ul style="list-style-type: none"> • 2 seconds concentric/eccentric per rep • No pause at top or bottom of each rep • 3-5 sets of 8-10 reps per exercise • 3-4 exercises per workout

Method #4: High Intensity Continuous Training (HICT)

The HICT method is extremely effective and a method I would consider a “secret” simply because I have never seen it discussed in western literature before and I don’t know of any other coaches writing about it or using it with their athletes. I first learned of it from a Russian coach named Val Nsedkin, one of the most knowledgeable coaches I’ve ever known, and I have used it with many athletes with tremendous success over the last 2-3 years.

This method is different from other forms of aerobic training in that it is both high intensity, and relatively high volume. This unique characteristic is also why it’s so effective. Whereas most aerobic training methods are either high intensity/ low volume intervals, or high volume/ low intensity continuous training, the high intensity continuous training method is high intensity based on resistance rather than speed and thus it allows for a higher volume of stimulus.

Because other high intensity methods are essentially high speed intervals, you can only perform them for a limited amount of time before you fatigue and have to slow down. Generally, most high intensity intervals only last 10-60 seconds before there is a rest interval, but with the HICT method you intentionally go slow and use maximal resistance to prolong how long you’re able to maintain the high intensity. This is a huge difference and distinction and it makes it unlike any other commonly used aerobic training method.

The HICT Method	
<p>Why is it important?</p> <p>Offers a very unique combination of high intensity and high volume and thus a high level of stimulus</p>	<p>How does it work?</p> <p>Stimulates greater oxygen utilization and results in increased endurance of the fast twitch fibers</p>
<p>Exercises:</p> <p>Spin bike, Versaclimber, lunges up a steep hill, bike ride up a steep hill. Box step ups can also be used.</p>	<p>Guidelines:</p> <ul style="list-style-type: none"> • Maximum resistance • Low speed (20-30rpm on spin bike) • 10-20 minutes per set • 1-2 sets per workout, 1-2 x per week

The easiest way to use this method is with a spin bike that allows for high resistance. All you have to do is crank up the resistance as high as you can while maintaining a pace of just 20-30rpm. This high resistance will force your fast twitch fibers, but the slow pace will mean you can maintain this work for much longer than traditional intervals. Because your heart rate is under the anaerobic threshold and there is adequate oxygen supply, this method is extremely effective at increasing the aerobic abilities of your fast twitch fibers. The end result is that your fast twitch fibers can generate ATP for much longer before fatiguing.

The only real drawback to this method is that it can be difficult to perform for the upper body – not to mention that doing it properly is extremely grueling! The best all around piece of equipment I've found for this method is the Versaclimber (www.versaclimber.com) so if the local gym has one, crank up the resistance and get to work! If it doesn't, then try to find a gym that has one because they are a great conditioning tool.

Other than that, you can use a spin bike for lower body, or if you're really up for a challenge you can also do walking lunges up a long steep hill. Start out performing this method for 10-20 minutes a time and work up to being able to do 2-3 sets of 20 minutes with 5-10 minutes active rest in between sets.

Your heart rate should typically stay in the 150s to low 160s for most people when performing this method. You can do HICT once or twice per week and in general I recommend that you do it in a separate session or with some minor accessory exercises. You can also perform 10-15 minutes of HICT after your hardest MMA training sessions to help increase recovery. HICT is an extremely powerful training method when used properly.

Method #5: Threshold Training

At the beginning of this chapter, I told you that it was important to increase how much power you could generate aerobically so that you had to rely less on fatiguing anaerobic processes to generate the necessary ATP. The threshold training method is very effective at helping you increase aerobic power and achieve this goal. The basic premise of the method is very simple, by working your aerobic system to the maximum limits of its energy production abilities, the body adapts by increasing the total number of aerobic enzymes and improving overall contractile properties. As a result, the maximum rate of aerobic energy production increases.

If you'll recall from earlier, the point where your body begins to shift the majority of its ATP generation from aerobic to anaerobic is known as the **anaerobic threshold**. This is a very important point because it reflects the maximum sustainable power output that your aerobic system is capable of. If we can raise your anaerobic threshold and/or increase your power output at the threshold, then you'll have to rely less on the anaerobic systems and you'll have better endurance.

Although there is definitely some genetic influence that determines where your anaerobic threshold is, it's also a very trainable quality because we can dramatically increase how much power you're able to produce aerobically through the proper training methods. Threshold training is one of these methods and consists of training at heart rates at or near your anaerobic threshold for different periods of time.

Because you are essentially asking your body to produce ATP as fast as it possibly can while predominantly using the aerobic system, this method places a great deal of stress on the entire system and provides a strong stimulus for it to improve. This is one of the reasons it is so effective, but it also means you have to be fairly precise in determining your threshold.

For maximum effectiveness, you want to train in a heart rate range that is within +/- 5bpm of your anaerobic threshold. Unfortunately, there is no simple and easy way for most people to determine where their anaerobic thresholds are exactly. The most accurate way is through a gas exchange test done at an exercise performance lab, but this is obviously impractical for most people. If you have access to a metabolic testing center in your area, this can offer an effective way to determine your threshold and it typically runs between \$75-125 for the test.

Aside from using a laboratory testing procedure, it can be difficult to get an accurate gauge of where exactly your anaerobic threshold is. The next best alternative is to use a simple test I came up with and perform 3x5 minute sparring rounds at a relatively high pace with a heart rate monitor on. If you don't spar, then you can do 3x5 minute pad rounds or something comparable such as the modified coopers test as described in a later chapter.

For the test, you will need to use a heart rate monitor with a lap function and I specifically recommend the Polar RS100 for this purpose. If you don't have one of these yet you can order one directly from my website at www.8weeksoout.com. All you have to do is record your average heart rate for each of the three rounds, excluding the 60s break between rounds, and take your average heart rate over the entire 3 rounds. While there is no research on this approach to show it accurately reflects your anaerobic threshold, I've found it to be reasonably close for most people and it is much better than just guessing.

Once you have found your average heart rate over the three rounds, this is the heart rate number you should use for the threshold training method. To use the threshold method, all you have to do is keep your heart rate at +/- 5bpm for repetitions of 3-10 minutes at a time using different types of exercises. Many athletes use this method in the form of circuit style training, although they rarely pay attention to where their heart rate is during the circuit. You can use running, MMA drills and sparring, cycling, etc. but keep in mind you'll need to lower your heart rate range by 5-10bpm in activities where you are sitting or lying down.

<i>The Threshold Method</i>	
Why is it important?	How does it work?
Increases the aerobic system's maximum rate of ATP regeneration so more power can be produced aerobically	Raises anaerobic threshold, and power at ANT, thus delaying the point at which anaerobic processes begin to dominate
Exercises:	Guidelines:
Any cardiovascular exercise can be used along with various MMA and combat sport specific drills can be used.	<ul style="list-style-type: none"> • HR +/- 5bpm of anaerobic threshold • Keep HR within range for entire set • 3-10 minutes per rep • 2-5 reps per workout, 1-2 x per week

Method #6: High Resistance Intervals (HRI)

High resistance intervals are an innovating approach to improving the aerobic abilities by increasing mitochondria, and thus the endurance, of your fast twitch fibers. Most interval training methods rely on maximum speed to reach the necessary intensity for the fast twitch fibers to be recruited. The HRI method instead uses lower speeds, but higher resistance. This method has actually been around for awhile in various forms, but few coaches actually understand exactly how it works or how to use it correctly.

As a football player in high school, our coach used to make us run sprints up the dreaded hill out back of the school. The hill as a brutally steep and comprised mostly of soft dirt and it took about 10-12 seconds to sprint up at full speed. We'd run one, take about 30 seconds to walk back down, and then repeat this 10-15 times. Little did I know it at the time – and I highly doubt my coach had any idea as well – but this was actually a near perfect use of the High Resistance Interval Method.

The key points to using the method correctly are to use both high resistance and short duration. This accomplishes the necessary goal of recruiting the highest threshold fast twitch muscle fibers, and maintaining a steady supply of oxygen to the working muscles. The result is that these fast twitch fibers then get better at utilizing oxygen by increasing their number of mitochondria (oxygen power plants) and thus their ability to maintain their high power output improves.

The easiest way to use this method is simply to do short sprints up a very high incline or up an actual hill. If you have a dragging sled you can also load it up with a ton of weight and do short speed drags as well. You can also crank up the resistance on a spin bike or other cardio piece as high as possible. Remember to keep your heart rate under your anaerobic threshold.

<i>The High Resistance Interval Method</i>	
<p>Why is it important?</p> <p>Improving the aerobic abilities of the fast twitch fibers means high power can be maintained longer</p>	<p>How does it work?</p> <p>Recruits the highest threshold motor units and increases the oxidative abilities of these fibers by supplying them with constant oxygen</p>
<p>Exercises:</p> <p>Uphill sprints, sled drags, spin bikes or cardio machines capable of very high resistance</p>	<p>Guidelines:</p> <ul style="list-style-type: none"> • HR below anaerobic threshold • Each rep should be maximal intensity • Rest to HR 130-140 • 10-12s per rep, 15-20rep/workout

Method #7: Aerobic Plyometrics

The Aerobic Plyometric Method is an off shoot of the High Resistance Interval method, but instead of using high resistance it uses the principle of plyometrics to accomplish the same type of muscular adaptations. In short, plyometrics rely on a forced lengthening of muscles to take advantage of what is known as the “stretch reflex” to increase the force of the subsequent contraction. In plain English, this means that by rapidly stretching a muscle you can make it contract harder on the rebound.

Plyometrics are an incredibly powerful stimulus and recruit a great deal of the fast twitch fibers because of this, but they must be done properly. First, because the aerobic plyometric method is meant to be done for a relatively long duration you have to use relatively low intensity. Whereas plyometrics can be very effective in increasing max strength and explosive power, the aerobic plyometric method uses plyometrics to improve explosive endurance so they must be done with this goal in mind. Second, you shouldn’t use this method unless you have a good amount of max strength to begin with and you must use perfect technique at all times.

The easiest and most effective way to use this method is to do short bounding drills for the lower body, and explosive push-ups or medicine ball rebounds for the upper body. To perform the jumps correctly, you should strive to do 8-10 short but explosive rebound jumps at a time, rest 10-15 seconds and then repeat. You’ll want to do 5-10 minutes of this per set and do 1-3 sets per exercise. Also, always make sure to do these on a good surface like field turf or wrestling mats to protect your joints. For the upper body, you can do short sets of explosive push-ups, 8-10 reps at a time, rest 20-30 seconds, and then repeat. Because this requires a high level of strength and power to perform correctly, it’s often more appropriate to use medicine ball rebounding to begin with. Simply lie down on your back and have a partner drop a medicine ball towards your chest where you catch and throw it back up as high as possible.

<i>The Aerobic Plyometric method</i>	
<p>Why is it important?</p> <p>Improving the aerobic abilities of the fast twitch fibers means high power can be maintained longer</p>	<p>How does it work?</p> <p>Recruits the highest threshold motor units using low intensity plyometrics and improves their endurance</p>
<p>Exercises:</p> <p>Lower body: double leg bounds Upper body: explosive push-ups and medicine ball rebounding</p>	<p>Guidelines:</p> <ul style="list-style-type: none"> • HR below anaerobic threshold • Each rep should be moderate intensity • Rest intervals 10-30s • Sets of 5-10 minutes, 1-3 sets per exercise

Method #8: Explosive Repeat

This final method for improving aerobic power is one I first learned about from Vershoshansky (a groundbreaking soviet era scientist) and it's known as the Explosive Repeat Method. Again, it bears similarity to the previous two methods but with some important changes. First, because this method is targeting the aerobic ability of the fast twitch fibers and how quickly they can recover, the method needs to be programmed properly over a period of time.

When used correctly, this method can dramatically improve your ability to perform short repetitive explosive bursts of muscular work. This is obviously an important ability to have when it comes to MMA as a fight is often a series of short explosive bursts. This method can be used to improve the anaerobic abilities as well, but we'll be covering that in the next chapter.

To use the Explosive Repeat Method for aerobic energy production purposes you will need to perform explosive exercise followed by short rest periods. Each week you increase the work interval and decrease the rest interval. The most effective exercises for this method are explosive squat jumps (while holding a kettlebell or with a bar on your back) and split squat jumps (jump lunges with a barbell) for the lower body and explosive push-ups or bench press for the upper body. This is also a very effective method to use with MMA specific drills such as pad and bag work and even some wrestling drills can be used.

You should perform 1-2 series (a cluster of sets) of 6-10 sets per exercise for 1-3 exercises per workout. You also must use 8-10 minutes of active rest between series and exercises. A sample of how to use this method over a period of three weeks is as follows:

Week One: 8-10s work: 60s rest

Week Two: 10-12s work: 40s rest

Week Three: 12-14s work: 30s rest

<i>The Explosive Repeat Method</i>	
Why is it important? How quickly your fast twitch fibers can recover between explosive bursts is essential to MMA performance	How does it work? Improves fast twitch aerobic abilities and repetitive power output by developing slow twitch fibers rate of lactate oxidation
Exercises: Lower body: squat jumps and split squat jumps with kettlebell or bar Upper body: explosive push-ups or bench press	Guidelines: <ul style="list-style-type: none"> • Increase work, decreased rest each week • Active rest 8-10 minutes between series • Rest intervals of 60-30s • 1-2 sessions per week

Aerobic System Training Methods Overview

Method	Targets	Guidelines	Rest	Volume	Frequency
Cardiac Output Method	Increase in Cardiac Output – Eccentric hypertrophy Vascular network Slow twitch Fibers	HR 120-150 Low resistance Can use MMA drills or cardio exercises	NA	30-90 minutes	1-3 sessions per week
Cardiac Power Intervals	Increase in Cardiac Strength Maximum rate of oxygen delivery Cardiac tissue mitochondria	60-120s / rep Max HR per rep High Velocity Can use MMA drills	2-5 minutes HR 120-130	4-12 reps per session	1-2 sessions per week
Tempo Method	Slow twitch fiber hypertrophy Increase in mitochondria	4-5s per rep 8-10 reps/set No rest pause Constant breathing	30-40s between sets 6-8 minutes active rest between exercises	3-5 sets per exercise 3-4 exercises per workout	1 session per week 2-3 weeks on / 1 week off
HICT	Oxidative (Aerobic) abilities of fast twitch fibers Increase in mitochondria	Maximum resistance Low speed 20-30rpm HR 150-160s	5-10 minutes active rest between sets	10-20 minutes per set 1-3 sets per workout	1-2 sessions per week

Aerobic System Training Methods Overview

Method	Targets	Guidelines	Rest	Volume	Frequency
Threshold Training	Maximum rate of oxygen utilization	HR +/- Anaerobic Threshold	1-5 minutes rest between reps	3-10 minutes per rep	1-2 sessions per week
	Oxidative abilities of fast & slow twitch fibers	Can use MMA drills or cardio exercises		2-5 reps per workout	
High Resistance Intervals	Oxidative abilities of fast twitch fibers	10-12s per rep HR under anaerobic threshold	HR 130-140	15-20 reps per session	1-2 sessions per week
	Power of Alactic system	Max Intensity each rep High resistance			
Aerobic Plyometrics	Oxidative abilities of fast twitch fibers	8-10 reps per set	10-30s between reps	5-10 minutes per set	1-2 sessions per week
	Reactive Strength	Bounding or reactive exercises Moderate intensity		1-3 sets per exercise	
Explosive Repeat Method	Oxidative abilities of fast twitch fibers	Increase work and decrease rest each week	30-60s rest per set	6-10 sets per series	1-2 sessions per week
	Rate of Aerobic recovery	8-20s work per set	8-10 minutes active rest between series and exercises	2-6 series per workout	

Aerobic System Development Summary

The aerobic energy system is incredibly important to your MMA performance, not only because it is responsible for the majority of ATP as the fight wears on in the later rounds, where many fights are won or lost, but also because it has the greatest potential for improvement. While the power output of the two anaerobic systems can be dramatically improved with the proper training, neither one can come close to matching the versatility and ultimate adaptability of the aerobic energy system.

Your aerobic system has the capacity to take someone all the way from coach potato to marathon runner and if you want to be successful in MMA, you must tap into this potential and *think of it as your foundation*. Just as you must learn the basics of how to properly throw a punch, kick, elbow, knee, etc., if you want to be a good striker capable of getting the KO victory, you must develop your aerobic system to deliver and utilize as much oxygen as possible, as fast as possible, in order to lay the groundwork for the kind of conditioning that wins fight.

The eight methods in this chapter are the answer to improving your aerobic system faster and more effectively than ever before. They will systematically build each and every component involved in oxygen transport and utilization and turn you into an ATP producing machine. The more you can rely on the almost endless capacity of the aerobic system to fuel your muscles, the less you'll have to rely on the fatigue inducing anaerobic systems.

I'm sure you've seen plenty of examples of the fighters who are only powerful, explosive, and feared in the first minute or two of a fight, but you don't have to be one of them. You can be the fighter who pushes a relentless pace no one can keep up, a fighter who has the conditioning to capitalize on mistakes no matter when your opponent makes them. Developing your aerobic system to the edge of its ATP production limits is essential to becoming this kind of fighter.

Far too many MMA programs are missing out on this key and neglect the proper development of the aerobic system in favor of the *two anaerobic systems*. This book is about Ultimate MMA Conditioning, however, and that means having right balance of energy production with all three energy systems capable of delivering the ATP your muscles demand throughout the course of training and in a fight. When one system is under or overdeveloped this balance is lost and your energy production and conditioning suffers.

In the following two chapters, the two anaerobic systems are discussed in detail and I'll explain how to develop them to work in coordination with your aerobic system. The final section will then cover how to develop a training program from the ground up regardless of whether you're 8 weeks out from a fight, or don't ever plan on fighting at all.

Discovering how your aerobic system really works and the most effective methods to making it work better is an important first step towards Ultimate MMA Conditioning. Now let's move on to the next chapter and discuss the anaerobic-lactic system and precisely how it affects your conditioning.

The Anaerobic Lactic Energy System

Chapter Four

If you've been training for any length of time, you've undoubtedly read somewhere, or been told by someone, that the deep burn you feel in your muscles as they fatigue is caused by a buildup of lactic acid. You've also likely been told that it's this same fatigue inducing lactic acid that is responsible for that deep muscle soreness you get a day or two after exercise.

In this chapter, you will discover that not only are both of these statements completely wrong and misleading, but that lactate is actually a vitally important component of energy production that prolongs how long you can keep exercising at high intensities. The truth is that just like the aerobic system discussed in the last chapter, much of what you've heard about the anaerobic lactic system is incorrect. Lactic acid is not an evil muscle fatiguing bad guy it's made out to be.

It's about time you learned the truth behind anaerobic lactic energy production and how it really works. Along the way, you'll also come to understand its role in conditioning for MMA and discover the most effective ways to train this important system.

Anaerobic Energy Production Overview

In the last chapter, I explained how the aerobic system creates energy using oxygen to combust with sugars and fats to regenerate the ATP your muscles need to perform muscular work. As long as the working muscles don't need ATP any faster, or in greater amounts, than your aerobic system is capable of supplying and there is an adequate oxygen supply, then it will be able to do its job of providing the vast majority of fuel your muscle need.

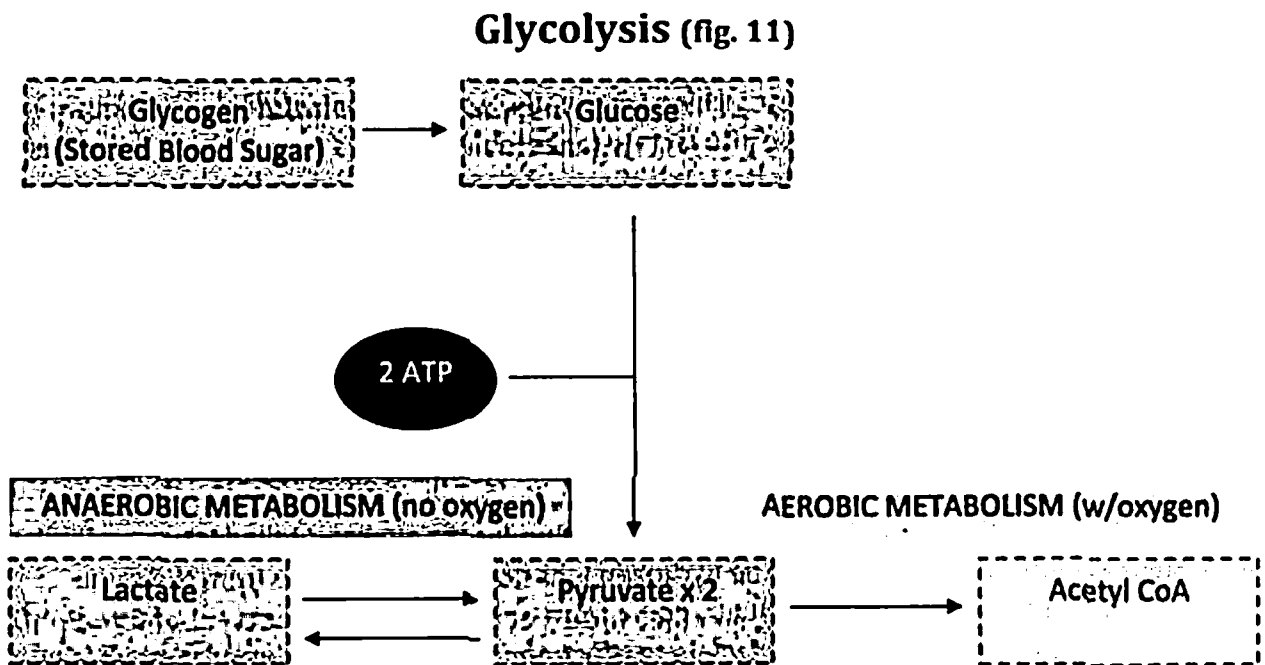
If you ask your muscles to generate a very high rate of power, however, there's a good chance they'll need ATP to be regenerated faster than the aerobic system is capable of and they'll have to turn to your anaerobic systems to make up the difference. Your body has two anaerobic energy systems: the **Anaerobic Lactic System**, and the **Anaerobic Alactic System** (also known as the **Creatine Phosphate System**). The Alactic system is covered in detail in the next chapter, but for now you just need to know that both of these systems can regenerate ATP much faster than the aerobic system, but both also lead to much more rapid fatigue as a result.

Your Anaerobic Alactic system can only produce ATP for a matter of around 10-12 seconds at max intensity before it can no longer regenerate ATP, while the Anaerobic Lactic system can provide ATP just over a minute, more or less, by breaking down blood sugar or stored sugar (known as glycogen) before it leads to fatigue. Considering that most fights last well over a minute, this means that it's vitally important for you to understand the role the anaerobic lactic system plays in conditioning. This is something very few fighters realize and yet it can make all the difference between gassing after a minute and being the last man standing.

How it Works

In order to have a better understanding of muscular fatigue, it's important to discuss a little more about just how the anaerobic lactic system works in the first place. Let's start by taking a simple look at how the system takes blood sugar (glucose) or stored sugar (glycogen) and breaks it down through a series of chemical steps to regenerate ATP without the use of oxygen. This process is known as anaerobic glycolysis or glycogenolysis depending whether the process starts with glucose or glycogen.

As you can see from the diagram below, glycolysis starts out by taking one molecule of sugar through a series of chemical steps until it eventually becomes 2 molecules of pyruvate. Along the way, there are also 2 ATP molecules produced that can be used by the working muscles.



Once pyruvate is formed, one of two things can then happen. One, pyruvate can be oxidized and turned into a molecule known as Acetyl CoA so it can enter the mitochondria and go through a series of chemical steps that use oxygen to generate 32 more ATP molecules. Or two, it can instead be turned into an interesting molecule known as lactate.

The first case would lead down the pathway of aerobic energy production you learned about in the last chapter, while the second is the process of anaerobic lactic energy production. It is the production of lactate that gives this system its name and distinguishes this system from the other anaerobic system, the alactic system.

Scientists at one point believed that lactate was only produced when there was not enough oxygen present. We now know that even at low intensities, when there is plenty of oxygen available, some lactate is still produced. This is an important point, as we'll later discuss.

A Brief History of Lactate

Over the years, lactate has been the subject of a great deal of research, debate, and confusion. It wasn't terribly long ago that most scientists believed that lactic acid was responsible for the burning you feel in your muscles and was also the cause of muscle soreness. Most of this belief initially came from the finding that at higher and higher intensities and workloads there is more and more lactate that accumulates in the blood. In other words, the harder and longer you work at high intensities, the more lactate you end up accumulating.

Eventually, research showed neither of these things to be true and that lactic acid as a substance doesn't really even exist in the body in meaningful levels. Scientists were also able to see that the lactate produced during high intensity exercise was essentially gone in under an hour so it certainly didn't make sense that it was causing soreness that you typically felt one or two days later. So if it wasn't lactic acid causing the fatigue or soreness, then what is?

Over the course of a great deal of research on lactate, the conventional wisdom soon became that during the breakdown of glucose into lactate (anaerobic glycolysis seen in fig. 11) there is also net production of hydrogen ions (H^+). It is these acidic ions rather than lactate, scientists believed, that lowers the pH of the cell and interferes with muscular contraction.

In other words, it's not the lactate or any lactic acid that causes the fatigue, but rather the hydrogen ions that get produced at the same time and through the same chemical pathways as the lactate. This helped explain why we see the correlation between lactate accumulation and fatigue. This model has been the prevailing line of thought for a great many years and is taught in most medical and physiology textbooks today.

Recently, however, this line of thought has also come under scrutiny and called into question as well. Some scientists now argue that the hydrogen ions don't actually come from the same reactions that produce lactate, but actually come from a completely different part of energy production. Instead, they believe that lactate production inherently helps delay fatigue because it "soaks up" a hydrogen ion as pyruvate is converted into lactate. In this process a molecule known as NAD that is required for glycolysis is also freed up and donated back up the chain.

Perhaps even more interesting, there's been research in the last few years indicating the possibility that the increased acidity in working muscles might actually play a role in preventing fatigue rather than causing it on some level as well! The exact proposed mechanism for this has to do with maintaining an electrochemical balance necessary for muscular contractions, but more research in this area is necessary before too many conclusions can be drawn.

While all this chemistry may sound confusing, the main important principle to take away is that lactate is not the bad guy it has been made out to be. Whether or not the hydrogen ions that are part of muscle fatigue result from the same chemical pathways as lactate production or they come from elsewhere isn't really that important. Just understand that lactate itself is not really causing fatigue, and in many ways it is actually helping to delay it.

You see, lactate can best be thought as an energy holding tank that acts as bridge between your aerobic and anaerobic systems. It serves as a valuable fuel source for your muscles, your heart, and even your brain. This is something few athletes and coaches really understand and yet its role in this regard is absolutely vital to performance.

Lactate the Energy Source

Aside from first understanding that there is no “lactic acid” that gets produced during exercise and that lactate itself doesn’t cause fatigue, the real breakthrough that the scientific community has made is that lactate is actually a very important energy source. To get a better idea of how this works, you can look back at fig. 11 and see that lactate is formed through a chemical reaction that starts with pyruvate.

The most significant thing to take note of is that this reaction is also reversible and lactate can be converted back into pyruvate. As long as there is sufficient oxygen and the necessary enzymes and substrates, this pyruvate can then of course enter the pathways of aerobic metabolism.

Regardless of the exact details, the key point is that during exercise, lactate that gets produced through anaerobic glycolysis can be transported to other working muscles, to the heart, and to the brain, where it can serve as an energy substrate and used in aerobic metabolism. It can also be transported to the liver and turned back into blood sugar as well.

This key role of lactate means that it essentially acts like a bridge between anaerobic and aerobic metabolism. It begins as the product of anaerobic energy production (no oxygen is used in its formation) but it can then be used by the same muscles that produced it or be shuttled to other areas of the body and used in aerobic metabolism.

The slow twitch fibers and the heart itself, both containing higher concentrations of mitochondria and aerobic enzymes, are particularly adept at using lactate as an energy source. During high intensity exercise, lactate is actually the heart’s preferred source of energy above all other energy substrates.

When you realize that, in many ways, the more explosive fast twitch fibers ultimately end up producing a fuel source that the more aerobic slow twitch fibers and heart, can easily use, it’s easy to see just how important role of lactate production is. It also goes to show how efficient and versatile the whole process of energy production is as well.

Rather than the bad guy it has been made out to be for many years, lactate is instead an absolutely vital component of energy production and is one of the real keys to ultimate conditioning!

Now let’s do a quick recap of what has been covered so far...

Anaerobic Lactic Recap

Hopefully by now you're not too confused or feel like you're stuck back in high school chemistry class and things are starting to make some sense. Just to make sure, let's do a quick recap of what we've covered in this chapter so far before moving on and discussing the role of the anaerobic lactic system in MMA and conditioning.

- A. The anaerobic lactic system is capable of a much higher rate of ATP production than the aerobic system, but it cannot sustain it for much longer than a minute at high intensity before fatigue sets in.
- B. When the body breaks down sugar in order to produce the ATP your working muscles need, it leads to the production of a substance called lactate. This happens regardless of if there is enough oxygen or not so at almost all levels of exercise some lactate is always being produced. A net of 2 ATP per glucose are produced through anaerobic lactic metabolism.
- C. Lactate production itself likely does not significantly affect muscular acidosis and it's much more likely that the H^+ that accumulate in high intensity exercise come from elsewhere. Conventional wisdom suggests acidity is one of the primary causes of muscular fatigue, but some research suggests the opposite may even be true.
- D. Once produced, lactate can then be converted back into pyruvate and oxidized through aerobic metabolism and in doing so it serves as a vital energy source to the more aerobic tissues such as slow twitch fibers and cardiac muscle. This means that lactate can be used by the same tissues that produced it, or it can be transported to other working tissues to be used as an energy source.
- E. Science has not yet provided the definitive answer as to the exact mechanisms of *fatigue at high intensity*. The majority of scientists believe that alterations of the pH balance and levels of enzyme activity, changes in cellular polarization due to the changes in the sodium/potassium balance between inside and outside the muscle cell, buildup of inorganic phosphates, depletion of energy substrates, etc. all contribute in some way to muscular fatigue. The central governor model will also be discussed later.

The exact mechanisms and role of each in the processes of muscular fatigue is not yet fully understood or supported by a preponderance of evidence. It's only safe to say there are many different causes and there is probably no one particular factor that can be singled out as the sole cause of muscular fatigue.

As long as you understand these five main points you have been paying attention and are following along well. If they make no sense whatsoever and you feel lost, I suggest you go back and reread up to this point because you'll need to understand these main principles in order to see how the anaerobic system relates to conditioning and to MMA.

Lactate & Conditioning

Now that you have the basics down of how the lactic system works and a much more clear view of the real role of lactate, it's easy to begin to see exactly how lactate accumulation relates to conditioning. If you remember that conditioning really just comes down to how quickly your body can produce ATP, how long you can produce it for, and how efficiently you use it, then it should make sense that the balance between the aerobic and anaerobic systems represents the tradeoff between power (how quickly you can produce it) and capacity (how long you can produce it for).

As I told you in the beginning of this chapter, the anaerobic lactic system can generate ATP quickly and provide for a higher level of power, but this power comes at a cost. Although there is still considerable debate as to the exact biochemical mechanisms that are responsible for muscular fatigue during high intensity exercise, it is very clear that the more your lactic system is used in relation to your aerobic system to produce ATP, the faster you will experience fatigue. Quite simply, this is the reason you can't run a mile at the same speed you can run a single lap, or fight for three rounds at the same pace as you could for just one round.

The best marker we have for understanding exactly where this ratio between aerobic and anaerobic energy production lies is the accumulation of lactate. This is simply because lactate accumulation represents the tipping point in a delicate balance towards anaerobic energy production. This correlation is why many have for so long have mistakenly associated the lactate itself as the cause.

When you consider the previous discussion that lactate serves as an energy source only in the presence of oxygen and aerobic enzymes it makes perfect sense that lactate accumulation is a good marker of the anaerobic/aerobic balance. Remember that some lactate gets produced through the breakdown of sugar at even low intensities, but there is still plenty of oxygen and aerobic enzymes to go around so the lactate gets used as fast as it is produced and there is no net accumulation. At this point, the aerobic system is therefore contributing the majority of the energy for exercise and fatigue is minimal.

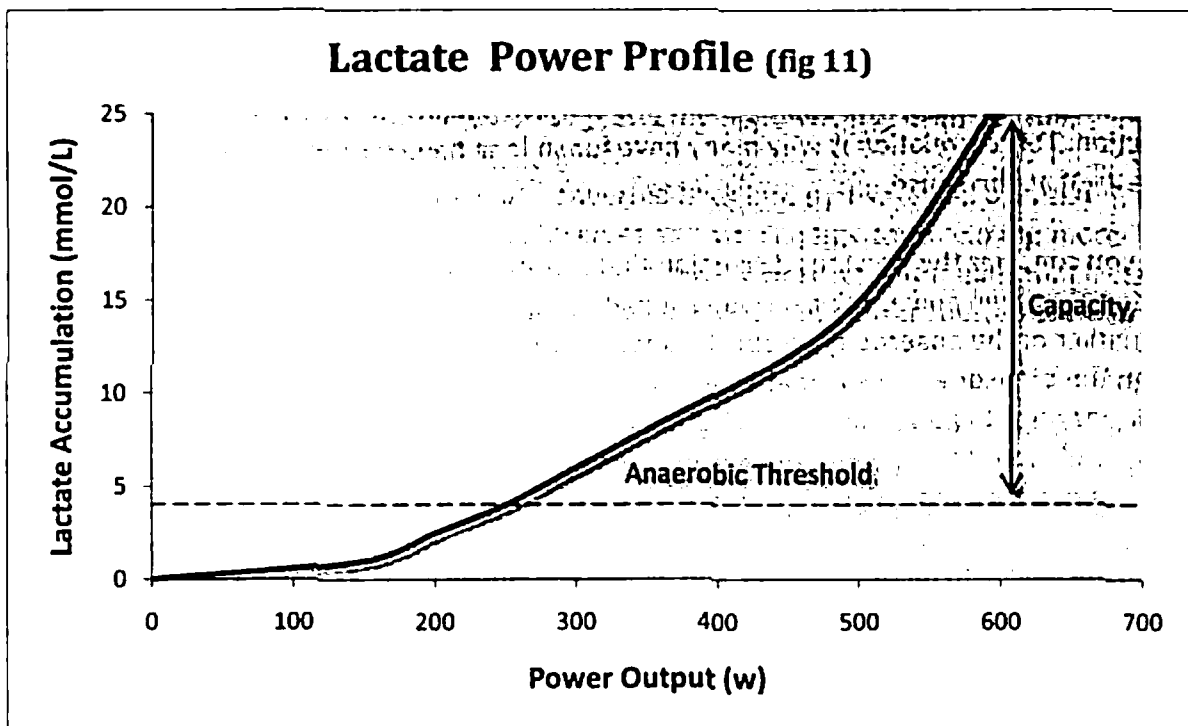
As intensity begins to increase higher and higher and the muscles demand ATP faster and faster, the body begins to increasingly rely on the anaerobic systems to make up the difference in ATP production that the aerobic system can't produce fast enough. When this happens, lactate is both produced and consumed at a much faster rate.

At some point, the tipping point is crossed and the anaerobic lactic system is so hard at work that it produces more lactate than the aerobic system can use and thus lactate begins to accumulate. This is the point commonly referred to as the anaerobic threshold and it marks the point where anaerobic processes begin to overwhelm and thus muscular fatigue begins to accumulate as well. There is a bit of a debate now as to whether there is a clear and concise point where lactate concentration begins to increase exponentially, as previously believed, or if it's actually more of a smooth linear increase as intensity rises and there is no single point.

Regardless of which the case may be exactly, changes in the accumulation of lactate during exercise reflects changes in energy production and conditioning. Higher accumulations of lactate reflect the body's increased tolerance to anaerobic exercise and enhanced ability to continue exercising despite the buildup of fatigue inducing anaerobic byproducts.

In athletes who rely heavily on this system, we see much higher total accumulations of lactate, often 50% higher or more, than in untrained athletes or in more aerobically trained athletes. The net result is that such athletes are able to maintain energy production using the anaerobic lactic system longer than their less trained counterparts. Such athletes are also able to generate higher power outputs as well because of a greater rate of ATP turnover using the lactic system.

These two abilities can be separated into the components of **anaerobic lactic power** and **anaerobic lactic capacity** and they represent the areas that can be improved through training. As you can see below in fig. 11, the power of the system is represented along the horizontal axis marked "Power Output" and capacity can be seen by looking at lactate accumulation. Greater capacity means you can maintain very high intensity exercise longer and thus you'll end up with a higher net accumulation of lactate.



In the real world situation of MMA, greater power of your lactic system means that in extended exchanges or flurries and takedowns, you'd be able to punch, kick, knee, wrestle, etc. harder and with more all around explosive power. Greater lactic capacity, on the other hand, means that you'd be able to maintain lactic energy production for longer before gassing.

These improvements must be tempered with understanding the physical costs associated with them, however, and understood within the greater context of MMA conditioning.

The Anaerobic Lactic System & MMA

Hopefully by now you already have a pretty good idea of how development of the anaerobic lactic system relates to conditioning for MMA, but this is an area where I see a lot of mistakes being made so it's a particularly important point to discuss. Many fighters and coaches see MMA as a mostly anaerobic sport and as such spend a great deal of time training at a fast pace and a high intensity.

This is reinforced by the mentality that many seem to have that conditioning is just a function of how hard you're willing to push yourself. "Train until you're ready to throw up or pass out and you'll develop great conditioning," is the attitude of many fighters and coaches out there.

The result of this approach is that a great deal of time can be spent developing the anaerobic lactic system without a real understanding of how this truly affects conditioning. Later, we'll get into a much more thorough discussion on how each of the systems affect one another and how it all relates to your conditioning. For now, it's important to understand that on a fundamental level, great conditioning comes from having the right balance between aerobic and anaerobic systems *depending on your specific needs*.

Because of this simple but often overlooked concept, you have to take into consideration the overall round length and total number of rounds when looking at the role of the anaerobic lactic system. In fights with shorter rounds and less total rounds, you can afford to use this system to a greater extent than in longer fights.

When you consider that an amateur MMA fight might be 2-3x3 minute rounds for a total of 6-9 minutes of fighting and a championship fight in the UFC is 5x5 minute rounds for a total of 25 minutes of action, it should be easy to see that there can be a big difference in the pace of a fight and overall energy system contributions.

Shorter fights mean you can maintain a faster pace without worrying as much about fatigue accumulating and thus the anaerobic lactic system can play a larger role. In longer fights, of course, the opposite is true and this is where relying too much on the anaerobic systems will lead to poor conditioning. This is one of the primary reasons you see certain fighters gas in their fights over and over again and why wrestlers used to shorter matches often have problems.

As you'll learn in later chapters on programming, muscle tissue can be glycolytic and rely mostly on anaerobic metabolism, or it can be oxidative and rely mostly on aerobic metabolism. Over development of one or the other has a negative impact on your conditioning and this is where the optimal balance must be found.

A higher level of anaerobic lactic development is necessary for fights that require continuous higher power output for fairly short duration. As such, the lactic system is more important in shorter fights with few rounds. In the next two sections, you'll learn the most effective methods to improve this system and later you'll learn how to put it all together.

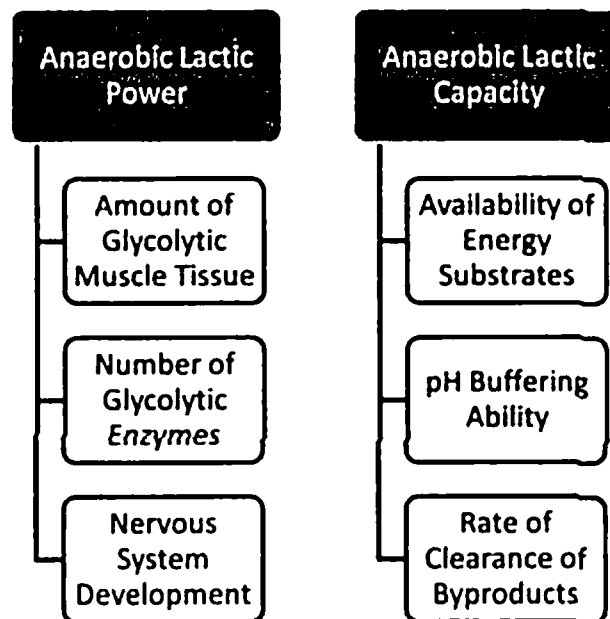
Anaerobic Lactic Adaptations

Although we've touched on the different mechanisms involved in anaerobic lactic energy production, it's important to understand exactly how the system improves in response to specific training methods.

In fig. 12 below there is the breakdown of the major adaptations that take place in response to training and you can see which component they affect. The power side essentially comes from having a lot of muscle tissue that's "glycolytic" meaning that it predominantly relies on anaerobic metabolism for its ATP, and a high level of the enzymes that are necessary to break down glucose.

If you have a greater amount of anaerobic muscle tissue and a lot of enzymes that can break down sugar very quickly, you are capable of producing a high level of anaerobic lactic power. Of course, how well your nervous system can activate and coordinate all your muscle also plays a large role in power output as well.

Adaptations of Lactic Energy Production (fig. 12)



On the other side of the equation, your lactic capacity mostly has to do with how well the body can tolerate the buildup of metabolic byproducts that are responsible for muscular fatigue. There are several different mechanisms the body can use to combat this buildup, such as neutralizing the acidity of the muscle cell and transporting different waste products elsewhere, but this is still an area of intense study and research and there are still more questions than answers. One thing we do know for certain, however, is that through training it is possible to increase how long you're able to sustain energy production using the lactic system, but the total amount this ability can be improved is relatively small and largely genetic.

Anaerobic Lactic System Methods

Now that we're finally done with the science for this chapter, let's get down to the training methods you need to know to improve both the power and the capacity of the lactic system. Before I discuss them, however, it's important to take note of my statement above about the inherent limitations in the development of this system.

First, because there are less "moving parts" to the system compared to the aerobic system, there are fewer factors that can be improved. The aerobic system is capable of taking someone from an out of shape couch potato to a marathon runner with enough time and the right training, but the lactic system just doesn't have nearly as much room for overall improvement. No matter how hard you train or what methods you may use, it will never have the capacity to be able to provide energy for anywhere even remotely close to as long as your aerobic system.

Second, recent research, as well as my own experience, has shown that there is an inherently genetic component to the development of this system as well. I'm not saying you can't improve this system with training, but your ceiling for how much it can improve and how quickly you'll see changes appears to be pretty well hard wired into your genetics. Fortunately, however, MMA is not really a sport that requires the outer limit of development of this system and trying too hard to develop them usually leads to more harm than good anyway.

Quite simply, these two points mean there are fewer training methods and principles that are the most effective. As such, working on this system really comes down to either one of two points. To improve power you have to work on generating as much energy as possible as fast as you can using the system, and to improve capacity you have to work on sustaining it as long as possible.

The five training methods you're about to learn all revolve around these two key principles.

Method #1: Lactic Power Intervals

Just as the name implies, lactic power intervals work to increase how much power your lactic system can generate. As with any method that is focused on increasing power, the key is to perform whatever exercise you are doing with 100% intensity and perform at the absolute highest rate possible. In essence, it is using this system to the maximum of its power generating abilities that provides the stimulus for it to improve, so going half speed won't get the job done.

If you choose to do sprints, for example, you must sprint as hard and as fast as you can. If you are doing lactic power intervals with bag and/or pad work, you must throw as hard and fast as you can with precise technique. You can really use the method with a wide range of different exercises, ranging from general exercises like sprinting, explosive squat jumps, etc. to more specific exercises like repetitive takedowns or striking combinations, as long as you follow the key principle of working at the maximum intensity possible during each repetition.

For this method, each rep should be **20-40s of maximum intensity work** and followed by **1-3 minutes of rest**. Your heart rate should come down to **110-130** and the goal should be to recover as much as possible between reps so that each rep is performed maximally. Remember, this method is about power and rushing between reps will mean you will become fatigued and unable to perform the rep at the highest level of power possible and thus you won't see the same resulting increase in power.

You should perform **3 reps per series** and then rest **8-15 minutes between series**. Active rest is best and a light jog, shadow boxing, jump rope, etc. will suffice. Following the prescribed rest intervals is vitally important for maximum results, **DO NOT shorten the rest intervals between series**.

Generally, you should perform **2-4 series per workout** and use this method once or twice a week. You can use the same exercise for each series or use a different one in each series. A wide range of exercises can be used, but further out from fights I recommend using more general training exercises with this method and the closer you get to a fight, the more specific your exercise selection should become.

Always remember the primary adaptations are only going to occur in the muscles that are actually performing the work. This is something we'll discuss in greater detail in the following chapters on programming, but it's an important point when it comes to choosing which exercises to use.

This method will primarily stimulate an increase in the amount of enzymes used in anaerobic glycolysis and thus the rate at which glucose can be broken down into ATP will be higher. As you learned in chapter 3, when you can generate ATP faster your muscles and produce more power, plain and simple.

Lactic Power Interval Method

Why is it important?	How does it work?
Lactic power output is an important component of wrestling and prolonged high energy output phases of fights. The more power, the better	Stimulates increase in the enzymes involved in anaerobic glycolysis and shifts the metabolism of working muscles to rely more on anaerobic vs. aerobic metabolism.
Exercises: A wide variety of exercises can be used ranging from sprints to very specific MMA drills can be used if done at maximum intensity and speed.	Guidelines: <ul style="list-style-type: none"> • Max intensity and speed on each rep. • Each rep should be 20-40 seconds • 2-4 series of 3 reps should be used. • Always follow recommended rest intervals

Method #2: Lactic Capacity Intervals

This method shares many similarities with the lactic power intervals, but with different work to rest intervals focused on increasing how long you can maintain lactic power for rather than simply your max power output. This shift in emphasis from power to capacity means that longer work intervals are used and less rest is allowed. This is the difference between training power and capacity and yet it seems often overlooked.

An increase in power comes from demand of the system to produce energy as fast as possible, which an increase in capacity is stimulated by demanding the system to produce energy as long as possible. By shortening the rest intervals and forcing the system to produce energy for longer, you are shifting the training emphasis from power to capacity and changing which adaptations result.

Use of this method will increase how long your body can produce energy for using the lactic system before it completely fatigues. In other words, it trains your body to buffer the mechanisms of muscular fatigue that result from the use of this system and thus prolong your ability to continue producing ATP with the lactic system.

This ability is important during periods of sustained high power output, but you must also remember that this increased capacity does come at the cost of aerobic performance. In later chapters we'll discuss this tradeoff in greater detail.

You can use the same exercises and selection principles outlined in the lactic power intervals, but you will need to increase the work up to **90-120s per rep**, and decrease the rest intervals to **1-2 minutes between reps**. Again **3 reps per series for 2-4 series** should be used. You should actively rest 4-6 minutes between series and use this method 1-2 sessions per week.

Lactic Capacity Interval Method

Why is it important?

The ability to sustain anaerobic energy production for extended periods of time is important for certain aspects of MMA and for shorter fights.

Exercises:

A wide variety of exercises can be used ranging from sprints to very specific MMA drills can be used if done following the specific guidelines outlined.

How does it work?

Stimulates increase in the buffering mechanisms involved in allowing anaerobic glycolysis to continue. Also increases glucose storage and utilization potential.

Guidelines:

- Each rep 90-120s.
- 2-4 series of 3 reps should be used.
- Incomplete rest intervals should be used
- Goal should be complete fatigue

Method #3: Circuit Training

Circuits are without a doubt one of the most widely used methods in MMA and when used properly, they can be very effective for increasing lactic power and capacity, depending on how they are structured. Circuits can also be used to developed aerobic power, as discussed in the aerobic chapter, but I consider longer, more aerobic circuits to fall under the threshold method.

Although there are literally *endless ways circuits can be put together*, there are some important guidelines that should be followed when targeting the lactic system. First, use exercises that involve the largest muscle groups as possible and perform them explosively. This will help recruit as many fast twitch fibers as possible and increase their lactic power and/or capacity and is a better choice for this method than exercises done at a slow or moderate tempo. Some of the best choices are: jump squats or kettlebell jump squats, explosive push-ups, explosive pull-ups, tire flipping, sled dragging, heavy medicine ball throws, MMA drills, etc.

Next, I recommend using a mixture of strength training exercises, MMA drills, and sprints into your circuits. The further out from a fight you are the more you can use strength training exercises and sprints and the closer you get to a fight the more you should begin incorporating MMA specific drills like bag/pad work and wrestling drills into your circuits.

Finally, when your goal is lactic power, I recommend each exercise in the circuit be done for **20-30 seconds** for a total of **60-90 seconds** followed by a rest period of **1-3 minutes** between each circuit. You should repeat each circuit **2-4 times** and then take an **8-10 minute rest** before moving on. Circuits focused more on lactic capacity should generally last **1-2 minutes total** with the duration of each exercise lasting **30-60 seconds**. Rest no more than **60-90s** between repetitions of the circuit and **6-8 minutes** between circuits.

The Circuit Method

Why is it important?

Can improve lactic power and capacity of many different muscle groups in a time effective manner when used properly.

How does it work?

Produces very rapid rate of ATP turnover and high levels of blood lactate when large muscle groups are used. Stimulates increase in lactic power or capacity

Exercises:

A wide variety of exercises can be used ranging from sprints to very specific MMA drills can be used if done following the specific guidelines outlined.

Guidelines:

- Circuit duration of 60-90s for power
- 1-2 minutes for capacity
- Use primarily explosive exercises
- Circuits generally used 2-3 times per week

Method #4: Lactic Explosive Repeat

If you remember back to the last chapter, I told you that the explosive repeat method could be used to improve aerobic or anaerobic abilities depending on how it is used. To effectively use the method to develop lactic power and capacity instead of the aerobic properties, the most important thing is the difference in work to rest intervals.

As you probably already suspect, the shift toward lactic means increased work intervals with a simultaneous decrease in the rest interval. To use this method properly, you must use work intervals of 12-40 seconds, followed by no more than 10-30 seconds of rest. Once again, you also need to change these intervals each week as shown below for the method to be the most effective.

Regardless of whether you are using the method to increase aerobic or anaerobic abilities, the same exercises as outlined in the previous chapter can be used. The closer you get to a fight the more you'll want to be using MMA specific drills and of course the further out the more you can use less specific exercises and drills.

Just as with the aerobic version of the explosive repeat method, you should perform 1-3 series of 6-10 sets per exercise for 1-3 exercises per workout. You also must use 6-8 minutes of active rest between series and exercises. A sample of how to use this method for increasing anaerobic power and capacity over a period of four weeks is as follows:

Week One: 12-15s work: 30s rest

Week Two: 15-20s work: 20s rest

Week Three: 20-30s work: 15s rest

Week Four: 30-40s work: 10s rest

The Lactic Explosive Repeat Method

Why is it important?

The ability to maintain repetitive explosiveness is a key factor in wrestling and grappling components of MMA

Exercises:

Lower body: squat jumps and split squat jumps with kettlebell or bar
Upper body: explosive push-ups or bench press

How does it work?

Increases enzymes involved in lactic ATP production as well as buffering mechanisms to improve lactic capacity

Guidelines:

- Increase work, decreased rest each week
- Active rest 8-10 minutes between series
- Rest intervals of 10-30s
- 1-2 sessions per week

Method #5: Static Dynamics

This unusual method is one I first read about many years ago in a Powerlifting magazine but for whatever reason, it never really caught on and I haven't heard much of its use in years despite its effectiveness for improving lactic capacity. Perhaps one of the reasons is that it's a very uncomfortable method when used properly, but this is one of the hallmarks of increasing tolerance to the fatiguing processes of anaerobic metabolism. In other words, taking the lactic system to its edges is not pleasant, but it's necessary if you want to improve it.

The key to this method is the use of 10 second isometric pauses in the fully stretched position of the exercise in between reps. The entire method requires performing two moderate speed reps, pausing for 10 seconds in the stretched position, performing two more reps, pausing for 10 seconds, etc. for the duration of the entire set. Make sure there is constant tension. Each set should last between 3-10 minutes, making it a very painful experience as time increases.

Because of these specifics, there are a limited number of exercises that can be used most effectively. For the upper body, you'll want to use Dumbbell Bench Presses, Shoulder Presses, and Lat Pulldowns. For the lower body, the best options are Dumbbell Squats and Stiff Leg Deadlifts. Remember, you absolutely must hold the stretched position of each of these exercises for 10 seconds between reps, and when you do your reps, you only do 2 at a time.

Only the muscle groups that are actively worked will see the increase in lactic capacity, so it's important to use a range of exercises. Start out performing 1-2 sets per exercise in each workout for 3-5 minutes per set and increase from there. Once you can do 10 solid minutes at a particular weight then increase the weight. You'll want to start out with very light weights, don't be surprised if you can only do 20-30lb dumbbells on presses to begin with. You will also notice quick progress and should this method 1-2 times per week for the best results.

The Static Dynamic Method

Why is it important?

Lactic process can lead to fatigue if tolerance to lactic processes is poor

How does it work?

Increases tolerance to build up of lactic fatigue mechanisms through pH buffering, inorganic phosphate buildup, etc.

Exercises:

Dumbbell Squats, stiff leg deadlifts, dumbbell bench press, shoulder press, lat pulldowns

Guidelines:

- 10 second pauses between reps
- Moderate speed on all reps
- Sets of 3-10 minutes

Anaerobic Lactic System Training Methods Overview

Method	Targets	Guidelines	Rest	Volume	Frequency
Lactic Power Intervals	Increase in maximal rate of lactic ATP production Fast twitch power output	20-40s per rep Moderate resistance Can use MMA drills or cardio exercises	1-3 minutes between sets, HR to 110-130 8-15 between series	3 reps per series 2-4 series per workout	1-2 sessions per week
Lactic Capacity Intervals	Increase in ability to buffer fatigue Increase in peak blood lactate accumulation	90-120s per rep Goal should be to tolerate high levels of lactic fatigue	Incomplete rest intervals 1-2 minutes	3 reps per series 2-4 series per workout	1-2 sessions per week
Circuit Training	Lactic power and capacity Rate of ATP production peak lactate accumulation	20-60s per exercise Total duration of circuits should be 1-2 minutes	1-3 minutes between circuit reps 6-10 minutes between series	2-3 circuits per workout	2-3 circuit sessions per week
Lactic Explosive Repeat	Lactic power and capacity Fast twitch power output	12-40s work 10-30s rest per interval Focus on maximum explosiveness with each rep	10-30s rep between reps 6-8 minutes rest between series	6-10 sets per series 1-3 series per exercise 1-3 exercises per workout	1-2 sessions per week
Static Dynamics	Buffering mechanisms of specific muscles used	10 second rest pauses between reps All reps done at moderate tempo	1-3 minutes rest between sets 5-8 minutes between rest exercises	1-2 sets per exercise 2-3 exercises per workout	1-2 sessions per week

Anaerobic Lactic System Summary

The lactic energy production system has been very poorly understood by both scientists and athletes for many years. Even today, there is still disagreement among the scientific community as to the exact mechanisms that lead to fatigue when you rely on this system for a large percentage of ATP production. Regardless of what these exact mechanisms may be, there are many things that are very clear about the lactic system.

First, despite what most people may think, lactate is not something to fear and it does not cause you to get tired. Instead, it acts as an energy bridge between the aerobic and anaerobic systems and its production is absolutely vital to allowing your performance. Without lactate, you would fatigue much more rapidly and anaerobic metabolism would fail very quickly. It is an energy source, not a toxic waste product as many have believed for so long.

Second, the lactic system can be trained to deliver more power and/or produce power for longer, but in the end, these adaptations are fairly limited compared to the more versatile aerobic system. There simply aren't as many working parts of the lactic system and there is a great deal of genetic dependence to anaerobic metabolism in general. Some research suggests as much as 60% of the potential for anaerobic energy production is attributable to genetic influence.

To increase the power of the system, it's necessary to do shorter bouts of work at maximal intensity with longer rest periods in between repetitions. This leads an increase in enzymes and glucose uptake into the muscle necessary for lactic energy production. To increase capacity, on the other hand, longer periods of work with shorter more incomplete rest periods are used. This stimulates the body to increase its ability to buffer the mechanisms that lead to fatigue and allows you to use the system longer before you inevitably gas out.

Third, we also know that the lactic system adaptations in many way conflict with those of the aerobic system and the two cannot both be maximally developed at the same time. In the following chapters on programming, this issue will be discussed more thoroughly. For now, it is important to understand that there will always be a trade-off between the highest power and the greatest endurance. A high level of lactic development will hinder aerobic performance to some extent and vice versa.

As I've told you several times in this book, conditioning is about having the correct balance between energy systems and the lactic system is absolutely pivotal in this regard. Too little development of the lactic system and you will be lacking in the ability to be powerful and explosive. Too much development in relation to the aerobic system, on the other hand, and you might be very powerful and explosive, but you'll also quickly fatigue and gas out in the later rounds. Such is the delicate balancing act a well conditioned fighter must play.

In the following chapter, the alactic system will be explored. After that, we'll finally get started on the discussion of how to put all the many complex pieces of conditioning together.

The Anaerobic Alactic Energy System

Chapter Five

The anaerobic alactic system can best be thought of as your fight finishing knockout system because of its ability to generate extremely high levels of power. This is the power you need to get the knockout, submission, or TKO stoppage.

The alactic system, also known as the “creatine phosphate system” or the “ATP-PC system” has the fewest chemical steps out of any of the three energy systems and therefore it relies on very few processes to rapidly generate the ATP your muscles need for maximum explosive power. Just as with the lactic system you just studied, however, the high power generation of the alactic system *comes also at a cost*.

Because it relies on very small amounts of stored ATP and phosphocreatine within the muscles themselves, it cannot provide energy for long periods at a time because it runs out of supplies. At maximum intensity, the alactic system is only able to generate ATP for a matter of 10-12 seconds or so, before it gives out and runs out of the building blocks it needs for continued energy production. Obviously, in a fight you have to be able to be explosive for more than just 10-12 seconds, and that’s where the alactic and aerobic systems work together.

The aerobic system works to replenish the chemical building blocks and enzymes that the alactic system needs to generate its high power output. This makes the aerobic system an essential component in how well you can utilize your alactic system to maintain your explosiveness throughout a fight. This is something I touched on earlier in the chapter on the aerobic system and *something we’ll be discussing more thoroughly in the last few chapters on programming*.

Also, contrary to how most textbooks talk about energy systems, rarely is your alactic system working at 100% intensity and thus it is able to contribute to energy production for far more than just 10-12 seconds. While it is informative to understand how long a system can last at 100% intensity, in a dynamic sport like MMA the body must rely on all three energy systems to varying degrees throughout a fight. Rarely does the alactic system operate at a true maximum capacity as it would in something like a 100m dash or other strength/power events.

All of this means that the alactic energy system is a very important component of your conditioning and your ability to be explosive throughout a fight. Unfortunately, the alactic system also has the least amount of room for improvement out of the three systems and has a strong genetic influence to its development *as well*. *This doesn’t mean you can’t train and improve it, however, it just means that there are limits to how much you can ultimately increase its power and/or capacity*. Before we discuss this further and get into the most effective training methods, let’s briefly go over how the system works in the first place.

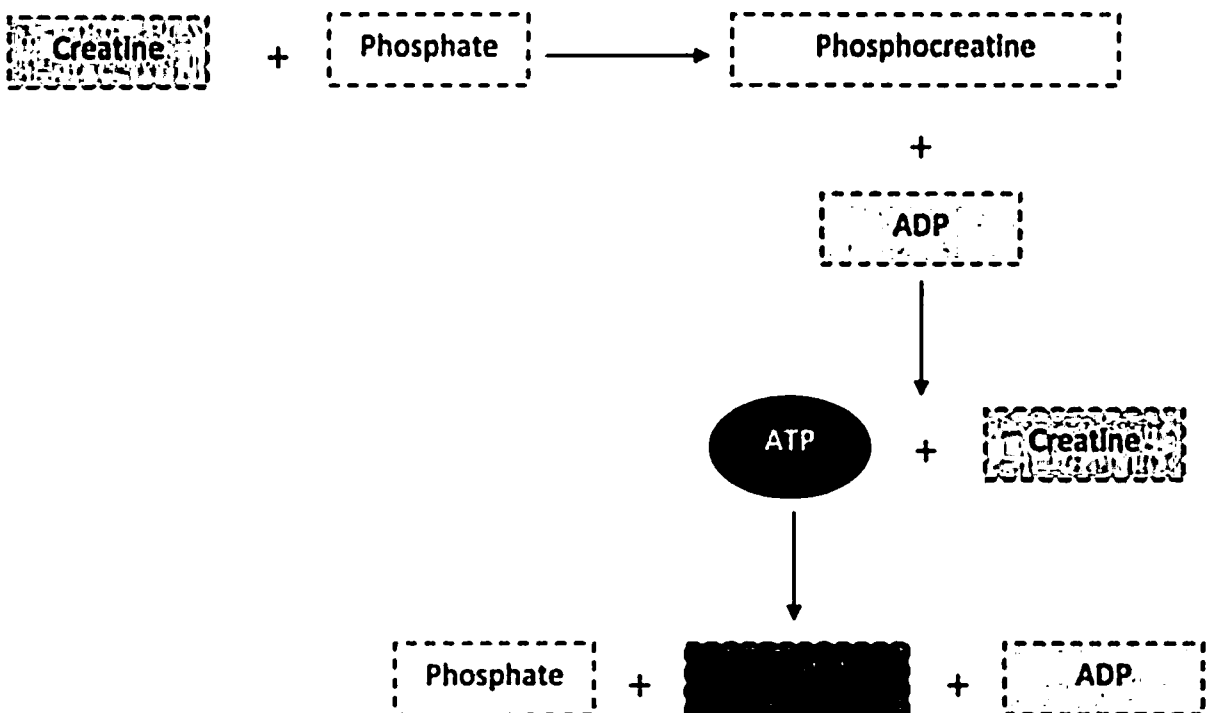
How it Works

Compared to the relative complexity of the previous two systems, the alactic system is fairly straightforward and simple. Rather than relying on the breakdown of stored sugars or fats, it instead depends on a chemical known as phosphocreatine to regenerate the ATP your working muscles need. Creatine itself is one of the most widely used sports supplements in history and its effectiveness in improving explosive performance and strength can be traced directly to its role in the formation of phosphocreatine.

During periods of intense exercise, the amount of stored ATP within the muscles runs out in just a second or two. After that, phosphocreatine stored in the muscle helps to rapidly regenerate ATP by donating its phosphate molecule. This phosphate molecule then bonds to ADP to form the ATP your muscles use for energy. Because there are only a few chemical reactions in this process, it can generate ATP very quickly and thus is capable of the highest power output out of all the energy systems. The problem, of course, is that it is limited in how long it can produce ATP for because very little creatine and phosphocreatine can be stored in muscles.

In fig. 13 below, you can see a schematic for how the pieces of the alactic system fit together. It's important to note that once the store of phosphocreatine in a muscle is used up, it can only be regenerated through aerobic processes. It is in this way that the aerobic system plays a large role in how well you're able to quickly recover after short explosive bursts of power.

Anaerobic Alactic Energy System (fig. 13)



Alactic System & MMA

In the last chapter, you learned exactly how the lactic system affects your conditioning because its metabolic pathways of energy production invariably lead to muscular fatigue. When it comes to energy production, there will always be an inherent tradeoff between maximum power and maximum endurance.

In other words, you will never be able to throw 100 punches in a row as fast and hard as you could throw just 5 or 10. This is because the lactic and alactic systems can both generate tremendous power, but they can only do it for a limited time.

The alactic system produces ATP at an even higher rate than the lactic system, and so it too can produce a level of overall muscular fatigue. The difference, however, is that its use is generally limited to very short bursts of explosive power and this short duration means the overall impact on muscular fatigue is typically much less than with the lactic system.

In between these explosive bursts, the aerobic system works behind the scenes to regenerate the necessary substrates and remove the metabolic waste products produced. In many ways, the aerobic system plays a role in how much fatigue results from the use of this system. This carefully orchestrated partnership between the aerobic and alactic systems is incredibly important in MMA and a big part of conditioning.

Throughout the course of a fight, there are many times where it's necessary to use the alactic system to throw an explosive combination of punches, kicks, knees, elbows, etc., go for the takedown or defend against one, improve position on the ground, or go for a fight finishing submission. This is where many MMA fights are won or lost.

In all of these examples, the alactic system must be ready to provide ATP at an extremely high rate and if it can't, then your power simply won't be there. This means that throughout a fight, how quickly and effectively your aerobic system can eliminate waste products and regenerate the alactic substrates this system needs to generate explosive power, can play a large role in your overall conditioning.

If your aerobic system is very well developed, it is capable of clearing out the fatigue inducing products of alactic energy production and refueling it quickly so you can be explosive over and over and over again. If the aerobic system is not very well developed, on the other hand, then the alactic system will contribute more to muscular fatigue and your explosive power will likely not be there when you need it the most.

Also, it's also rarely discussed that when it comes to explosive power, the speed of relaxation phase plays a key role. Power is usually only mentioned in terms of how fast your muscles can contract, but this is only half the equation. Your muscles must also be capable of very fast relaxation if you are going to generate very high levels of power. Research has shown that there is a direct link between the mitochondria in your muscle fibers and their relaxation speed.

This means that aerobic properties, i.e. mitochondria, actually play a role in just how explosive you really are. Research done in the former Soviet Union showed that the speed of relaxation phase was one of the key determining factors that separated the top level athletes from the truly world class athletes.

Overall, MMA is predominantly an aerobic-alactic sport, meaning that it relies the most heavily on the development of these two systems and the interaction between them. In later chapters, we'll discuss this relationship and overall model of energy production more thoroughly, but for the time being, it is important to know that your alactic system development is critical to your MMA performance.

Your goal in training should be to maximize how much power your alactic system can produce while subsequently improving how fast the aerobic system can refuel this system for repeated use. Now let's get started talking about exactly how that's done.

Alactic Adaptations

Because the alactic system has so few chemical steps to it, there are not many areas in which it can adapt and improve. This makes it the least trainable of the three energy systems and it's unlikely you can ever increase its overall energy producing capacity by a large percentage. As I said before, there's also a pretty strong genetic influence to this system as well. Some people naturally have much more powerful alactic systems than others.

One of the reasons for this, most likely, is that fast twitch fibers can store a much larger amount of phosphocreatine in them and thus have greater capacity for alactic energy production. Unfortunately, your percentage of fast twitch fibers vs. slow twitch fibers is largely a genetically inherited trait, and most research shows this just isn't something you are going to ever significantly alter through training.

With that being said, there are still improvements you can make through specific training that can improve alactic power and/or alactic capacity. An improvement in power largely comes from an increase in specific enzymes such as creatine kinase, which is responsible for speeding up the breakdown of phosphocreatine. Just as with the other two systems, the faster the chemical reactions involved in alactic energy production can occur, the greater the power the system can generate.

Alactic capacity, on the other hand, is largely the result of how much ATP and phosphocreatine the muscles themselves can store. Once this store of phosphocreatine runs out, alactic energy production cannot continue any longer so of course the more of this chemical you can store in the muscles, the longer this system can work.

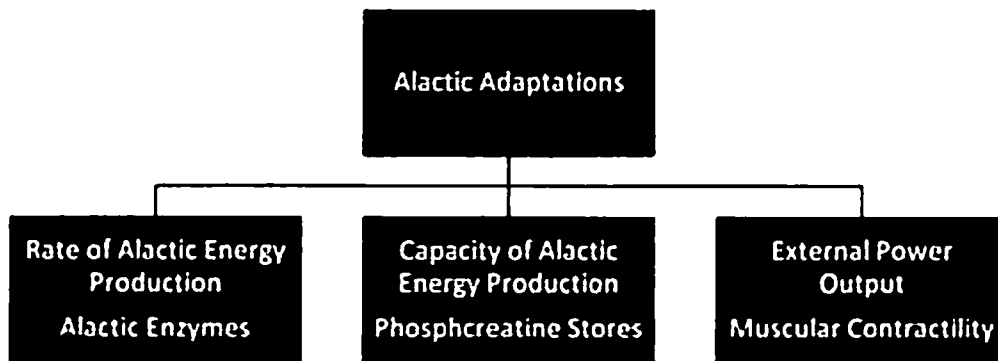
This is the primary function of creatine supplements and how they work. There is a fairly small margin for increase here, however, and you simply can't dramatically increase how much phosphocreatine the muscle can store.

Aside from alactic power and capacity, one thing that can see much greater improvement is the economy of alactic energy production. This means the body can become more efficient at how it uses the alactic system. Remember that muscles are made up of a large collection of muscle fibers that fire in many small groups independently from one another.

This level of independent control means the body can selectively recruit different groups of fibers at different times. The result is that when one group of muscle fibers fatigues and runs out of phosphocreatine, another group of fresh muscle fibers can then take over. The first group of muscle fibers can then regenerate their phosphocreatine store or continue producing energy using the lactic or oxidative systems. It is in this way that the body can economically use the alactic system over a period of much more than just 10-12 seconds as most textbooks describe.

Also, as discussed above, contractility, i.e. how fast your muscles can contract and relax, plays a large role in just how much external power your working muscles can generate with the alactic system. This is an area that also has a significantly larger room for improvement than on the energy production side. Dramatically increasing this characteristic is the result of your overall training strategy and will be discussed more thoroughly in later chapters.

Adaptations of Alactic Energy System (fig. 14)



The training methods you are going to learn in this chapter will help improve all three of these different components of alactic energy production. Even though your level of improvement is ultimately limited, the alactic system is an important part of overall conditioning and performance in MMA and there it is a definite need to train it as effectively as possible

Alactic Training Methods

Because of the inherent limitations of increasing alactic power and capacity, I've chosen to describe just five different training methods. These are the five most effective methods and they are based on developing the alactic system to the limits of its energy production potential.

Also, remember that in MMA the alactic system is closely tied to the ability of the aerobic system to regenerate its building blocks so it can provide for higher power over and over again throughout a fight. Because of this, three out of the five training methods you're about to learn are designed around this important principle in mind.

Just as with the other two systems, training to improve lactic power revolves around shorter work periods of maximum intensity and power, while working to improve capacity means using shorter rest periods and longer periods of work. Because the alactic system provides energy for much less time than either of the first two systems, all the methods will use the shortest and most explosive periods of work out of the three systems.

Don't forget this system is your key to finishing fights and getting to KO, TKO, or submission victory and you must train it as such. Training this system with half hearted intensity will not get the job done. The alactic system has only a marginal room for improvement in the first place, so to maximize your results you must put all your effort into each method and each repetition when training.

Method 1: Alactic Power Intervals

Training to improve your alactic power is the definition of high intensity and is not an easy task. This method is designed to increase how fast your alactic system can produce ATP and thus how much power it is ultimately capable of generating.

Your specific muscular contractility and MMA technique and strategy of also play a large role in how well this alactic power translates into getting the knockout or submission. At the end of the day, though, the more power your alactic system can generate, the more explosive potential you have to work with. Also, many of the methods that target the alactic system will undoubtedly help improve your contractility as well.

For some fighters, this type of training comes very easily as they likely have a higher percentage of fast twitch fibers and are naturally very explosive. For others, who may have great endurance but relatively poor explosive power, this type of training will be very challenging and uncomfortable.

Whichever the case may be for you, it's important to keep in mind that dramatic increases in explosive power do not come overnight. If you are a fighter that lacks in explosiveness, you will generally need to increase your all around strength and power through resistance training and use all the methods outlined in this chapter before you will see dramatic results. This progression of physical preparation will be more thoroughly discussed in the following chapters on programming.

To effectively use the alactic power interval method, you will need to perform the exercise of your choosing (see the box below for recommended exercises) at 100% intensity for no longer than 7-10 seconds. The focus must be on maximum acceleration and power for the entire time.

Because the working interval is so short, there is no room for halfway or anything less than 100% if you really want to see an improvement in explosive power. Remember, the goal is an increase in how fast this system can generate ATP as well as how you then turn that ATP into explosive knockout power, so if you aren't going 100% then you won't be training the system to its limits. Without this intense stimulus, the alactic system will not really improve much and you'll see poor results.

Another key component to this method is to make sure you use enough rest between reps to allow for full recovery. If you do not rest long enough, you will quickly accumulate fatigue and this will impair your ability to go at 100%. This is a mistake many fighters and athletes make because they feel they need to rush through everything and turn it into conditioning, but when it comes to increasing power this approach will lead to very poor results.

In order to get enough rest between working reps, you will want to rest 2-5 minutes between them and make sure that your heart rate is at 120 or below before doing the next rep. The more reps you do, the longer your subsequent rest interval should typically be. Always keep in mind that the goal is not to become fatigued, but rather to be able to generate the maximum power on each rep as possible.

It's also better to do active rest at moderate heart rates such as shadow boxing, jumping rope, jogging, etc, between reps because this will help speed up the aerobic processes responsible for recovery faster than doing nothing at all.

You should perform 5-6 reps of these high intensity explosive reps per series and then rest 8-15 minutes before moving on to another exercise. You'll generally only want to do 2 of these series per workout, for a total of 10-12 reps, because when done properly they are extremely taxing on the nervous system. Always remember that quality is more important than quantity and this is why you must follow the recommended rest guidelines.

Alactic Power Intervals

Why is it important?

Explosive bursts are a part of every MMA fight and the ability to be quick and powerful is vital to performance

Exercises:

Just about any repetitive explosive exercise can be used such as jump squats, sprinting, bounding drills, MMA drills such as pad/bag work, explosive push-ups, etc. can be used

How does it work?

Improves maximum rate of ATP regeneration by the alactic system by increasing the amount of enzymes involved in its energy production

Guidelines:

- 7-10 seconds per rep
- Active rest 2-5 minutes between reps
- 5-6 reps per set
- 1-3 sessions per week

Method 2: Alactic Capacity Intervals

Alactic capacity is probably one of the least trainable and most genetically influenced qualities in the grand scheme of energy system development, but if you've never really focused on training it before, chances are good that you do have some room for improvement. The alactic capacity intervals themselves do also help to develop the rapid aerobic recovery you need as well, so even if you don't see a huge improvement in alactic capacity you can still benefit from this type of work.

As we've discussed before, capacity can best be thought of as the total duration the system can produce energy, so to train this quality we have to take the alactic system to the limits of its energy production. This means you'll want to use working reps of **10-15 seconds** and rest intervals of **20-90 seconds**. You should do **10-12 working reps** per set before resting **8-10 minutes** and repeating the method with a different exercise. Generally, **2-3 exercises** or series per workout can be used with a maximum of 3 during periods of high volume training.

You can use a wide range of exercises depending on your individual needs and training schedule. You want to select exercises that are well suited towards explosive power and ones that use as much muscle as possible. Closer to a fight, you can use this method with MMA specific exercises and it works very well with pad/bag work. For example, you can throw light combinations during the rest intervals and then throw as hard and as explosively as you can for the 10-12 seconds.

Unlike with the power intervals, you will definitely notice and accumulate significant fatigue as you challenge the outer limits of capacity. Your goal should be to maintain your exercise technique and power output throughout each rep and each set as well as possible, keeping in mind that by the end of each rep and each set you will likely be slowing down. This can be a mentally challenging method when done properly, so if it's easy then you aren't doing it right.

Alactic Capacity Intervals

<p>Why is it important?</p>	<p>How does it work?</p>
<p>Helps improve the ability to maintain explosive power for extended durations, which is often necessary in a fight</p>	<p>Improves maximum capacity of the alactic system by increasing the amount of stored phosphocreatine</p>
<p>Exercises:</p>	<p>Guidelines:</p>
<p>Just about any repetitive explosive exercise can be used such as jump squats, sprinting, bounding drills, MMA drills such as pad/bag work, explosive push-ups, etc. can be used</p>	<ul style="list-style-type: none"> • Work interval of 10-15 seconds • Active rest 8-10 minutes between series • Rest intervals of 20-90 seconds • 1-3 sessions per week

Method 3: Max Effort Strength

Although this is obviously a book about conditioning and energy system development more so than strength development, maximum strength is an important component of power output against higher resistances. In MMA, this means that it can play a role in helping improve your all around alactic explosive power. The interesting thing about max strength is that most coaches out there seem to fall into one of two categories.

The first category thinks strength is everything and tries to train just about every athlete like a Powerlifter and get them as strong as possible. The second category believes the opposite is true and that max strength is overrated and doesn't correlate to performance. So who is right?

The correct answer really depends on the sport, but in MMA max strength plays a role mostly in wrestling/grappling aspects of the game where your opponent presents a high level of resistance. In the pure striking aspects, max strength won't correlate to a large degree with how hard you can punch or kick, but when you've someone's full bodyweight pressing against you in various positions then the game changes and the importance of max strength increases.

The max effort method can help increase your all around nervous system development as well as alactic power and it provides a powerful biological stimulus for adaptation. In other words, lifting heavy causes a ton of hormones to be produced and this is important for general training purposes and the benefits of this should not be overlooked. It is very important, however, to keep the volume of heavy lifting in the correct range because when combined with a high volume of MMA training it can be very physically demanding on your joints and entire body.

To use this method, I recommend performing 2-5 sets of 1-5 reps per exercise using the major compound multi joint movements. 2-3 exercises per workout with 8-10 minutes rest between them can be used and generally you will want to do 1-2 workouts per week using this method.

<i>The Max Effort Method</i>	
Why is it important?	How does it work?
Can increase alactic power output and results in high level of hormonal production that stimulates biological adaptation	Improves maximum neuromuscular recruitment and can play a role in improving contractility
Exercises:	Guidelines:
Major compound exercises such as barbell squats and deadlifts, pull-ups, barbell rows, RDL, etc. should be selected. The more muscle being worked, the better.	<ul style="list-style-type: none"> • 1-5 reps per set • Active rest 8-10 minutes between series • Rest 2-5 minutes between sets • 1-2 sessions per week

Method 4: Strength-Aerobic Method

The strength-aerobic method is a modified version of a program written about by Verkhoshansky and it is essentially a combination of the max effort method and the tempo method. This method could have been included in the aerobic chapter as well since it can increase both alactic power/capacity and aerobic fitness as well, but I decided it was most appropriately used with the goal of alactic development.

The basics of this method are to perform 3-4 heavy sets of 3-5 reps and then follow this up immediately with the same exercise using the tempo method guidelines to perform another 3-4 sets of 8-10 reps. This accomplishes the goal of increasing the strength of both the fast and the slow twitch fibers and does so at aerobic working heart rates.

You'll find this is a very challenging method and you'll only want to include 2-3 exercises per workout when using it. You'll also have to make sure and select the appropriate weight during the tempo method sets, which usually means using a weight less than 50% of your 1RM. In between the max effort sets you should rest 2-5 minutes and follow the rest interval guidelines of 40 seconds when doing the tempo method sets. You should also perform active rest for 8-10 minutes between exercises.

You'll want to make sure to choose the major exercises for method that are used in both the max effort and tempo effort methods. Because you'll only be doing 2-3 exercises, it's important to get the most out of each exercise and that means using compound multi joint movements that work a lot of muscle like squats, deadlifts, bench press, pull-ups/pulldowns, etc. One or two strength-aerobic workouts per week, spaced at least 3 days apart, can be performed effectively. Generally, you'll want to take one week off of this method after every three weeks on but this will be covered more in the section on programming. If you're a fighter who has very little time for extra workouts outside of your MMA training this can be a great method for you.

The Strength-Aerobic Method

Why is it important?

Fast and slow twitch fiber strength plays a key role in being able to sustain repetitive high power output

How does it work?

Improves strength of both fast and slow twitch fibers by increasing nervous system function and size of slow twitch fibers

Exercises:

Any major compound multi joint movement can be used such as squats, bench press, deadlifts and RDL, Pull-ups/pulldowns, bent over rows, etc.

Guidelines:

- Compound movements only
- 8-10 minutes rest between exercises
- 2-3 exercises per workout
- 1-2 sessions per week

Method 5: The Complex Method

This final alactic method is another “combination method” that uses two methods together and when used properly, it is extremely effective at improving explosive power. This should also be considered an advanced method and should only be used if you have a good amount of training experience under your belt. Beginners often make the mistake of using advanced methods before they are ready, but doing so will hurt your overall potential for long term development.

The complex method is essentially a combination of the max effort method and alactic power intervals. There are many different forms and variations of this method that are known by different names, but the guidelines offered here are the ones I consider to be the most effective and I’ve seen great success increasing explosive alactic power using them.

One of the reasons this method is so effective, is that it provides a very strong stimulus for the nervous system and recruits a great deal of fast twitch muscle. The primary key to this method is to perform **2-3 sets of a max effort strength movement using 2-3 reps at 90-95% of your 1RM followed by 3 sets of 6-8 reps (7-10s) of a much lighter movement done as explosively as possible.** If you’re using the same exercise, you’ll want to use just 20-30% of our 1RM or so.

The heavy weight will stimulate the nervous system and allow for greater activation in the following explosive exercise. Many coaches advocate using very short rest periods between the two exercises, but I don’t believe this is the most effective approach when an increase in power is the ultimate goal. I recommend resting **3-4 minutes between sets and 8-10 minutes between exercises.** You’ll want to perform no more than **2-3 of these series per workout** and keep in mind this is an extremely taxing method and should only be used **1-2 times per week for 2-3 weeks at a time** before a rest week. As far as exercises, you can choose from the recommend max effort and alactic power interval exercises accordingly for each part of the method.

The Complex Method

<p>Why is it important?</p> <p>Helps develop the nervous system’s ability to maximally recruit muscle fibers and improves explosive ability</p>	<p>How does it work?</p> <p>Improves maximum amount of muscle recruitment as well as increases amount of alactic enzymes to improve alactic power</p>
<p>Exercises:</p> <p>Select from the appropriate max effort exercises for the first sets and from recommend alactic power interval exercises for the second group of sets.</p>	<p>Guidelines:</p> <ul style="list-style-type: none"> • Maximum acceleration on all reps • 8-10 minutes rest between exercises • 2-3 exercises per workout • 1-2 sessions per week

Alactic System Training Methods Overview

Method	Targets	Guidelines	Rest	Volume	Frequency
Alactic Power Intervals	Increase in enzymes of alactic energy production	7-10s per rep Max power output in each rep	2-5 minutes between sets, HR to 120 or below	5-6 reps per series 1-2 sets/series per workout	1-3 sessions per week
	Power output of fast twitch fibers	Can use MMA drills or cardio exercises	8-15 between series		
Alactic Capacity Intervals	Increase in phosphocreatine storage capacity	10-15s per rep Goal should be to maintain maximum power as long as possible	Incomplete rest intervals 20-90s	10-12 reps per set 2-3 sets/series per workout	1-3 sessions per week
	Power endurance of fast twitch fibers				
Max Effort Method	Maximum neuromuscular strength	1-5 reps per set Maximum weight using proper technique	2-5 minutes between sets 8-10 minutes between exercises	2-3 exercises per workout 2-5 sets per exercise	1-2 sessions per week
Aerobic Strength Method	Strength of fast and slow twitch fibers	Compound movements only Use principles of max effort and tempo methods	2-5 minutes max effort 40s tempo 8-10 minutes between exercises	6-8 sets per exercise 2-3 exercises per workout	1-2 sessions per week
Complex Method	Max strength and alactic power	Maximum acceleration on all reps Always follow appropriate rest intervals	3-4 minutes rest between sets 8-10 minutes between rest exercises	5-6 sets per exercise/series 2-3 exercises per workout	1-2 sessions per week

Alactic System Summary

Just about every fighter I've trained would like to be more powerful and more explosive. Alactic power is an essential component in determining if you're the kind of explosive fighter that can get the knockout or the submission at any point in the fight, or if you're the kind that never seems to be able to finish his opponents.

The alactic system works closely with the aerobic system in MMA to produce the repeated bouts of high power output that take place over and over again throughout a typical fight. When you need to throw a fast paced punching combo, improve your position and pass guard or take the back, grab the arm and go for the armbar, get the takedown, etc., all of these *explosive movements require the alactic system* to provide the rapid source of ATP your fast twitch muscle fibers need. Without the alactic systems contribution to energy production, most fights would end up being slow and boring.

In order to become a more explosive fighter, you must work to develop your alactic system. To become an explosive fighter who is just as explosive in the third round as he is in the first, you must develop both your alactic and aerobic systems to the edge of their energy production limits. As we discussed previously, the aerobic system has a great deal of room for improvement and can be trained in many different pieces. The alactic system, on the other hand, is much more genetically determined but it can still be improved through training.

Fortunately, even a marginal increase in explosive power can sometimes make all the difference. MMA is a very unforgiving sport of inches and milliseconds and having just that little extra bit of explosive power to throw one more punch or one more kick can often be the difference between getting a knockout and going to a decision.

You can likely improve your alactic power somewhere in the neighborhood of 15-30% through proper training, depending on what level you're at now and there is no doubt this can translate into better performance in the ring or cage. *To increase your alactic power, you need to train at 100% intensity with as much explosive effort as you can possibly generate. Always make sure to then rest as long as necessary for complete recovery before repeating.*

Training to improve alactic capacity also requires a very high level of effort and concentration as well. You also need to use shorter rest periods and slightly longer intervals of work. In this way, you are able to stimulate the body to increase its limited storage of the building blocks of alactic energy production, primarily phosphocreatine, and increase how long the system can produce energy for. Even though the alactic system is fairly limited in how long it can provide explosive energy for, many times it only takes a few seconds of furious flurries to get the win.

The five methods I've outlined in this chapter are your blueprint to becoming a more powerful and more explosive fighter. When used properly, they will help take your alactic power development to its limits and give you the extra explosive edge that can be the difference in a fight between getting the knockout victory and just getting knocked out.

SECTION III: PROGRAMMING AND MANGEMENT OF TRAINING

Joel Jamieson

The Ultimate MMA Conditioning Blueprint

Chapter Six

At this point, you might be feeling a bit overwhelmed, or perhaps even a little confused, by all the information you've learned thus far. I'm sure many of the methods I've covered have been different than ones you've used in the past and you're probably sitting there wondering just how exactly they all fit together into an actual training program.

In this final section of the book, I'm going to take all the different training methods you've learned in the last three chapters and show you how to fit them all into a program that is built on the foundational principles you learned back in the first section. Regardless of your training experience or fighting ability, the eighteen different methods outlined in the previous three chapters can dramatically improve your conditioning and help make you a better fighter.

I have used these exact same methods with countless different fighters, ranging from those at the very top of the sport preparing for a world championship fight, all the way down to beginners getting ready for their first fight ever. That's not to say they are the only effective methods that are out there that can be used, but they have proven effective with all my athletes time and time again and will do the same for you if used properly.

Along those lines, it's equally important to understand that any training method is only as good as its application. This means that real results come not just from using effective methods, but from applying the right methods at the right time in the right way. Without everything put together properly, even the right methods can lead to mediocre results.

This final section is about teaching you exactly how to accomplish this difficult task of effectively applying the methods you've learned into your own training. I'm going to take the relatively complex science of energy system development that we've covered throughout the book and show you how it can be used in a simple system that really delivers as promised.

In order to do that, this section will be broken up into three different parts. First, I'll summarize the role of each energy system and how they work together in the sport of MMA. This will give you an overall energy system model for performance that your training must be based on. Next, I'll give you an overview of programming principles that need to be precisely followed for the best results.

Finally, I'll give you the tools you need to put all the pieces of the puzzle together to create your own conditioning program. You'll learn the best assessments to use, as well as how to create both general and specific training blocks. Whether you're getting ready for a fight or not, you'll discover how to design programs guaranteed transform your conditioning from the inside out.

Putting the Pieces Together

In the last three chapters, we've covered a great deal of information about the body's three different energy systems and how they work. We've also briefly touched on the specific role of each in MMA. Now that you understand the basics of energy production, it's time to take the next step and finally talk about how they all work together to determine what kind of fighter you are.

Perhaps you're the type of fighter who can keep a good pace from bell to bell but can never seem to get the knockout or finish the submission. Or maybe you're the opposite and have no problem knocking people out...as long as it's in the first round. Whether you fit one of these descriptions or fall somewhere in between, the key thing to realize is that how each of your body's energy systems is developed is the determining factor in both how much power you can generate and how long you can sustain that power for.

Remember that at the end of the day, your fighting skill is what makes you a fighter and will ultimately determine your successes and failures in the ring or octagon, but it is your body's capacity to produce and utilize energy that gives you the ability to use your skills in the first place. It is because of this simple principle that you should never think of your training program as two separate parts, MMA skill development and strength/conditioning, but rather as an integrated and seamless extension of one another.

Once you come to understand this all important principle, the question then becomes how to precisely develop each energy system to give yourself the opportunity to use your MMA skill to the best of your ability. You already know from the previous three chapters how each of the three energy systems work in isolation, so the only real piece of the puzzle left to understand is how all these systems work together in MMA and their overall role in performance.

Once this last piece is in place, developing an effective conditioning program becomes a simple act of connecting the dots rather than throwing darts at a wall, as many often do. Instead of just mixing all sorts of different methods together without any sort of rhyme or real reason, you will be able to accurately assess where your level of physical preparation is and have the necessary tools to take it to the next level. This is where dramatic results become commonplace and as you'll be able to see real and consistent progress in your long-term development as a mixed martial artist.

Energy Systems & MMA

Without a doubt, the biggest mistakes people make in their MMA conditioning program comes from the all too common misconception that MMA is mostly an anaerobic sport. By now, you have likely come to understand that all three energy systems are important in MMA, but it is the aerobic system that plays the largest role in your conditioning and performance. Because of this, proper development of this system is absolutely vital to your conditioning and success.

Most people underestimate the importance of the aerobic system in MMA for two reasons. First, due to the latest trend to bash any type of endurance training in favor of higher intensity intervals, many people mistakenly associate the aerobic system only with very low levels of power. As such, they consider it useful for little outside of very long endurance sports like marathon running. They see that endurance athletes tend to not be very explosive or heavily muscled and they figure this is what happens when you train the aerobic system.

Second, MMA is obviously an explosive sport and to most people this explosiveness represents the anaerobic systems. When you watch a sport and see fighters throwing combos, going for the takedown and defending it, finishing a fight with an explosive submission, etc., it can be easy to see why people think of MMA as a mostly anaerobic sport.

What people can't see, however, is that under the surface, the aerobic system is working tremendously hard throughout an entire fight and even at the highest level of anaerobic work, the aerobic system is still contributing a great deal of the total energy production. For many years, textbooks and experts have referenced material that makes it look like the aerobic system does not contribute much energy for the first 2-3 minutes of activity. This also implies that *three energy systems turn on and off in sequence. Research over the last few years, however, has shown this view to be completely false and very inaccurate!*

What science has come to now shown us, is that all three energy systems are essentially "turned on" from the very beginning of exercise. They are not activated in sequence as physiology textbooks often tend to depict, but rather they all overlap to some degree and all three contribute to total energy production through all periods of exercise. This is an incredibly important point to understand and should not be overlooked.

At lower intensities of exercise, the aerobic system is able to meet the ATP demands of the muscles and provide the vast majority of the energy production necessary. At these intensities, the anaerobic systems contribute very little. As exercise intensity increases, however, the aerobic system begins to need help and this is where the anaerobic systems begin to kick it up a notch and take up the slack.

The higher the intensity goes, the greater the relative anaerobic systems contribution becomes, but the mistake people make is thinking that at this point the aerobic system stops contributing altogether and only the anaerobic systems are working. Nothing could be further from the truth, however, and aerobic system is actually contributing at its highest levels of power even at the peak of anaerobic activities. This means there really is no such thing as a purely anaerobic exercise or activity, the aerobic system is always involved and contributing energy.

We've now seen from newer research that even in very short high intensity exercises or efforts lasting as short as 1 minute, like a 400m sprint for example, almost 50% of the total energy production can come from the aerobic system. This means if you were to stand and punch a heavy bag or throw different combinations as hard as you possibly could for 1 minute straight, nearly half the energy would come from the aerobic system!

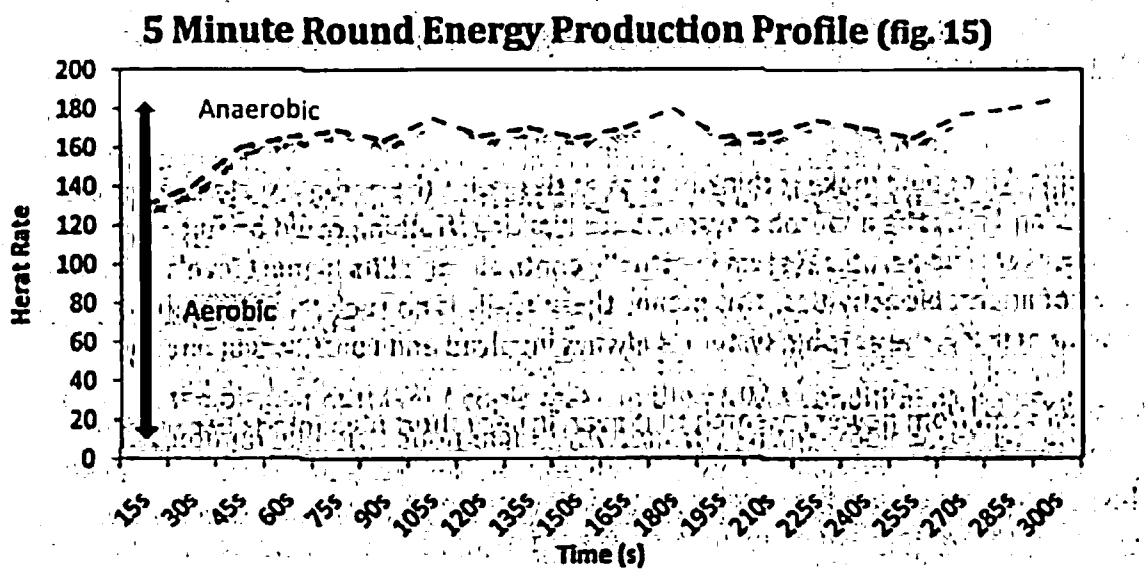
MMA obviously usually lasts much longer than just 1 minute and is not like a full out sprint done at 100% intensity, so it should be clear that over the course of an entire fight, the aerobic system will be responsible for the overall majority of energy production.

This is a very different picture of energy system production than most people have, and yet a great deal of research, along with my own anecdotal experience, has proven this picture to be much more accurate than the traditional view of how energy systems work. There is no doubt that both the lactic and alactic anaerobic systems contribute to total energy production throughout a fight and are important as well, but the aerobic system is the foundation for your MMA conditioning.

If you think back to the role of the aerobic system in using the lactate that's produced by the lactic system and refueling the necessary substrates of the alactic system, the case for the aerobic system's importance becomes even stronger. A highly developed aerobic system actually enables you to use your anaerobic systems to a greater extent without fatigue.

To get a better idea of how this energy system picture looks in the real world of a fight, you can see a typical heart rate profile of a single 5 minute round below in fig. 15. The darker shading down below the heart rate line represents where the majority of total energy production is coming from the aerobic system, while the lighter shading band up top represents a greater contribution from the anaerobic systems.

You can see that a majority of a single round takes place between a heart rate of about 160-180 in this example. For most fighters, this would represent an area very close to their range of anaerobic threshold, a point where their aerobic systems are working at their maximum capacity. The relative contribution of the two anaerobic systems, by contrast, fluctuates and up down in response to periods of explosive fighting action throughout a typical fight.



What can be taken away from this heart rate profile is that the aerobic system is essentially working at maximal, or near maximal, throughout an entire fight. The anaerobic systems are used as necessary to provide ATP whenever the aerobic system can't provide it fast enough, or in great enough quantities, to generate higher levels of power.

During the periods on the graph where you see a sharp increase in heart rate, this would reflect periods of very explosive activity and a higher level of alactic energy contribution. Periods where there is a prolonged higher power output, lasting 10-20 seconds or more in the 170-180 heart rate range and above, would correlate to a higher lactic system contribution.

It should also be noted that during the 1 minute rest interval between rounds that you can't see in the graph, the recovery processes that take place are almost purely aerobic as this system works to get rid of all the byproducts produced by the anaerobic systems and fully refuel the alactic system to generate high power again. The more well developed your aerobic system is, the faster these processes will happen and the better you can perform in the next round.

In a well conditioned fighter, you will see overall lower heart rates in fig. 14. This would reflect a greater ability to produce the necessary ATP aerobically and thus less relative contribution from the anaerobic systems. This is the real key to endurance and the difference between the best conditioned fighters and those who can barely make it out of the first round.

It's also important to realize that in addition to how well conditioned a fighter is, the exact heart rate profile you'll see during an MMA fight, or any combat sport match for that matter, will depend somewhat on the style of fighting and of course the pace and duration of the fight. Certain parts of MMA, mostly grappling type skills, tend to require more constant and longer periods high power output than others and tend to require a greater use of the lactic system.

Striking skills, on the other hand, tends to involve cyclic periods of short explosive flurries and brief periods of lower intensity activity where the majority of energy will come from the alactic and aerobic systems working together. The result of this is that the specific energy production requirements of a fight depend to some extent on the exact style of a fight. This principle needs to be taken into consideration when developing programs and will be discussed in more detail in the following chapters.

As previously discussed, the duration and round structure of a fight also makes a difference in the energy system requirements as well. Obviously, fighting for 3x2 minute rounds is much different than fighting for 5x5 minute rounds. Fights that are shorter duration allow you to keep a higher pace because there is less time for fatigue to accumulate throughout the fight, and thus the anaerobic systems can contribute a higher percentage of total energy.

If you were to try to fight a 3x5 minute fight at the same pace you could maintain for a 3x2 minute fight, you'd be lucky to make it into the second round without gassing. In other words, the longer the fight, the more important development of the aerobic system becomes. The more you rely on your anaerobic systems as the fight wears on, the faster you will gas out.

Understanding Fatigue & Conditioning

Before I give you the ultimate blueprint to putting together your own conditioning program, it's necessary to talk a little bit more about why fighters gas out in the first place. Although we have discussed that there are many different mechanisms likely responsible for causing muscular fatigue, this doesn't give you the complete picture of what exactly happens in a fight. What is it exactly that causes a fighter to fall apart and lose due to sheer exhaustion? Once you understand what happens when you aren't *well conditioned*, then the entire picture of conditioning and all the pieces of the puzzle should start to fit together and make sense.

Local vs. General Fatigue

First, I'd like you to think for a minute what it feels like to lift weights until you hit failure and can't do any more reps. Now compare that feeling to what it's like to totally gas out in the gym while training MMA – hopefully you've never had that same feeling in an actual fight! In either case, your muscles are unable to continue producing the same power and you're experiencing fatigue. There is obviously a big difference, though, between these two examples of muscular fatigue.

In the case of weight lifting induced fatigue, the particular muscle groups working in the exercise become unable to lift the same weight any longer. If you were lifting very heavy weights, 1-5 reps or so, chances are you probably didn't feel any burning sensation or a "pump" but rather you simply couldn't lift the weight anymore. If you were lifting lighter weights for higher reps, you probably felt more of a burning feeling deep in the muscle, growing stronger with each rep, until you were simply unable to do any more reps.

Both of these cases are examples of "local muscular fatigue." If you've ever done this with a heart rate monitor on, you've probably noticed your heart rate doesn't get up anywhere close to as high as it does when you're training MMA. It's rare to see a heart rate in the 160s or above when strength training unless you're doing higher reps on exercises like squats or deadlifts that use a lot of large muscles. This example of fatigue essentially stems from more localized factors, such as those discussed in the chapter on the lactic energy system.

The fatigue you experience from MMA obviously feels quite a bit different than simply maxing out at 10 reps on the bench or pull-ups or whatever, and there is a specific reason for that. The type of fatigue you experience from MMA can best be thought of more as "general fatigue" because it involves the heart and entire cardiovascular system and a much larger amount of muscle.

What many people often forget is that the heart *itself is a muscle*, and just like any other muscle, it too can become fatigued during high intensity or prolonged exercise. When you train in MMA, you are using a huge number of muscles throughout your entire body all at the same time to perform the many different skills of the sport. Because of this, the heart is required to pump vast amounts of blood and oxygen to all areas of the body. As exercise intensity increases

and the demand for energy grows, the heart beats faster and faster. At some point, however, the heart becomes fatigued and is no longer to pump as hard or as fast.

When this happens, blood flow and oxygen supply are reduced to all your working muscles and their ability to produce energy aerobically is significantly impaired. If you keep trying to produce the same amount of power, i.e. you keep working just as hard, then the only option the working muscles have is to produce more of the ATP they need anaerobically.

As we've discussed throughout the book, this anaerobic energy production leads to a rapid buildup of fatigue inducing byproducts and the working muscles can't keep this up long before you become gassed. Unlike the strength training example earlier, this general fatigue means that gassing out in MMA is the result of many different muscles throughout your entire body, including your heart, becoming unable to continue working at the same rate.

The muscles that are the best suited for aerobic metabolism, in other words those with the most mitochondria and aerobic enzymes, will last the longest before they give out and are forced to reduce their power output. The most anaerobic muscles, on the other hand, will of course fatigue the fastest and their power will be reduced first. This means that as you continue training at higher and higher intensities and heart rates, more aerobic fibers will be able to maintain their power output for much longer than the more anaerobic ones.

The take home message is that when you have a large amount of muscle all fatiguing and unable to continue working at the same rate, you feel completely exhausted and gassed out. Even the diaphragm and different breathing muscles – muscles that play a significant role in oxygen transport – can become significantly fatigued and contribute to reduced oxygen supply. This is very different from when only a small group of muscles become fatigued and thus the fatigue is more localized to just those particular muscles.

Central vs. Peripheral Fatigue

It's also vital to discuss that regardless of whether fatigue is localized to or more general, the brain and nervous system play a very important role in fatigue as well. This theory is known as the "central governor model" of fatigue because its main hypothesis is that the brain and CNS are the primary regulators of fatigue, not the actual muscles themselves (peripheral).

In recent years, research in this area has shown that perhaps it's not only a lack of oxygen or a buildup of anaerobic byproducts that is responsible for fatigue, as scientists have long believed. Rather, the brain itself acts similar to the governor on a rental car and carefully monitors and limits the edges of muscular work to prevent any damage to the working muscle fibers.

The details of how exactly the brain accomplishes this difficult task are incredibly complex and still a topic of intense research. The underlying concept, however, is that the brain is constantly receiving feedback that lets it know how much power the muscles are generating, how much ATP they are using and how much they have left, how much oxygen is being supplied, etc.

From all this information, the brain then regulates the level of electrical impulses to the working muscles that stimulate them to contract and relax. This gives it the ability able to turn muscular power up or down. This regulation strategy is based on optimal completion of the task at hand given your current potential for energy production and current rate energy utilization.

In this way, the brain is able to protect itself from the damage that would result if your muscles were to run completely out of ATP, or if there were not enough oxygen to keep the heart pumping blood, etc. This complex system of constant feedback and protective regulation looks to be an essential part of how the body keeps all of its systems running smoothly no matter what we throw at it. This is the part of the body's drive to maintain equilibrium and stay alive.

Exactly how much of the reduced ability to maintain power output (fatigue) is the result of the brain turning down the muscle activation as part of this protection/optimal pacing strategy (central factors) and how much is the function of acute metabolic changes within the muscles (peripheral factors) remains a topic of great debate and the focus of a good amount of current research.

In reality, I believe the most likely answer to this question is that both factors are responsible for fatigue and work together in a tightly coordinated fashion. This helps ensure that we produce as much power as we are capable of, but stay within the limits of what our muscles can handle. How this might work is extremely complex and yet elegantly simple at the same time.

Once our muscles start to accumulate byproducts of anaerobic metabolism, run low on energy substrates and enzymes, etc., their ability to contract and relax starts to become impaired on some level. The brain, in turn, is constantly receiving feedback on the working state of the muscles and as their ability to function becomes compromised, it reduces the electrical impulses so they don't become over exhausted to the point of complete fatigue and permanent damage.

Perhaps the most interesting idea is that based on past training experiences, the brain actually uses this regulation as a method of optimally pacing your power output and work rate. As you train more and more in specific exercises or specific sports, your brain essentially learns how to more effectively govern your muscular activity to provide precisely the right amount of power output based on your rate of energy production/utilization and your total energy potential.

This process is much like a race car driver learning the most effective way to drive a particular race track. The more they learn all the details of the track, where to hit the gas, when to apply the brakes, where to start the turns, etc., the more efficient their driving becomes and their lap times decrease.

This central regulation model also helps explain the mental component of conditioning and why certain fighters seem to be able to push past fatigue and maintain their power output better than others. To the extent that the brain and CNS can regulate power output and muscular activity, mental toughness and conscious efforts perhaps has some influence on this process.

The central governor model of fatigue also offers insight into why more experienced athletes are much better at using their energy potential more effectively and more economically than less experienced athletes. This model is also why all conditioning programs are not created equal and must be looked at from two different perspectives, both general and specific.

General vs. Specific Conditioning

First, we must consider the muscles themselves, including the heart and cardiopulmonary muscles as well, and their ability to produce energy through aerobic and anaerobic metabolism. As we've thoroughly discussed, how each of the energy systems is developed ultimately determines how fast ATP can be produced (rate), how long it can be produced for (capacity), how much total ATP is capable of being produced, etc.

Developing the three different energy systems to increase any or all of these factors can be thought of as **general conditioning** and is where you will build your potential for energy production. This potential is what you should be training to improve in between your fights.

By contrast, **specific conditioning** is the development of the body's ability to utilize its energy production in the most effective way possible within the context of a specific exercise or sport such as MMA. This results from the brain optimizing energy expenditure and work rate to meet the specific demands necessary. It must do this while simultaneously protecting your body from the damage that would likely result if you were to exceed your limits of energy production.

This may sound complicated, but basically it means that just like the race car driver who gets more familiar with the track and is then able to drive his car closer to the edge of its performance limits, your brain gets better at regulating energy production and lets you rev your muscular engine higher, so to speak. This is why fight specific conditioning is so important and is why you must spend time before a fight training to optimize energy utilization rather than maximizing potential for energy production.

The Ultimate MMA Conditioning Blueprint

In the next two chapters, you will learn the details of how to apply my system of Ultimate MMA Conditioning based on this two phased conditioning model. Each phase has its own principles and targeted goals that form the foundation for developing your individualized program. If you truly want to become a better fighter and dramatically improve your performance, you must look at conditioning as much more than just something you do a few weeks before a fight.

Between fights, you will train to develop your energy systems to increase how much energy they are capable of producing, just as you will train to improve your MMA skills. While your striking becomes sharper and your ground game becomes more dangerous, you will become capable of producing much more total energy. This increase in energy production is what provides the foundation for your long-term development as a fighter because it gives you the ability to perform your skills faster and more explosively.

Remember, this speed of movement is a requirement for improved performance and one of the main differences between the amateurs at the bottom and the pros at the top of the sport. The best fighters in the world have amazing technical skill that they are able to use to get the counter punch knockout or transition to a fight finishing submission in the blink of an eye.

As you begin to train for a particular fight, you will shift gears and begin working to focus your efforts into specific conditioning to make sure you can effectively use the energy you are capable of producing in the actual fight. Far too often, fighters fail to realize the importance of this process and make the mistake of wasting an excessive amount of time and energy on general conditioning methods right up to the fight. Such a strategy will almost guarantee you don't live up to your potential come fight time.

In other words, all the strength training, sprints, hill running, plyometrics, circuits, intervals, etc. in the world won't do you much good if you aren't able to specifically focus and channel your development into the skills of fighting, and into the specific needs of your fight. Your brain and central nervous system are the ultimate regulators of power output, muscle function, and fatigue. This specific conditioning phase is absolutely essential to maximizing how well all the systems in your body are centrally regulated to generate the knockout power you need at any point in the fight.

This transition from general to specific conditioning should ideally begin around 8 weeks out from a planned fight, if at all possible. That being said, I know there will probably be times in your career when you might have to take a fight on short notice and not have a full 8 weeks to ready. Before you accept a fight two weeks out, just know that the closer to a full 8 week training camp you can have, the better your performance will most likely be.

After preparing countless fighters for different fights of all levels, I've come to the conclusion that this 8 week training camp window is the proper period of time for most fighters to train and focus on a single fight. When you extend a training camp into the 10-12 week range, you increase the chances of overtraining and getting burnt out from training so intensely.

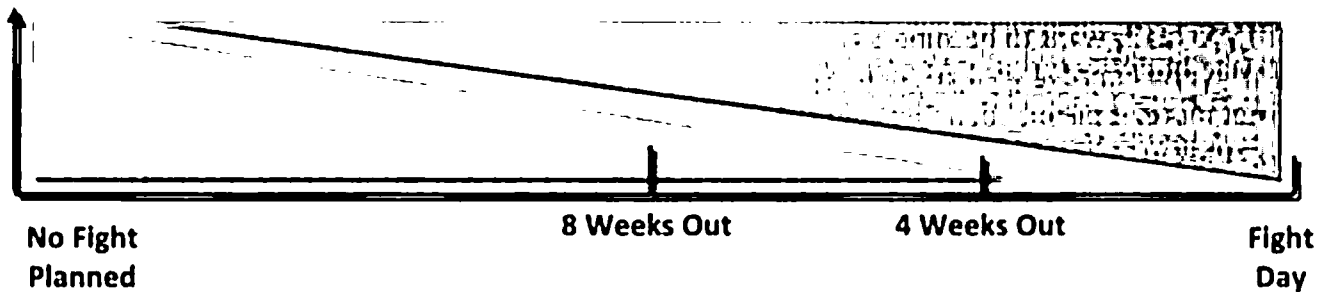
Any shorter than 8 weeks, and there isn't enough time to get in optimal condition and peak for the fight. In fig. 16, you can see a representation of the underlying training principles for phases of general and specific conditioning and where each should fall in your training program.

Remember, each of these two phases has a distinct purpose. Failing to follow the principles of each phase will likely lead to poor results and a lack of consistent improvement in your conditioning and performance.

It's important to note that the transition between general and specific conditioning phases should not be abrupt or sudden, but is instead marked by a gradual decrease in volume of one with a subsequent rise in the other. In this way, you can be sure that the improvements you made in your general conditioning program will not be lost, but rather focused into your specific fight energy system needs.

General vs. Specific Conditioning Training Principles (fig. 16)

General Conditioning Phase	Specific Conditioning Phase
<ul style="list-style-type: none"> • Increase in energy production potential • Concentrated training blocks • General training exercises • Individualized training assessments • Increase in technical MMA skills 	<ul style="list-style-type: none"> • Primary goal: Fight specific conditioning • Maximize power while minimizing fatigue • MMA Specific training exercises • Fight specific work rate and duration • Focus on MMA tactical strategy for fight



In the next two chapters on programming, you will learn how to put together your own training programs for both phases of conditioning. In the development of general conditioning programs, you'll need to start by understanding where your strengths and limitations are so that you can select the most effective and appropriate methods possible.

This will ensure that you aren't simply throwing together a bunch of random exercises or circuits with no particular rhyme or reason. Instead, you'll discover how to target your training around your individual and specific needs.

Once you've improved your weaknesses, maximized your strengths and increased your overall potential for energy production, you'll need a detailed blueprint for how to take that potential and turn it into fight specific conditioning. This conditioning is what will help you get the win in the cage or ring.

Within this blueprint, I'm going to teach you precisely how to create a fight specific conditioning program based on the same principles that I use day in and day out to help the best in the world get in better condition than ever for their fights. It works for them and it will work for you.

General Conditioning Programs

Chapter Seven

Amateur fighters often believe the fastest way to get to the big time is to simply fight as often as possible. It's not uncommon for up and comers to fight 6-10 or more times in a single year. The problem with this approach is that you don't really develop as a fighter when all you are doing is preparing to fight.

Instead of learning/refining new skills and developing their energy systems to improve their strength and conditioning abilities, they are spending the vast majority of their training time sparring and conditioning. Unfortunately, this is an all too common mistake.

If you really want to become a great fighter, you absolutely must take the time to develop your skills and improve your strength, speed, power, endurance, etc. This means taking fewer fights, not more. It means spending your time going through drills over and over again rather than just getting in the ring or cage and throwing down. Perhaps most importantly, it means looking ahead and seeing the big picture rather than just what's directly in front of you.

Whatever level you may be at, if you want to improve as a fighter, the time to do it is between fights. In this chapter, I'm going to give you a blueprint and training strategy to help you become stronger, faster, more explosive, and much better conditioned. These are the qualities that you will need if you want to be a well rounded fighter and move up the ranks. When the time does come to fight, these are also the qualities that will separate you from your opponent and give you the ability to use your hard earned skills as effectively as possible.

This chapter is going to lay out two options for you. First, if you're just a casual MMA fighter who only trains and fights recreationally, I'm going to give you an outline of how to focus your training into targeted training blocks that will help maximize your strengths while minimizing your weaknesses.

If you have no plans to ever fight professionally, or if you don't compete in the sport at all, using these targeted blocks within the system I'll outline is enough to get the job done to dramatically improve your strength, speed, power, conditioning etc. and help you reach whatever your training goals may be.

If you take your MMA training seriously and you're determined to get to the top of the sport no matter what it takes, however, you need something more. You need a completely individualized training system that is able to precisely combine the exact training methods you need to improve, with the correct *volumes and intensities* that your body is physiologically prepared to adapt to. At the end of this chapter, I'll outline this type of program for you as well.

General Programming Guidelines

When developing and managing a training program, there are several key principles that you need to follow in order to make sure it will meet your needs and help you reach your goals. I've already covered many of these principles and outlined the most effective training methods for each energy system. Now, in order to put everything you've learned together into a simple system that you can use on a daily basis to get better, there are five key guidelines your training program must always follow.

Principle #1: Train to Maximize Your Strengths and Minimize Your Weaknesses

This first principle is perhaps the most important and arguably the most often ignored as well. It might be human nature to want to spend the most time doing what we naturally tend to excel at, but this strategy will leave you with holes in your game and in your physical development.

The correct approach to training starts with the understanding that everybody is different and has unique natural abilities that they can capitalize on, as well as individual limiting factors that can hold them back. There is no denying that your genetics play a large role in your potential and your performance, but the real key to success is to be able to use them to your advantage.

If you're a naturally strong and powerful athlete, then your goal should be to use this ability in your fighting and to train to get even stronger and more powerful. If you have always had better endurance than everyone else and you never seem to get tired, then you should train this quality until you can outlast anyone and go harder from bell to bell than any opponent can.

You also must keep in mind, however, that many fights are won on an athlete's individual strengths, but on the flip side, many are also lost due to their weaknesses as well. Your goal in your training program should be make sure your strengths are as big an advantage as possible, while protecting against your weaknesses becoming a liability that could cost you a fight.

If you have the genetics to be strong and powerful, but you've always had endurance problems, your training should focus around improving your endurance to the point that it gives you the opportunity to use your strength and power. Likewise, if your endurance is endless but you're weak and get pushed around, you will need to improve your strength while staying conditioned.

The bottom line is that you need to learn to work with what your genetics have given you and use them to your advantage. Don't think you can go from being stronger and more powerful than everyone else to also being a conditioning machine that can outlast anyone, because chances are that you can't. What you can do, however, is develop the conditioning necessary to use your strength and power to your advantage to get the win.

Develop a fighting style and train with the goal of making the most of what comes easiest while improving what is the most challenging and you'll be on the right track to performing your best.

Principle #2: Train the Right Qualities Together

Training the right qualities together is a principle that is often overlooked when it comes to programming, but it is an area that you need to pay close attention to. Because each of your three energy systems has unique working parts that govern its energy production qualities, each system requires very specific adaptations to improve.

In order to make your training as effective as possible, you need to take these adaptations into account when structuring your training program. You must organize it in a way that does not lead to conflicting demands on these systems or inadequate stimulus for them to improve.

The most general and obvious systems to avoid trying develop simultaneously are the aerobic and lactic systems. Each of these systems rely on different enzymes and lead to somewhat opposing development in the muscles themselves.

Training the aerobic system, of course, leads to an increase in oxygen supply by the cardiovascular system as well as more mitochondria, greater capillary density, and elevated aerobic enzymes within the muscle tissue. This essentially means that you end up with more oxidative muscle tissue.

Training the lactic system, on the other hand, trains your body to get better at energy production in the absence of oxygen. Because of this, you will end up with decreased mitochondria and capillary density, along with a subsequent rise in glycolytic enzymes and thus an overall increase in glycolytic muscle tissue.

Although you certainly need development of both systems and they both contribute to energy production, mixed martial arts requires a high degree of aerobic development for success and neither system is most effectively improved when you are trying to develop them both at the same time. There will be times when you will want to focus your training on the aerobic system, as well as periods where you'll want to increase the lactic system, but trying to develop them both at the same time, therefore, is not the correct approach.

This principle means that in all areas of your training, from your strength training to your conditioning to your MMA training itself, you must take into account what adaptations exactly you're trying to stimulate. Only then can you create a program that is structured properly to place enough specific demand on whatever areas you are trying to improve.

The shotgun approach of trying to just throw everything together all at once most often leads to conflicting demands and thus poor results for anyone other than a beginning athlete. Even beginners would be better off with a more structured approach.

The 8 week block training system will help you structure your training efforts to ensure that the correct qualities are being trained together and developed properly. This will guarantee your hard work pays off and you see continued improvement and results from your training.

Principle #3: Test, Assess, & Track Your Progress

The only numbers that really count in MMA may be your wins and losses, but using objective measurements to test and assess which areas you should focus your training on as well as track your progress is an absolute must. This is especially important because, unlike in most other sports where it is relatively easy to gauge your skill development by an objective and measureable end result, this is not the case in MMA.

A track athlete can see his times improving, a basketball player can see his free throw or field goal percentage go up, a golfer can see his scores going down, etc. In MMA, however, your only true test of progress comes in the ring when you fight, so that makes it even more vital to use various objective measurements to keep track of your physical development outside the ring.

In each of the basic training blocks discussed in this chapter, I will give you a few basic tests that you can use to measure and keep track of your progress. Do yourself a favor and use them. Without these tests and measurements as your guide, you will have no real objective way of knowing where you're at, where you have been, or where you need to go. Using these simple physical tests to assess and track your progress will help you save valuable time and effort by making sure your programs are producing the results they should be.

Principle #4: Integrate, Don't Separate

This is a principle I will again echo in the next chapter on specific conditioning, but it's so important it's worth discussing in both chapters. At the crux of this principle is the fact that MMA is a highly skill intensive sport, there is no off-season from MMA training.

This means that you will never have a period where all you focus on is strength and conditioning, as most other sports have, so all your training must be tightly integrated and managed as a single program. You should not consider your training as separate elements with MMA skill development on one hand and strength and conditioning on the other. Instead, you must manage the volume, intensity, and training methods of your entire training program as a whole or you will not get the best results in any area.

At the end of the day, you will only go as far as your skills in the sport will take you, and so your training program should start with your weekly MMA training schedule. From there, build your strength and conditioning training schedule around the specific needs of your skill training.

On days where you will be doing higher intensity/volume of MMA training, you should cut back on your strength and conditioning work and vice versa. You must always take into account how all of your training ties together and how each aspect affects one another. In this regard, you'll also want to take principle #2 into account and always make sure that all of your training efforts are coordinated to lead to the best results.

If you're trying to develop your aerobic abilities, for example, you need to consider this in your MMA training and try to reduce the volume of high intensity lactic work, for example. You could use this training period to really focus in on learning and practicing new techniques and skills work, which tends to be at lower intensities and more aerobic. You will always see the best results from looking at your MMA training and your strength and conditioning programs as extensions of one another rather than completely separate and independent programs.

Principle #5: Use the 8 Week Block Training System

One of the bigger mistakes you can make if you want long-term results and improvement is to try to develop everything all at once. While you can see results from this approach if you're a complete beginner or fairly untrained athlete, you will quickly reach a point of diminishing returns and results will grind to a halt. In order to continue to improve, the body needs more specific stress than the "train to improve everything" approach allows for.

If you're trying to develop strength, speed, power, endurance, etc. all at once, then most likely none of these qualities are individually getting enough training volume to improve. The best way to stimulate a specific quality to improve is to focus your training efforts on it. The Russians and Europeans refer to this as "unidirectional loading" or in more recent years it's simply been called "block training."

Once you're past a beginner stage, this is the type of system you absolutely must use if you want to see continued improvement. Over the years, I've found 8 weeks to be the correct amount of loading time for these training blocks for most purposes and for most people.

In the following sections, I'll give you the training principles necessary for the five different types of training blocks that I use with my fighters and recommend you use as well.

1. General Endurance
2. General Strength
3. Explosive Speed & Power
4. Power-Endurance
5. Fight Preparation

Each of these five training blocks are focused around specific physiological targets or training adaptations. Rather than trying to train everything at once, these blocks are trying to improve just one or two specific areas of physical development while maintaining others.

By using this targeted system, you can achieve the goal of training to maximize your strengths while minimizing your weaknesses. In each 8 week block, you will see consistent and measured physical development within that specific target that will be maintained in the subsequent block. Throughout the course of your training, the 8 week block method is a powerful approach to achieving consistent progress and results.

The 8 Week Block System

Let me first start by saying that the Block Training System is nothing new or revolutionary. In fact, it's been in use in one form or another since the mid to late 70s as a way of organization training and was originally developed by the Soviets through research they did on developing training programs for explosive power type sports in track and field.

What their initial research showed, was that by concentrating high volumes of strength work in the early preparatory season, they could focus the latter stages of training on explosive power and technical work and see a continuing increase in performance. The importance of this finding, more or less, was that there are ways of organizing training programs over an athlete's yearly training cycle that lead to better results than others.

Over the years, this concept of planning and managing different types of training through a yearly cycle has been known as periodization. Few topics have been the subject of more debate than periodization and countless different models have been put forth as the ideal way to organize training for each sport.

Sadly, few of these models take into account many of the original training principles pioneered by the Russians and discussed in this book and most leave a lot to be desired. This is especially the case in MMA, where there often tends to be little organization of training or planning in the first place.

The 8 Week Block System is the best way to solve this problem and an easy solution to organize and focus your training around achieving specific goals and adaptations. Rather than trying to improve each energy system or all sorts of different motor abilities all at once, it concentrates the loading in your training into 8 week periods or blocks. This is the answer to achieving real and lasting results.

In each 8 week block, training means, methods and exercises are selected and organized based on all the principles I've outlined in previous chapters. Volume and intensity are managed according to your individual work capacity, principles of general adaptation and within the context of your overall training program as a whole.

Along these lines, there are several important guidelines of the 8 week block system that you must pay special attention to regardless of which type of training block you are using.

3 training sessions per week

For the vast majority of fighters reading this book, performing 3 training sessions per week around the goals of each block is the right amount. Two of these will be focused loading sessions on the primary training emphasis of the block, and one will be targeted more towards maintaining secondary qualities.

In an ideal world, you'd be able to perform these 3 training sessions separately from your MMA skills workout for the most part. The reality, however, is that many people may only be able to get in 1 or 2 extra training sessions outside of MMA training.

Unless you're a professional fighter, chances are you have a full-time job, family commitments, etc. Most people will have a difficult time getting in 4-5 MMA skill sessions as well as another 3 strength/conditioning workouts. Not to mention a lot of people simply don't have the physical preparation and work capacity to respond and adapt well to this much training.

This means that you'll need to perform some of your 3 training sessions during your MMA workouts, either at the beginning, at the end, or as part of the workout itself. Regardless of which you may do, it's important that you do get in 3 sessions per week. Doing only 1 or 2 training sessions focused on different aspects of strength/conditioning is generally only enough to maintain abilities, not to dramatically improve upon them.

Consistently doing more than 3 sessions along with a high volume MMA training, however, is often only possible for very well trained athletes with great work capacity, rest, and nutrition. Unless this is you, I recommend 3 sessions per week as the optimal amount for you and for the vast majority of those training in MMA.

Organization of Training

Far too often, people start and end the development of their training program simply by choosing which exercise they are going to do. They look at programming as nothing more than deciding which particular exercises should be done on which day. This is a poor approach because exercise selection is only one of the criteria for programming. Relatively speaking, it is actually further down the list of importance of factors to consider.

More important than what exercises you select, is how you choose to use them to create specific demands on your different systems. The same exercise can be used to create totally different adaptations and lead to different results based on how it is applied. When creating programs, the following factors should be considered in terms of importance and sequence of selection:

1. Training Type (skill work, resistance training, running exercises, jumping exercise, etc.)
2. Training Method
3. Intensity
4. Volume
5. Exercise Selection

First, you need to determine the category of exercise, training methods most appropriate to your goals, and the correct volume and intensity based on your work capacity and physical preparation. Only then should you determine which exercises to use based on those decisions.

Understanding Volume & Intensity

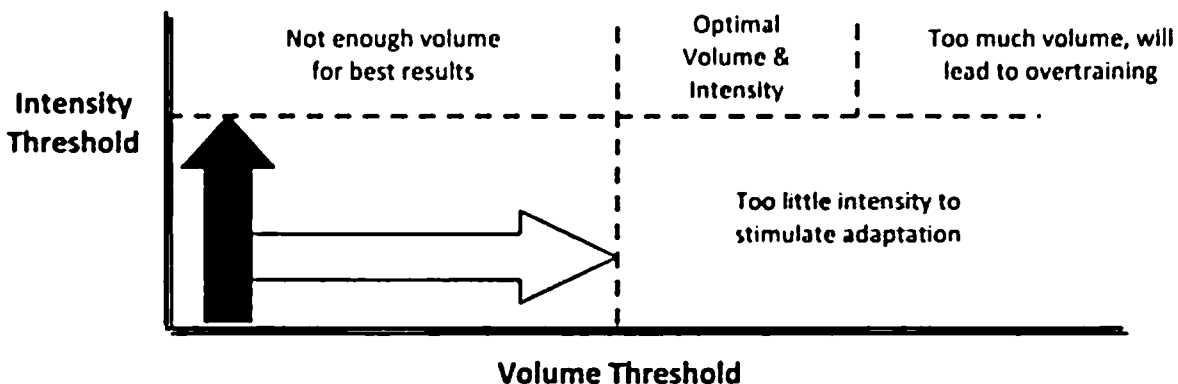
Intensity and volume of exercise are at the very foundation of all programming and both represent thresholds that must be crossed in order for the body to be stimulated into adaptation. If you don't go above a particular level of intensity or achieve a certain volume of training, nothing happens.

You could walk all day at a heart rate of 70-100 and yet because the intensity is not high enough, your cardiovascular system would see very little to no improvement. On the other hand, you could do just one single set of your 1RM squat and even though the intensity was very high, it wouldn't be enough volume to really increase your strength.

Within a single training session, the intensity threshold is best thought of as the primary trigger for adaptation, while the volume threshold is more accurately described as an amplifier. Crossing the intensity threshold means you've created a demand on your body and called its mechanisms of adaptation into action. As a result, a series of different hormones are released into the bloodstream that set off a chain reaction of chemical processes. These chemical processes then stimulate biological adaptation through the synthesis of different proteins.

The volume of exercise directly influences the level of these different hormones and thus acts to more or less amplify the biological processes involved in adaptation. Generally speaking, a higher volume will increase this signal, but only up to a certain point. At some point, higher volume can actually lead to a decrease in hormonal output (or a rise in other hormones that cause other effects) and thus the opposite of what you're trying to achieve.

Intensity & Volume Thresholds of Training (fig. 17)



When you are a beginner, you have a fairly low threshold for both volume and intensity. It takes very little of either one to stimulate the body to adapt and you see results from just about anything. This is where training everything together can actually be effective.

Over time, however, as you become more experienced in your training this all changes. Through natural processes of adaptation, your thresholds begin to increase and it takes higher and higher intensities and greater volumes to continue to stimulate the body to adapt further.

This is generally where most programs fail, as they don't properly manage intensity and/or volume to take this into account and sooner or later you stop seeing results. The way to solve this problem is to use what is called the "conjugate" sequencing organization of programming. Although it may sound technical and complicated, all it really means is that within each training block you will need to manipulate intensity/volume properly to see continued improvements and results from your training efforts.

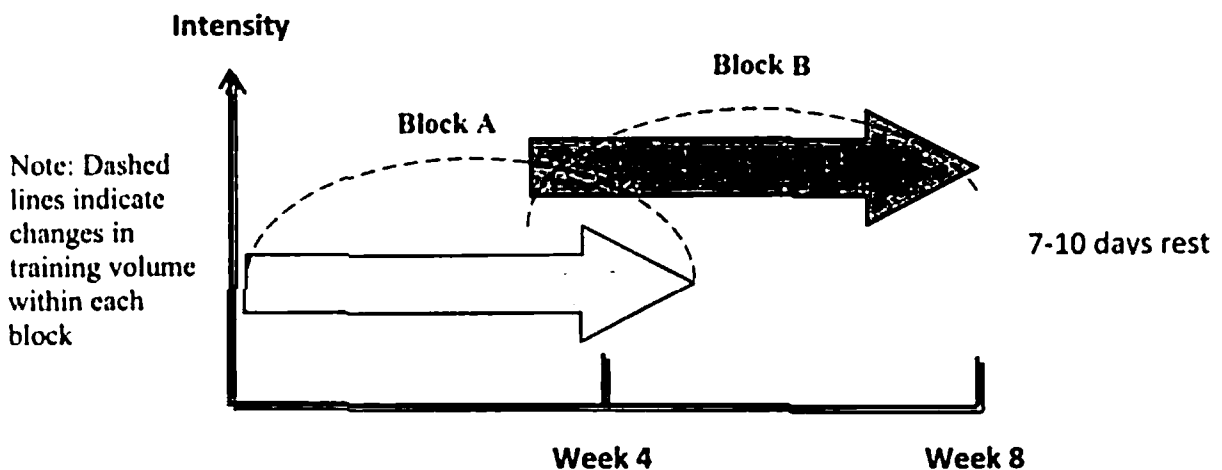
One of the most important principles of training, and in using the conjugate system, is that you always want to use the *lowest* intensity and *least* amount of volume that will stimulate adaptation. I often see beginners trying to use advanced methods that are totally unnecessary. Save higher intensity methods and higher volumes for later in your training when they become necessary for you to see improvements. Don't waste these powerful methods when you can still see great result from relatively low intensity and volumes.

In the Block System you will use two overlapping five week blocks within each 8 week training block. You can get a visual representation of how this works down below in fig. 18. As you can see, you'll increase the intensity from one block to the next by selecting different categories of training as well as different training methods. This is done in such a way that as you progress through the 8 week block, lower intensity methods will gradually be replaced by those of higher intensity.

Your fourth and fifth training week in each 8 week block will also generally be one of lowered volume as you transition into the higher intensity means and methods. This is important to avoid overtraining and to prepare the body for the next level of intensity to come.

After each 8 week block, you will need to take a rest period of 7-10 days of lower intensity and lower volume to let your body rest/recover from the previous training block. After this period, you can then begin the next training block as long as you have fully recovered and are physically prepared for the training demands of whatever your next training block may be.

8 Week Block Organization of Volume & Intensity (fig. 18)



General Endurance Block

By this point, I'm sure you understand well the importance of general endurance when it comes to MMA conditioning. You likely also know that general endurance is the result of having a massively well developed aerobic system. A system capable of generating a relatively high level of power and supplying the majority of energy you'll need to produce in a fight. Thus, general endurance should be considered your foundation of training and is the "aerobic base" you often hear athletes talk about.

Back in chapter three on the aerobic energy system, I discussed all the components of how exactly the system works, what physiological adaptations are necessary for it to be able to generate more energy, and which training methods are the most effective for doing so. There is no need to repeat all this information again here, but make sure you are familiar with all the aerobic system training methods and how to perform them properly before proceeding with the general endurance block.

The general endurance block is where you will take all these methods and apply them in an intelligent and organized fashion to stimulate the body to increase its potential for aerobic energy production. The end result, of course, is your cardiovascular and cardiopulmonary systems will become better at supplying oxygen and your muscles will improve how well they can utilize this oxygen to regenerate ATP.

A high level of general endurance means a greater amount of energy can be produced aerobically and thus you will have to rely less on your anaerobic systems. The more energy you can produce aerobically, the greater your ultimate potential will be for the specific conditioning you'll need to develop later as you get ready to fight.

This principle is the underlying foundation of developing general endurance and something most fighters should spend a great deal of time and energy working on. This is especially true of less experienced fighters who are relatively new to the sport. Taking the time early on to develop a very high level of general endurance will pay off greatly in the long run and lead to the kind of relentless conditioning that your opponents will fear.

Even if you are a seasoned pro but are still lacking in conditioning and fatigue faster than you should, the general endurance block is the place to start. After the 8 week training block, you should notice a profound difference in your endurance and ability to maintain your pace longer before becoming fatigued. This, of course, is what conditioning is all about.

General Endurance Training Principles

When focusing on aerobic development, it's important to keep in mind several training principles in order to maximize results. Remember, in this 8 week block your primary training goal is to develop the different components of aerobic energy production and this is best achieved when you pay attention to the following guidelines.

1. You should include only a minimal amount of lactic work during the general endurance block. That's not to say you absolutely can't do any whatsoever, but the overall volume of training should be done in the aerobic zones of training. This means the vast majority of your training should take place under your anaerobic threshold.

Even in the second block within the 8 weeks as you increase intensity, you will still spend very little time exceeding this threshold. This principle is absolutely vital to your aerobic performance as doing a higher volume of lactic work will reduce the improvements that you'll see in aerobic energy production.

2. In the general endurance block, you can also work to improve/maintain general strength or explosive speed & power. These qualities will not conflict with the demands of the training methods for aerobic development, and can be trained together.

Aerobic training is not the strength/power killing monster that it's been made out to be by many other coaches and a few pieces of over extrapolated research. Of course you won't see the same improvements in strength or power as you'd see as if you were doing no aerobic training at all, but this is true of training multiple qualities together in general. If you were to perform a tremendously high volume of aerobic training and no strength work at all, of course your strength and power would likely go down, but this will not be the case in the general endurance block as outlined.

If you're a relative beginner and have poor general strength, I suggest including more strength work in the general endurance block and making this a secondary target. If your max strength levels are not a problem, then you can include more work on explosive speed/power in this block instead. Depending on whichever the case may be, choose the methods for each of the 5 week blocks appropriately as outlined.

3. If one of your goals is to increase lean muscle mass, you'll want to avoid performing a high volume of aerobic work immediately following your strength training sessions. Research has shown that after heavy strength work there is a large increase in hormones that simulates subsequent protein synthesis that is integral to muscle growth. *When a high volume of aerobic work, or even worse, a high volume of lactic work, is performed too soon after strength work, the result is that the hormonal output can be decreased and thus protein synthesis is lowered.*

If you are trying to increase strength while staying at a particular weight, you can use this to your advantage and avoid a gain in lean muscle mass, but if this is not the case you'll want to try to avoid a high volume of aerobic or lactic training for 24-48 hours after your strength training session. Before you go telling your training partners you have to take the elevator instead of the stairs because you're trying to build muscle, remember that a high volume generally means 45-90 minutes of training or more. There is no harm in doing 15-20 minutes of moderate paced aerobic work after a strength session as part of a cool down. This can actually help speed up recovery.

Testing & Assessment

There are several different tests and assessments that can be used to gauge your starting point and your improvements in aerobic fitness and general endurance. These tests range from the very simple to very expensive and complex, but I'll outline the most common and easiest tests and assessments of general endurance.

1. Resting heart rate
2. Modified cooper test
3. Heart rate recovery
4. VO2 Max & Lactate Threshold

Resting Heart Rate

Although resting heart rate does not necessarily correlate 100% with aerobic fitness and general endurance, it can provide a very good "rough estimate" and very simple method for gauging improvements in both. Generally speaking, a lower resting heart rate is associated with greater stroke volume and a higher level of aerobic fitness. The best endurance athletes tend to have very low resting heart rates in the 40s and even as low as the 30s in extreme cases.

Over the years, I've assessed well over a hundred fighters of different levels and have seen, with little variance, that those with the best general endurance tend to have resting heart rates in the low to mid 50s. Although there have been exceptions to this rule, it's rare to see a fighter with a resting heart rate in the 60s or 70s who has very good general endurance and conditioning.

I recommend checking your resting heart rate only with a heart rate monitor and making sure to always do so while in the same body position. Your resting heart rate will change whether you are standing, seated, or lying down, so always take this into account. I typically check a fighter's resting heart rate in the seated position and gauge their results from there.

Throughout the 8 week general endurance block, you should expect to see a drop in resting heart rate of anywhere from 5 to 10 beats per minute if you're starting with a high number to begin with. It's also important to note that you'll likely see small daily fluctuations in your resting heart rate because it's a fairly fluid number that will change depending on various factors, so don't expect it to always be the same or to go down at a constant rate.

Modified Coopers Test

In this test of general endurance, a modified version of the common Cooper Test you will simply run as far as you can in 6 minutes. You will need to record the distance you covered in yards as well as your average heart rate over this distance as well. Obviously, this means you need a heart rate monitor to perform this test correctly and again this is where the Polar RS100 can come in very handy because it allows you to record lap times.

From this test, you can look at your overall distance covered, as well as your average heart rate and average speed over the distance to give you several markers for general endurance. You can use your average heart rate over the 6 minutes as a rough gauge of where to set your heart rate *during your threshold training and calculate your average running speed to get an idea of your power output (running velocity) at anaerobic threshold*. Keep in mind that this may not be as precise a gas exchange test, but it will give you a very good gauge for measuring your improvements in general endurance in a simple and inexpensive way.

Heart Rate Recovery

Just as with resting heart rate, looking at how fast your heart rate recovers can give you a rough gauge of cardiovascular fitness and general endurance. A heart rate that comes down faster after exertion is an indication of greater aerobic fitness and endurance. You'll want to keep track of how quickly your heart rate comes down after a variety of different training exercises, ranging from your aerobic work to your MMA training and sparring, throughout the entire 8 week block.

Generally speaking, the faster your heart rate comes down the better. If you can get down to 130 or below within 1 minute of intense training, then it's an indication of good general endurance. Although there will certainly be times where this is unlikely and exceptions to the rule, I've consistently seen those fighters with the best general endurance be able to hit 130, or very close to it, within just 1 minute after even the most intense sparring rounds. This is again where I'll have fighters use the Polar RS100 to keep track of 1 minute heart rate recovery.

VO2 Max & Lactate Threshold

These two tests require relatively expensive equipment and typically are only done in a laboratory setting, but since they provide very accurate markers of general endurance they bear mentioning here. VO2 max is typically a maximal exertion test done to failure that essentially measures the size of your aerobic engine.

Unfortunately, genetics play a very large role in your VO2 max and ultimately it can only be improved marginally through training. If you're going to get a VO2 max testing done, make sure to choose a quality laboratory that has extensive experience working with athletes and be as well rested as possible before the test. If you're relatively untrained, you can see noticeable improvements in your results from one test to the next. This is more an indication that you weren't in shape and couldn't get up to your true VO2 max in the first place than anything else.

Your lactate threshold was thoroughly discussed in previous chapters and the most accurate way to have it tested is through a gas exchange test done, likely in conjunction with a VO2 max test. *There are also blood lactate tests that can be done as well, but these are not as accurate as the gas exchange tests and are less practical*. The easiest method to determine both lactate threshold and VO2 max is with the Omegawave Sport, but few athletes have access to one unfortunately. At the end of this chapter, I'll discuss how this problem will soon be solved.

General Endurance Block Training Methods

All of the methods you learned back in the chapter on the aerobic system can be used in the general endurance block, as well as most of those in the chapter on the alactic system. The trick is to use the right methods at the right time to stimulate an improvement in fitness. Always remember that one of the most important training principles when it comes to selecting the methods and the volume/intensity of your program is to start with the lowest intensity and the least amount of volume that will stimulate adaptation and increase from there.

Once these methods start to lose their effectiveness, and/or more intensity/volume is required for continued improvement, then you replace them accordingly. In the block system, this is why you use two distinct but overlapping “mini-blocks” within each 8 week training program. As the methods you choose in the first block begin to lose their effectiveness, you replace them with ones of higher intensity that will stimulate further adaptation.

Block A

The first 5 weeks in the general endurance block should focus on the cardiovascular side of aerobic fitness and feature the use of lower intensity methods like cardiac output. This will help build the vascular network as well as work to increase stroke volume of the heart itself. For strength work, you’ll also want to primarily use the tempo method and target the slower twitch fibers in this block as well. Interval work should be done at a low volume in this block.

Start with moderate to low volume in each training session and increase as the block progresses. Remember that developing aerobic fitness and general endurance requires a fairly high frequency of training, meaning you need to be working out 5-6 days per week, so make sure not to overdo the volume in each session to begin with. Three training sessions focused on improving the qualities of general endurance along with your MMA schedule should provide the necessary frequency of training. If you aren’t training in MMA, make sure to do more than just 3 training sessions or you won’t see consistent results.

Block B

As you increase the intensity in Block B, you can use methods such as threshold training, HICT, and HRI, etc. to begin to shift the focus more towards the muscular endurance side of the equation. You will still want to do some lower intensity work aimed at the cardiovascular system as well, but you can reduce the volume of this work as you start to include the higher intensity methods.

If you have a relatively high level of general strength then this is the block where you can also work a higher volume of explosive speed/power work into the equation, as this type of short burst activity with longer rest periods naturally suits aerobic development. In this case, you can use methods such as the explosive repeat method, aerobic plyometrics, HRI, etc. If your strength is poor, however, stick with more general strength exercises and methods in this block.

You can use the following table to help choose the most appropriate methods for each of the two training blocks. Exactly which methods you choose as well as the precise amount of volume and intensity you use should be determined by your own work capacity, overall training schedule, level of experience, nutrition and sleeping habits, mental stress level, etc.

General Endurance Block A	General Endurance Block B
<ul style="list-style-type: none"> • Cardiac Output • Tempo Method • HICT • Low volume of intervals such as HRI • Focus on technical work 	<ul style="list-style-type: none"> • Threshold Method • HICT, HRI, Aerobic Plyometrics • Explosive repeat for speed/power • Cardiac Output • Focus on increasing work rate or duration

Distribute the methods you select over your three weekly workouts with your highest volumes and intensities on the days when you will be spending the least amount of time working on MMA skill development. At least two of your three training sessions should be entirely focused on improving your general endurance, while the third can include a higher volume of work on a secondary training target as discussed previously. Always remember to incorporate the overall principles of the general endurance block into your entire MMA program for the best results.

Summary

General endurance is without doubt the most important capacity to develop as a foundation for MMA conditioning. Taking the time to improve your general endurance will undoubtedly lead to improved conditioning come fight time because it will greatly increase the power and capacity of your aerobic system and thus decrease how much you have to rely on your anaerobic systems.

Don't make the all too common mistake and fall into the trap of thinking you can develop general endurance with nothing but high intensity intervals, or that lower intensity aerobic training is only for marathon runners. While it is true that on the surface it may not seem like going slower will help your performance, the truth is that conditioning is the result of many different pieces of the puzzle. Lower intensity aerobic training provides very distinct and important physiological benefits and must be included in your program for maximum results. Also, remember you can use MMA specific drills and exercises for this part of training as well.

If your resting heart rate is in the 70s and/or you have trouble making it through 1 or 2 rounds without gassing, then your training program should start and end with working on your general endurance. Only after you've developed a solid foundation of general endurance should you begin to focus your training efforts on other areas of physical performance.

General Strength Block

I'll be the first to admit that many years ago, when I first began working with MMA fighters, my initial inclination was to do a ton of strength and power work with them. Having come from a background mainly working with football and strength/power type sports, fighters didn't seem very strong or explosive by comparison, so I was sure all I had to do was make them really strong and powerful and they'd be transformed into a whole new fighter.

It didn't take long, however, before I quickly learned the folly of this line of thinking and I realized that there is a world of difference between being strong and powerful in a weight room and being strong and powerful in the ring or cage. As soon as guys that were 40-50lbs lighter than me, who couldn't lift hardly anything by comparison, were tapping me out every 20 seconds and controlling me despite my greater strength. The lesson became very clear.

It's important to realize that in MMA a great deal of your strength in the sport comes from technique itself. Learning how to use your bodyweight properly, to manipulate leverage as if it were a weapon, to use your opponent's momentum against him (or her), etc., has the ability to exponentially increase how strong you feel to your opponent in MMA. This is why some of the best in the sport can appear relatively weak if you ever watch them lift weights or workout, but then feel very strong and overpowering on the mat.

Obviously, general and specific conditioning also plays a large role in how strong you are in MMA as well. All the strength in the world won't do you any good if you don't have the endurance to maintain it throughout the course of a fight. This is why I decided to write a book about "MMA Conditioning" rather than "MMA Strength" and why I've focused so much on developing your aerobic system first and foremost.

Now, with all the above being said, most of the best fighters I've worked with have had at least a decent level of general strength. They may not have been able to put up Powerlifting type numbers, but they also weren't weak by any means and the most explosive fighters I've worked with have all been relatively strong.

Where strength tends to have the biggest influence on power output is against higher resistances. In MMA, higher resistance comes in the form of your opponent pushing, pulling, and trying to force you into positions you don't want to be in and vice versa. This means that strength plays the biggest factor in the grappling skills and situations. It should come as no surprise then that wrestlers tend to have a very high level of relative strength as a result.

If you're a fighter who is just not very strong and you often get overpowered by opponents within your same weight class, then the general strength block will help you overcome this weakness. The good thing is that general strength is fairly easy to improve if you train it correctly and consistently, but that training must be tempered with the grueling physical demands and realities of MMA training itself. Failure to take this into account can wreak havoc on your body and your joints. The general strength block, therefore, must be used correctly.

General Strength Training Principles

If you are going to seriously improve your general strength, it is very important that you pay very close attention to the following training principles. Developing a good level of strength takes time and dedication, but just about everybody can improve their general strength relatively quickly if they do the right things. As a fighter, however, your body and your joints are already under a tremendous amount of daily stress, so you must make sure to always keep several training principles in mind when doing a general strength block.

1. Lower your overall MMA training volume during the general strength block. I know this might seem counterintuitive to your basic instincts as a fighter, but you will get better results in terms of strength development and put less wear and tear on your joints if you decrease your training volume *a bit while you're focused on strength*.

You still have to train MMA obviously, but if you can cut down on the volume of high intensity work such as sparring. Instead, spend more time on lower to moderate intensity training such as learning new techniques and drilling. This will allow you to put more energy into your strength development. Along these lines, it's usually a good idea to begin a general strength block not long after a fight so that you'll have enough time before your next fight to really concentrate on improving general strength without it interfering with your skill development.

2. Don't confuse size with strength. If you need to move up a weight class then you will need to gain lean muscle mass in order to do this, but don't make the mistake of thinking that getting stronger is just about gaining muscle because it's not. Strength itself, especially strength in relation to bodyweight, is mostly about your nervous system development.

The more muscle your nervous system can use at once in a coordinated fashion, the stronger you will be. Improving the body's ability to activate the greatest amount of muscle fibers comes exactly from doing just that, not from higher rep bodybuilding type work. Muscle that is developed through typical bodybuilding methods is generally not going to help you *become much stronger or more powerful*, and it certainly won't help your conditioning any.

3. Along the same line as principle #2, don't confuse strength with endurance. Far too often, I've seen fighters say they are working on developing strength and yet they are doing nothing but circuits and supersets. You might develop some strength-endurance from these methods, but strength and strength-endurance are far from being one and the same and should be trained differently. You will need to use heavy weights, low reps, and long rest periods to maximally develop your general strength. The athletes who have the greatest relative strength, Olympic Weightlifters and Powerlifters all train in this fashion for a reason, because it works. For the best results, save the strength endurance methods for another block and focus on lifting heavy to get strong.

4. Stick to the basic lifts, not circuit acts. Another key point with regards to strength development is the principle of specificity. In recent years, the “functional training” movement has convinced many people that strength developed in the major key lifts such as squats, bench presses, pull-ups, deadlifts, etc. aren’t “functional” and don’t transfer into the real world.

Going back to what strength is all about in the first place, activating and coordinating the greatest amount of muscle fibers at once as possible, it’s easy to see that exercises that require extreme levels of fine motor coordination because they are unbalanced and unstable do not fill the bill.

Such exercises activate much less muscle because they are inherently unstable and so the largest motor units (bundles of muscle fibers) are turned down as a protective mechanism. In other words, the reason you couldn’t squat very much if you were standing on an ice rink is because you’d be using less muscle, not more, and unstable surface or “functional training” is not going to increase your general strength.

Using major strength training lifts that require the nervous system to activate a huge amount of muscle fibers is the best and most effective way to improve your general strength. This general strength can then be turned into more specific power that you can use in the ring/cage through more specific exercises to improve power in other blocks.

This transfer will also naturally happen to some extent just by training in MMA as well, so don’t get caught up in thinking that every exercise has to be completely specific to the skills or MMA or that the strength you develop with the major lifts isn’t “functional” because this is just not the case. Stick to the basic lifts for the best results.

5. In the general strength block, your secondary target can be either general endurance, or speed/power. If you are lacking in general conditioning, of course, this should be your other focus and something that can be improved upon during the general strength block. If your general endurance development is not an issue, however, you can focus one of your three training days around explosive speed/power instead.

You should always keep in mind, however, that training to improve your general strength is physically demanding, and it is particularly hard on your central nervous system. Because of this, any other work you do on explosive speed/power should be of relatively low volume.

In other words, don’t spend more than one training session focused on this goal because when combined with your MMA training, there are not many athletes, aside from those at the highest levels, who have the necessary work capacity to adapt and respond well to such intense demands. Along the same lines, you also want to keep any lactic work done during this block to a very low volume as well.

Testing & Assessment

Unlike general endurance and the other blocks, general strength is relatively straight forward and doesn't have a whole lot of options as far as testing and assessment goes. The most obvious tests and easiest assessments to use, of course, are simply a measure of how much weight you can lift in the various lifts. If you see your weights going up, you're getting stronger and if you don't, then you're not, plain and simple.

When it comes to strength, most people generally gauge their levels by their one repetition max, typically referred to as 1RM. Although I'm not against using this approach, most MMA athletes will be better served by instead using a three rep max or a five rep max. If you want to plug these numbers into one of the many calculators that can project your one rep max from these numbers feel free. Personally, I think it's just as easy to just look at how much more weight you can do for three or five reps to gauge your improvement in strength.

You will want to keep track of how much you're lifting in all your exercises, paying special attention to your 3RM or 5RM on the major lifts such as squat, bench, deadlifts, pull-ups, etc. as this will give the best all around indication of general strength and your improvements. These lifts use the most muscle and are the most demanding of your central nervous system and seeing them dramatically improve is a good indication you've developed your nervous system as a whole.

Along those lines, I've often been asked how much weight a fighter should be able to lift in such major lifts and the answer is that it really depends on the individual. There are a lot of variables that come into play that make it difficult to give exact numbers that all fighters should fall within. Generally speaking, if a fighter can squat 1.5-2x bodyweight, deadlift 2-2.5x bodyweight, bench press 1.25-1.5x bodyweight, and perform 5-10 pull-ups with 40-50lbs of added weight, then it's pretty safe to say they have a good level of general strength.

Keep in mind that these are just rough guidelines and I have seen fighters that are strong and explosive in MMA and yet they probably can't lift within these ranges. They've tended to be the exception rather than the norm, however. I'd also be willing to bet that the most explosive fighters in the sport would fall within these ranges, or at least be very close to them.

Those who may be far below these numbers and yet are still successful typically either A) don't strength train at all and their numbers are low in the lifts simply because they've never really done them, or B) they just aren't very strong but rely heavily on their technique to win fights. In either case, their performances would most likely improve if they were to spend some time improving general strength.

I recommend performing your three and/or five rep max in the major lifts at the start of your 8 week block, at the beginning of week five, and then again 7-10 days after your last workout in your general strength block. When combined with your daily workout log, this testing strategy should give you a pretty accurate picture of your improvement in general strength.

General Strength Block Training Methods

Developing strength is relatively straightforward and largely a function of your nervous system and genetic predisposition, based on how many fast twitch fibers you have, tendon insertion points, etc. As such, there are fewer training methods that need to be used in this block. You can target the slower twitch fibers with the tempo method or the higher threshold fibers with the max effort method.

If you need to gain muscular size, you can also use lighter weights and higher reps and more of a bodybuilding type method, but any increase in size must still be converted into an increase in relative strength through the methods listed above. As a fighter, you never want to build muscle just for the sake of building muscle. If you are undersized or moving up in weight class then you will need to put on some lean muscle mass, otherwise focus on building strength by improving your nervous system and not just by adding muscle mass.

If you're relatively inexperienced when it comes to lifting weights, as plenty of fighters I've seen have been, then you will not have to use as much intensity or volume during the strength block to see good results. If you've been strength training for many years, however, then you'll need to increase the weight and intensity to break through a plateau and reach a new level of general strength.

You will need to do two days of general strength work during this block using heavy compound movements. Your first day of strength work should be your highest volume day, while your second day should be 3-4 days later and use 60-70% of the volume of day one.

On your third day, you can do some accessory movements to focus on weak areas, as well as a moderate volume of explosive power movements or some aerobic work depending on what your secondary target is. Generally, I prefer to do this workout 1-2 days after the second strength workout.

Block A

In the first training block of developing general strength, you'll begin by keeping things simple and performing 3-4 major lifts per workout and generally use the max effort method and the 5-7 reps per set range. You can use 4-6 sets per exercise for your first strength session and 3-5 for your second. Make sure to always follow the principles for developing strength and allow for complete rest intervals, 2-4 minutes between sets and 5-10 minutes between exercises. Failing to rest this long will lead to less than optimal improvements in strength.

If general endurance is your secondary target, I suggest using the tempo method, or strength-aerobic method, primarily in your first strength session with the highest volume and the max effort method in your second. If you don't need to work on endurance, however, then you'll want to use max effort method for both strength workouts. If you're an experienced lifter, you can include things like bands and chains in one of your strength workouts as well.

Block B

In this block, you'll need to up the ante and increase intensity. The easiest way to do that is to first increase the weight and drop the reps. I like to keep the majority of reps in the 3-5 range during this second block, and also include more intense methods such as accommodating resistance as well as the complex and shock methods. When you use the complex method to combine a max effort strength exercise with a high intensity plyometric exercise like a depth jump, there is perhaps no greater CNS stimulus than this.

Remember, however, that unless you're an experienced lifter there is no need for more advanced methods. **Never use more advanced methods than necessary** or you will not get the most out of them and they won't be as effective later in your training. Simply increasing your weight and dropping the reps will be enough to stimulate further improvements for most fighters with little heavy lifting experience. If you have no idea how to use "bands and chains" as I mentioned above, then chances are that you probably don't need to be using them.

General Strength Block A	General Strength Block B
<ul style="list-style-type: none"> • Tempo Method • Max Effort Method • Strength-Aerobic Method • Majority of sets in 5-7 rep range • Long rest periods between sets 	<ul style="list-style-type: none"> • Max Effort Method • Complex Method, Shock Method • Majority of reps in 3-5 rep range • Can use accommodating resistance • Focus on constant increase of weight

Summary

MMA is not a Weightlifting or Powerlifting event, but having a fair amount of general strength will provide you with the solid foundation of nervous system development that is necessary for explosive speed and power. A lot of fighters have relatively poor levels of general strength and are able to compensate with good conditioning and a high level of skill, but there is no reason you can't have all three. You will also see the benefits of increased hormonal production from the methods used in training general strength and this is very important for general adaptation and increasing your overall biological power as well.

During the general strength block, make sure to select the appropriate volumes, intensities, and methods given your experience level. Don't use more advanced methods or higher intensities/volumes than necessary. Also, remember that heavy lifting combined with MMA can be hard on your joints and your body if you don't pay close attention to managing your overall program volume. Always follow the general strength block principles for best results.

Explosive Speed & Power Block

Anyone who has ever watched MMA has seen just how explosive the sport can be. Fights can end in the blink of an eye and many of them often do. In order to be competitive in today's MMA game, you need to be as explosive and as quick as possible. Aside from general endurance, explosive power and speed is arguably the next most important physical ability to possess as a fighter. It's also something that is difficult to have too much of.

Unfortunately, as I mentioned in chapters 4 and 5, there is ultimately a genetic influence and limit on how explosive and powerful you can be. That's not to say, though, that it can't be dramatically improved through training. If you are genetically gifted in this area, you will have a natural advantage in the sport and should train to maximize it and take full advantage of your opportunity to be faster and more explosive than your opponents.

If you are not naturally strong or powerful, you still must train this area and work hard to make sure this is not a liability. Whichever the case may be, there is no doubt that you can become faster and more explosive. The Explosive Power and Speed block will help you accomplish exactly that goal

Before getting started in this block, it's important to possess a fair level of general strength and general endurance before trying to improve your explosive power and speed. If either of these two areas are lacking, you will not get the most out of the explosive power and speed block and should instead focus your efforts in those areas first. In other words, if you can't even squat your own bodyweight, or you gas before the end of the first round, your time and energy should not be spent on explosive speed and power exercises.

Assuming that you do possess the necessary foundation, you must first understand that training to improve explosive speed and power requires a different approach than you might be used to. It's all too common in MMA to confuse power with power-endurance and try to improve your explosiveness with methods that are much better suited towards improving the latter quality. These two qualities are not one and the same, however, and you must not confuse the two if you want to see real changes in either one.

As you probably understand by now, explosive speed and power depends on how fast you can contract and relax your muscles and this is largely based on your nervous system's abilities. In fact, in studies where they have switched the neural input between a fast and slow twitch fiber, they've seen the mechanical behaviors of these two fibers reverse. In other words, the fast twitch fiber behaved more like a slow twitch fiber and vice versa. This should tell you that the nervous system itself is really the ultimate governor of explosive speed and power.

Because of this basic principle, increasing your explosive speed and power means you must pay special attention to your central nervous system development. This is accomplished through high intensity, highly focused efforts, with as much rest as necessary for the nervous system to fully recover. This is the difference between explosive speed and power, and power-endurance.

Explosive Speed & Power Training Principles

1. Explosive speed & power is primarily a function of how fast your nervous system can contract and relax your muscle fibers and how quickly your alactic energy system can supply ATP to these fibers. As such, you'll need to focus your efforts around improving these two areas and use long rest periods with full recovery between sets.

Failing to include enough rest between sets will lead to your highest threshold muscle fibers not getting as much quality work as they should. Explosive speed and power is about quality of work, not about quantity, so don't make the mistake of turning the workout into a conditioning session. Always rest as long as necessary between sets.

2. Each rep in each set should be a maximal effort in order to recruit as many fibers at once as possible. Going halfway or putting half an effort into speed and power work will leave you with poor results. You must always attempt to accelerate the resistance (or your own body depending on the exercise) as much as possible. The attempt to accelerate the weight is generally more important than the actual speed of movement when it comes to increasing your explosive speed and power.
3. In order for your explosive speed and power to apply to the skills of MMA, you will need to include a fairly large amount of specific exercises. In some areas, this is done fairly easily, but in others it is not. Because of the complex nature of many of the skills of the sport, you will at times need to get creative when designing explosive speed and power exercises.

Also, training specifically is not just a matter of adding some type of resistance to a specific skill, and you must be careful not to do anything that could interfere with your technique. The last thing you want to do is screw up your technique because you added a bunch of resistance to a skill and altered your specific movement patterns. More about exercise selection will be discussed later in the section on training methods.

4. Don't forget that speed of relaxation is just as important as speed of contraction when it comes to developing maximal explosive speed and power. This quality comes from an overall training strategy that includes work to increase mitochondria within the muscle fibers. The use of HRI, HICT, and aerobic plyometrics will help accomplish this goal. You will also want to avoid a high volume of lactic work during this block, as high levels of lactate within a muscle will lead to a decrease in mitochondria and relaxation speed.
5. Never forget that your explosive speed and power is highly influenced by your skill and technique itself. No amount of explosive power and speed work can replace a high level of skill and technique to start with. The skills of MMA are highly complex motor patterns and require a great deal of coordination between many different muscles throughout your entire body. The better you can learn how to use all these muscles together at once as efficiently as possible, the faster and more powerful you will be.

Testing & Assessment

There are many different tests for explosive speed and power, ranging once again from very simple to very complicated. Unfortunately, the ones that tend to give the most useful information tend to also be the ones that require some technology which most fighters may not have access to. Even if all you have is a tape measure, there are still some useful tests you can do to test and track your explosiveness.

In an ideal world, you'd be able to measure the power generated by your skills such as how hard you punch, kick, knee, elbow, etc. Unfortunately, to do this accurately is very complicated and impractical and so less specific measures of explosive speed and power must be used. If you see improvements in the power generated in these tests, it's an indication that your nervous system is improving its ability to rapidly contract the muscles that are being tested.

As long as these are the same muscles involved in fighting and the same general ranges of motion, you should see a concomitant increase in your specific speed and power as well. Likewise, if you aren't seeing these numbers improve at all as a result of your training, it's a pretty good indication you aren't doing something correctly.

1. Standing broad jump
2. Standing triple jump
3. 10 second push-ups
4. 10 second pull-ups
5. Tendo & Myotest

Standing Broad Jump

A very simple and reproducible measure of overall lower body explosive power is the good old fashioned standing broad jump. All you need is a tape measure and space to jump and it does provide a pretty good assessment of changes in lower body explosive power. You can also throw in a vertical jump test here, but MMA is a horizontal sport with very little vertical component to it and so movements such as the broad jump are more applicable in measuring horizontal power that is relevant to MMA.

Standing Triple Jump

Along the same lines as the standing broad jump described above, the standing triple jump adds a component of muscular elasticity to the test by increasing the jump from one to three. All you have to do is take off from both feet and then perform consecutive jumps, one on each foot, before again landing on both feet.

Typically, in the standing triple jump would land first on your left foot and then on your right, but the order is fairly unimportant as long as you're doing it the same way each time you perform the test. This is a simple test you can do in conjunction with the standing broad jump.

10 Second Push-Up Test

This is another simple and easy to perform test that requires nothing but a stopwatch. To do the test, simply perform as many push-ups as you can in 10 seconds. The key is that you must use perfect form when doing each and every rep or you'll make the test far less accurate. It's a good idea to have someone else watching your reps and counting them for you to make sure you are doing them properly and so you can focus on doing the reps rather than counting them.

Although it's not a perfect test by any means, when you see an increase in the number of push-ups you can do in ten seconds, it's a pretty good indication that the muscles involved in upper body pressing, i.e. chest, shoulders, triceps, etc. are becoming more powerful. I recommend performing the test 2-3 times with a couple of minutes rest in between and then taking an average of these numbers.

10 Second Pull-up Test

Just like the push-up test above, this is another fairly easy and practical test you can do with just a stopwatch, but again you must pay close attention to your technique for the results to be valid. Make sure you perform a full range of motion, going all the way to a completely extended hang up to chin over the bar in each and every rep. You also don't want to bounce in the bottom and you should avoid a swinging motion or the test becomes more of a gauge at how good you are at using technique to generate momentum rather than a test of muscular power. In this test as well, it's a good idea to perform the test 2-3 times and then take the average.

Tendo & Myotest

These two testing devices are nothing short of amazing. If you have access to either one or both of them, there is literally an infinite number of ways you can use them to test and assess explosive speed and power. Although each has slightly different uses advantages and disadvantages, they both provide you with very accurate and incredibly informative data on your explosive speed and power.

The Tendo has been around for quite a few years now and consists of a small cylindrical shaped base with a small cord coming out of it and a display unit. The cord attaches to a bar, or any object really, and gives you a measure of how fast the bar moves in each rep. This gives you an opportunity to measure changes in bar velocity in just about any strength movement you can think of ranging from squats to pull-ups to bench press to Olympic lifts, and just about anything in between. The Tendo is also very easy to set up and use and costs around \$1000.

The Myotest is a fairly new device and it too offers tremendously valuable information. It looks basically like an iPod, but it can be used on a bar or strapped to an athlete to give precise measures of power output including vertical jump and power of repetitive jumps. Just like the Tendo, you can also use it to measure bar speed. I love this little device and for around \$700 it's well worth it if you're serious about training or coaching. The website is www.myotest.us

Explosive Speed & Power Block Training Methods

Training for explosive speed and power is the subject of many different books and I could probably write an entire book on just that one topic alone. In the end, it all comes down to which methods you use, and the sequence you use them in. As a fighter, you are not as interested in how much power you can generate in a single repetition, but rather in explosive bursts. These intermittent flurries of explosive power, whether they happen in the striking, wrestling, or ground aspects of the game, are part of what define MMA and where you want to focus your development.

Also, it's important to take into consideration that the skills of MMA require you to generate speed and power against both high and low resistances. In some aspects of the fight game, such as in grappling, you're trying to manipulate and control your opponent's bodyweight, which provides a significant amount of resistance.

In other skills, however, such as striking, you are punching, kicking, kneeing, etc. against very little resistance but trying to do so as fast as possible. Power is a function of both resistance and speed of movement, and that means that to increase your power in a way that is relevant in MMA, you'll need to work to increase your speed of movement against both high and low resistances as well. The best way to do this, for several different reasons, is to focus each of the 5 week blocks on each of these different components of power.

Block A

In past sections, I mentioned that strength plays the biggest role in how much power you can generate when it's being generated against higher resistances, and so in this first training block you will need to include more strength work at a higher intensity. Your first of the three training sessions should include the highest volume of the max effort method accordingly.

When using the max effort method in this block, make sure to keep your reps in the 1-5 range and pause for 1-5 seconds, or even sometimes more, and **completely relax your muscles between reps**. The key is that you must focus on maximum acceleration in each and every rep and treat each rep as a separate lift. This helps develop what is known as "starting-strength" or the ability to generate speed and power from dead stop, as well as relaxation speed.

In the second training day of this block, you can include some lower resistances with a higher speed of movement. This would be an area where it would be appropriate to use the explosive-repeat method, for example. You can generally use resistances in the 40-80% of your 1RM and sets of 1-6 reps. In this block you can also use more general training exercises, but in the next block you'll make the transition into more MMA specific exercises.

Because the two primary training sessions will be fairly CNS intensive, you'll want to use lower intensity training methods on the third day at only a moderate volume. This can be an accessory day where you focus on weak areas and/or you can include some aerobic work also.

Block B

In the second training block, you need to make the transition into more speed-strength oriented training methods. You do this by reducing your volume of max effort work and replacing it with methods that use lower resistances and higher speeds of movement. This is also where it would be appropriate to use the "shock method" such as depth jumps or drop push-ups and such if you have the physical preparation. These are incredibly demanding on the CNS and must only be used appropriately, but they can produce dramatic results.

You can also use the shock method as part of the complex method discussed in the section on the alactic system. This would involve performing a few sets of the max effort method followed by 2-3 sets of the shock method. This is the most intensive method for increasing speed and power that there is. It should only be used for small periods of time, a matter of a few weeks, and only for advanced athletes.

The first training session of the week is where you want to focus the highest volume of these explosive speed-strength type exercises. You can do them again at a lower volume in workout three. You want to give yourself at least 3 days of rest before repeating these types of very demanding CNS workouts and you must pay careful attention during these periods to be getting enough rest or you'll be more likely to overtrain your CNS.

As mentioned previously, in this second block you'll want to use more MMA specific exercises as well. This is fairly easy in the grappling type skills because you can do various takedowns and throws against heavy opponents as exercises, but it becomes a bit more challenging on the striking side. For most fighters, doing a variety of rotational throws with medicine balls and explosive pressing movements is going to be the most effective.

If you have access to good pulley machines, such as those made by Keiser, or a dragging sled, you can replicate certain parts of the skills of striking with added resistance as well. One exercise I like in particular for MMA is to attach a dragging sled around an athlete's ankle and have them work on explosive knees.

The reason I like the sled is because it provides the greatest resistance at the beginning of the movement and much less at the end and this replicates the same pattern of resistance as skills involved in striking and thus has good transfer. Another thing you can do during this block is use heavier gloves than normal for your striking work and go up to 18-20oz gloves for all your bag and pad drills as well.

Along those lines, when working on MMA drills during an explosive speed and power block, it is helpful to follow the same general principles as you will be in your other sessions. Try to use longer rest intervals and intentionally use maximum power in your skills. Obviously, this must be done with good technique and you shouldn't just throw as hard as you can and be sloppy. Intentionally working on the speed and power of your skills with longer rest periods will help make sure that your improvements in explosive speed and power will transfer into MMA.

The last thing you'll want to focus on during this second block is focus on bursts of explosive power for 8-15 seconds. In other words, focus on increasing alactic power and capacity and your ability to maintain your explosiveness over this time period. In the first block, you were using heavier weights for fewer reps. In this block, however, you'll want to use lighter weights, faster speeds, and slightly longer work intervals up to the limits of alactic energy production.

Explosive Speed & Power Block A	Explosive Speed & Power Block B
<ul style="list-style-type: none"> • Explosive Repeat Method • Max Effort Method • Maximum acceleration • Rest-pause between reps • Long rest periods between sets 	<ul style="list-style-type: none"> • Complex Method • Shock Method • MMA Specific Exercises • Majority of sets 8-15 seconds • Lighter weights; maximum speed

Summary

Although some people are naturally more explosive than others, there is no doubt that every fighter can become much faster and more explosive by focusing on the right kind of training. There are even still many fighters out there today who do next to zero resistance training aside from general bodyweight exercises. In this case, simply following the principles of the general strength block will develop strength and improved power.

Once a fighter has a fair level of general strength, however, then they must focus on the methods laid out in the explosive speed and power block to continue to see improvements. Through this kind of training, the biggest changes come in the form of the nervous system's ability to more rapidly fire and relax your muscles over and over again, known as contractility. How well your muscles are coordinated also improves considerably as well. Muscles that can fire and relax faster and with greater coordination can produce more power, plain and simple.

Aside from focusing on the methods in this chapter, your MMA skill training itself will also play a *big role in how fast and explosive you are in the ring or cage. The right footwork and the right technique* in all the many different skills in MMA will increase how efficiently you move and put your body in the correct positions to be able to move as explosively as possible.

Finally, it's important to realize that all the explosive speed and power in the world won't do you any good if you don't have the conditioning to support it. Being incredibly explosive for one round might get you a few wins here and there, but it will also cost you in the later rounds. There is no getting around the fact that it requires more energy to be more explosive and if your body can't supply that energy, you will gas out. Because of this, you must have a high level of general endurance before focusing on explosive speed, power, and power-endurance.

Power - Endurance Block

When it comes right down to it, the ability to maintain your explosive power from bell to bell in a fight is the most important physical quality you can have, aside from possessing great technique and strategy of course. The ability to be quick and powerful in the last round is really how conditioning is defined and judged really. Just barely making it through the last round is rarely good enough.

Whether a fight is won or lost in the last few minutes often comes down to which fighter is conditioned well enough to still have some power left. You don't want to be that guy who seems to be landing a bunch of shots but doing no damage whatsoever because there is just no power behind them. You want to be the kind of fighter who can knock anyone out in the last round just as easily in the first.

Given the importance of power-endurance, you might be tempted to do as many fighters seem to do and just train this quality all the time. This is really what fighters are mainly trying to develop when they do nothing but circuits and complexes all the time. They figure that if fighting consists of five minute rounds, then the best way to train for it is to just do five minutes of different exercises over and over again.

The problem with this line of thinking is that power-endurance is a complex physical ability that arises from the specific development and interaction of many different systems. Because of this, your power-endurance will ultimately be limited by how well these systems are developed, as well as how they are developed in relation to one another.

Along these lines, your level of general endurance and explosive speed and power provide the foundation for your power-endurance. If you aren't very explosive, or have poor aerobic development to begin with, you will have a very limited potential to develop a high level of power-endurance regardless of how much you try to train it.

This means that rather than spending all your time trying to just do endless rounds of complexes and circuits, you must first make sure that you have very well developed aerobic and alactic systems. Only once your general endurance and explosive speed and power are up to par, should you then work on finalizing these physical qualities into power-endurance.

In this way, a power-endurance block can be thought of in a similar light as sparring sessions. Just as sparring gives you the opportunity to put all your skills together and test them against a live opponent, training power-endurance will test and improve your ability to use your general endurance and explosive speed and power in a more specific way.

Traditionally, many have approached power-endurance simply as a matter of developing your lactic system to its limits. As you've learned throughout this book, however, aerobic power also plays a pivotal role in power-endurance. In this block, you'll work to first maximize aerobic power and then increase how long you can maintain your explosive power production for.

Power-Endurance Training Principles

The ability to maintain your explosive speed and power throughout a fight and press a pace your opponent cannot handle is not an easy thing to develop. It will take time and a focused training effort in between fights. The Power-Endurance Block is an opportunity to finalize the physical development you've achieved through the other training blocks and ensure they'll provide you with the specific MMA conditioning that you need. Because power-endurance is a complex physical ability, it is especially important that you pay close attention to the following training principles within this block.

1. Do not overuse the power-endurance training block. It should only compromise a small minority of your overall training volume in a given year and is meant to be used after you've worked to develop general endurance, general strength, and explosive speed and power. This block will only help you finalize these qualities but your improvements in the power-endurance block will be limited by how much time and effort you've put into your previous training blocks.
2. Pay careful attention to recovery. This type of training block is very physically demanding and it can be easy to overwork if you're not mindful of your overall training schedule and recovery. Watch for the warning signs of overtraining and make sure to take at least one day per week completely off.

Towards the later weeks of the block it is also a good idea to use active recovery methods such as sauna/cold shower, massage, low intensity cardio, hot yoga, swimming, etc. Along these lines, you must also make sure to be getting enough sleep and following a sound nutrition program during this block if you want to get the most out of your training effort.

3. Because you will be working many different physical abilities in this block naturally due to the demands of power-endurance, you do not need to have a secondary target in this training block. You will want to include one day per week or so of a moderate volume of general strength work to preserve strength levels, but everything else will be worked and retained through the methods used in this block.
4. In order for the power-endurance block to be most effective, it is especially important that during this training period your MMA work is tightly coordinated with your power-endurance methods. This means that this block is the time to increase your relative volume of sparring and intense MMA specific drills.
5. You will achieve the best results in this training block if you have and use a heart rate monitor to gauge your rest intervals and improvements over the block. Without this valuable tool, you will essentially be guessing as to how quickly your heart rate can recover and how high it is getting during your intensive intervals. Eliminating this guesswork will help ensure sure your training in this block is as effective as possible.

Testing & Assessment

Power-Endurance is not a particularly easy ability to test and measure and doing so requires looking at various measures of muscular endurance along with total body power and endurance. There is no one single test you can do but rather several that, when put together, offer a good picture of your ability to maintain your explosive speed and power.

The most meaningful test of this, of course, comes in the ring or cage and this is where you should notice significant improvements over the course of this training block. The various tests and assessments described in this section should compliment your measure of power-endurance taken directly from your MMA training.

1. Max Push-ups
2. Max Chin-ups
3. 2 Minute Sit-ups
4. 1 Minute Sprint
5. Jump Tests

Max Push-ups

This is obviously one of the simpler tests of upper body power-endurance and is useful because it requires no equipment except for a stop watch. The only requirement is that you use strict form and perform as many push-ups as you can as fast as you can. Keep track of how many push-ups you can do and how quickly you can do them to gauge the power-endurance of your upper body pressing muscles such as the shoulders, chest, and triceps.

Max Chin-ups

This is another simple test for upper body power-endurance that is practical and easy to perform. Just as with the push-ups, it's imperative to use strict technique and go through a complete range of motion on each repetition. You'll also want to keep track of the maximum number of pull-ups you can do along with how quickly you can do them to gauge your progress.

2 Minute Sit-ups

Your abs and core are obviously an extremely important part of your muscular endurance and absolutely must have great power-endurance to support the many complex movements of MMA skills. Performing as many full sit-ups as you can in two minutes is a good gauge of the local muscular power-endurance of these important muscles and it provides you with a reflection of how well your abs and hip flexors can maintain their power.

Because it would be relatively easy to do a large amount of sit-ups if you were to go at a slow pace, you will want to use 2 minutes as your cut off point. Just as with the other tests, make sure to use perfect technique in each rep and go through a full range of motion.

1 Minute Sprint

Unlike the previous 3 tests, the 1 Minute Sprint test is a measure of general total body power - endurance rather than localized muscular power-endurance. Whereas the first three results take into account the individual muscles themselves, the 1 Minute Sprint gives you an indication of your body's overall aerobic fitness as well as how much power you can generate anaerobically.

You don't necessarily have to perform a sprint for this test, but you want to use an exercise that uses a large amount of muscle to generate a high level of power and gives you the ability to record your total distance in a 1 minute time period. Personally, I like the Versaclimber or the Airdyne bike for this test the most because both meet this requirement and are low impact.

If you don't have access to either of these, then you can simply sprint for 1 minute and keep track of how far you can go. You can't really perform this test on a treadmill very well, so you'll need to have access to an indoor or outdoor track. Whichever exercise you choose to use, make sure you use the same one throughout the block to keep track of your progress.

If you have a Polar RS100, it's also useful to measure your max heart rate, average heart rate, and heart rate recovery after 1 minute of performing the test. If you can cover a greater distance while keeping your heart rate the same or even lower, it's a clear indication your power-endurance is improving. Seeing your heart rate come down faster also gives you a sign that you were able to cover the distance with a greater relative contribution from the aerobic system, which is obviously an important component of power-endurance.

Jump Tests

Regrettably, most fighters won't have access to jump testing equipment that allows you to measure power-endurance, but it bears mentioning because the technology is becoming cheaper and cheaper and in the near future it should become more prevalent. To perform different jump tests to measure power-endurance, you'll need a jump mat and supporting software, or the Myotest discussed previously. The Omegawave testing system offers perhaps the best overall test in this regard, but it's unlikely any fighters outside of those working directly with me will have access to one.

The advantage that the Myotest and jump mat type systems offer is that they can measure both how long you are in the air as well as how quickly you're able to get off the ground. When taken in consideration of your bodyweight, this gives tremendously valuable feedback on relative power output as well as power-endurance when taken over 30-60 second durations.

Many athletic performance centers have jump mats and they are generally available for a few hundred dollars along with the software. My personal recommendation, if you don't have access to one but want to invest some money, is to get the Myotest and set it up to perform power tests of 20-40 jumps. These are great indicators of power-endurance.

Power-Endurance Block Training Methods

The most effective methods to increase your power-endurance come from those discussed in the sections on all three energy systems. This is simply because power-endurance is such a multi-faceted physical quality that requires development and coordination between all three energy systems.

If any of your three energy systems, alactic, lactic, and aerobic, are poorly developed, your power-endurance will suffer. You will end up either not being able to produce very much power, or you won't have very good endurance, depending on which system is lacking.

Along these lines, the methods in the power-endurance block must be carefully chosen and utilized properly. Going through endless circuits and different random intervals is not enough to maximize your power-endurance. Your program must be a carefully thought out and perfectly executed progression of *precise training methods*.

First, your aerobic power must first be maximized followed by work on your lactic power and capacity. Training methods targeting the alactic system will also be used in both phases. The block system is ideally suited towards these goals and the A and B blocks must be designed accordingly.

Block A

In the first 5 week block focused on power-endurance, the most important principle is to increase your anaerobic threshold and your power output at your anaerobic threshold. Accomplishing this will help maximize how much power your aerobic system can contribute and thus improve the "endurance" side of the power-endurance equation.

There are several methods that you can use to improve this area, but the key component to them is to produce maximum power while keeping your heart rate within close range of your threshold. If you have no idea where your anaerobic threshold is in the first place, then you'll have to get the best rough estimate by using the modified coopers test as described in the section on general endurance.

As mentioned elsewhere, you can also take your average heart rate over three rounds of five minutes each and use this number as a guide as well. For the best results, you'll want to keep your heart rate within 5 beats +/- of the threshold number during the training methods that require this.

If you have the Polar RS100 that I recommend, you will want to set your heart rate zone for this range while you're training. You'll get an audible signal when you go outside the zone so it's a great feedback tool to ensure you're training at the proper intensity. Without using a heart rate monitor it is pretty difficult to make sure you are training at the right heart rates and unlikely you'll get the best results. This is an area where just guessing or going by feel is not a good idea.

There are several different methods you can use in this first block. The most effective methods are threshold training, the explosive-repeat method, and HICT, all while using the right heart rates. You can also include of the tempo method and max effort methods for a moderate volume of strength work as well. The goal, of course, in all of these methods is aerobic power and that means training at the limits of aerobic energy production.

I suggest performing one or two training days out of the three using one of the methods that keeps you at a constant heart rate around anaerobic threshold, and then one the other training day using the explosive-repeat method. Your strength work is also best performed on the explosive-repeat method day as well.

When using the explosive-repeat method in this regard, you will want to start the block with shorter work intervals and longer rest intervals, focusing more on alactic power and capacity, and then progress more to the lactic side as you work through the block. By the end of the block A, your work times should be over 30 seconds with rest intervals down to 10-20 seconds.

Block B

After you've worked hard to increase your aerobic power, you'll want to finish the second half of the power-endurance by increasing the anaerobic power and capacity. This block will be very mentally and physically challenging because you'll need to push past stages of fatigue to really challenge your body to improve how long you can maintain anaerobic energy production for.

As discussed earlier, some athletes are more genetically gifted in this area than others, but just about every fighter can improve through training. The key to results is maximum effort until complete fatigue. Stopping halfway, before you've fully exhausted your ability to generate a high level of power, will not produce the kind of results you're looking for.

You'll be working up in the anaerobic zones for a high volume of your training and that's not comfortable or fun, but it's vitally important for improving both the muscle's ability to tolerate a buildup of anaerobic byproducts as well as for the mechanics of reducing central fatigue. By pushing your body close to its limits, your brain will reduce its natural protective influences.

For this second training block, you'll of course want to use methods designed around high intensity up into the peak of anaerobic energy production levels. This means that methods like the lactic power and capacity intervals, the lactic explosive-repeat method with high work to rest ratios, cardiac power intervals, and circuit training can be the most effectively utilized.

I recommend only two training days per week using these high intensity methods, spaced 3-4 days apart. Trying to do 3 days of them combined with your MMA training is simply too much volume and intensity and you won't be able to recover properly. Your energy systems need time in between to improve through supercompensation so hitting them too frequently will lead to poor results and overtraining. On your third training day, you absolutely must use some HRI, HICT, or aerobic plyometrics, to regenerate any mitochondria lost during the lactic work.

It's also useful and important to keep track of how long you're able to perform various exercises before becoming fatigued to gauge your improvement during this second block. You'll want to start with more of an emphasis on lactic power and then transition more towards lactic capacity by increasing work time and decreasing rest as the block progresses. Each week, you should see a continued improvement in how long you can maintain your explosive speed and power for.

Depending on your training experience and specific development, it's not unreasonable to expect to see a 10-20% increase or more in how long you can perform various exercises for by the end of the full 8 week power-endurance block. You will want to retest at the end to gauge just how much you were able to improve.

Power-Endurance Block A	Power-Endurance Block B
<ul style="list-style-type: none"> • Threshold Training • Explosive-Repeat, Circuit training • HICT, Tempo Method - moderate volume • Keep HR +/- 5bpm of ANT • Goal to increase power at ANT 	<ul style="list-style-type: none"> • Longer work intervals; shorter rest • Cardiac Power Method • Lactic Power & Capacity Intervals • High Volume of training over ANT • Maximum duration past fatigue

Summary

Perhaps no area of physical development is more poorly understood by most than power-endurance. This is especially unfortunate given its obvious importance in the sport of mixed martial arts. The most common approach, and also the biggest mistake, is to train this area above all others and with endless volume without first building the necessary foundation of both power and endurance separately.

Just as you'd be limiting yourself as a fighter if all you ever did was get in the ring and spar without also working first on learning technique and skills, you must first create the physiological building blocks of power-endurance through proper training strategies as laid out in previous sections. Only then should you follow the principles laid out in this section and train to improve how long you can maintain your explosive speed and power for.

When the time does come to focus on this area, you must be mentally prepared to go 100% if you are serious about getting the best results. There is no doubt power-endurance training is physically and mentally demanding, but being able to push yourself past your old barriers of fatigue is a key to reaching the next level as a fighter. I'm a firm believer in the old saying in sports that you will perform in competition like you train and if you want to have ultimate conditioning, then you have to train each time as if your fight depends on it, because it does.

Block Training Applications

In the previous four sections, I have given you a precise blueprint on how to apply the Block Training System to MMA to improve every aspect of your strength and conditioning in between fights. Ultimately, of course, the goal of this system is to improve your performance in the ring/cage or octagon, come fight time. If you apply this system and all the principles as I've specified, I can guarantee that you will become stronger, faster, more explosive, and much better conditioned.

The first question I'm sure many will ask, however, is where to start. The questions of which training block you should use and exactly how much volume and intensity are appropriate for you are important and obvious questions to ask, but they are also difficult to answer.

The Principle of Individualization

In this book, I have intentionally avoided giving a bunch of sample workouts or training programs simply because if there's one overriding principle I've come to learn over the years of coaching, it's that everybody is different and has different needs. If there was a sample workout or training program that applied to the majority of people reading this book then I would gladly give it, but the fact is that there are far too many variables for this ever to be the case.

More than once, I've seen the same program given to two different people lead to completely different results. What can be perfectly suited and an ideal program for one particular athlete can be a total disaster that reduces performance for another.

Programming is a matter of applying the right types of stressors in the right amounts at the right time. If any of these three variables are not addressed correctly in a training program, results and performance will suffer. In other words, there is no one size fits all program, no sample workout, and no magic exercise that everybody can use to get the best results. Anybody who tells you something different is either naïve, or selling something.

Along these lines, my purpose in this book has been to provide with you an overview of all the different training principles that are important to understand when developing training programs to make you a better fighter. I have done my best to empower you with the knowledge and tools it takes to write the most effective training programs possible.

Regardless of whether you are brand new to the sport, a recreational athlete who never wants to fight, or a seasoned professional who has fought for world championship, all of the principles you've read apply and can be used effectively. The truth is that training principles and methods are universal, while training programs themselves must be individual.

In moving forward and developing these individualized training programs, you have two general options. The first option is to study and apply all the training methods and principles covered in this book for yourself and design your own programs, and the second option is to let me help.

Designing Your Own Programs

There will be many reading this book who will want to take everything I've presented in this book, along with previous experience and knowledge of training, and get to work designing their own programs. I am sure there are also many other strength and conditioning coaches reading this book who already design programs and are always eager to look for new information and new methods to try with their athletes. If you are in either of these groups, I'd like to offer some general tips and guidelines for using the Block Training System.

First, when designing and managing your training program, there are three fundamental considerations above all else:

1. Selection of means and methods
2. Organization of training loads within each training sessions and each week
3. Individualization and management of volume and intensity based on adaptive responses to training

In order to correctly address your individual needs and produce the desired results, your training program absolutely must take all three of these into account. Applying the correct stressor in the correct amount and at the correct time comes from answering the many questions that these three principles present to you as an individual.

Selection of Means & Methods

I have given you many different methods in this book from which to choose. You must decide which are the most appropriate and effective to use based on your specific goals, needs, and given level of physical preparation. I have outlined the specific adaptations that result from each method and in what area of physical development they will be the most effective.

From this information, it is up to you to go about the job of selecting exactly which methods are the most appropriate. You can use many of the different tests and assessments I've offered to aid in this selection process. Although it would be nice if there were one single definitive test you could do to that would give you all the answers and tell you which methods to use or which block you should use, you must look at the entire puzzle of physical development when designing programs.

If you are a relative beginner in the sport and/or have a relatively low level of physical development, it makes your choices much easier. In this case, your time is best spent in the general endurance and general strength blocks. These are your foundation and you will need to spend time building them accordingly. In general, the longer you spend developing something, the more stable the result adaptations become and the longer they will stay with you.

As you become more advanced and your level of physical preparation increases, the selection of means and methods becomes more difficult and even more important.

Organization of Training Loads

The next consideration is the organization of training loads, both within each training session and over the course of your entire training week. This is essentially a determination of how you are going to distribute the training loads within your program. There are many different variables that must be taken into account and failure to do so is guaranteed to lead to less than optimal results.

The most important factors that must be considered are the specific and general effects of training. You can break up these effects into four different categories: acute effects, immediate effects, accumulated effects, and delayed effects. Each of these four categories differs primarily in the timeframe in which the effect is exerted.

Acute effects are those that take place in direct response to a training session. Your heart rate increases, powerful hormones are released into your bloodstream, etc., as all the systems of the body's stress response are activated. These are generally very short lived effects, but they also serve as triggers for longer lasting training effects as well.

Immediate effects, on the other hand, are longer lasting than the acute effects and tend to exert their influence over a 12-48 hour window after a training session. This is essentially the time frame where different systems are still recovering from your training session and the body's repair machinery is hard at work. Biochemically, you will see altered levels of various enzymes, hormonal increases/decreases, and a higher level of protein synthesis as the body repairs and builds new tissues.

Accumulated effects are those that result from the summation of acute and immediate effects and are typically looked at from a time frame of several days. After a week of training, for example, you can experience deep fatigue or new levels of performance depending on how you structured your training.

There are many different effects that accumulate over a training week as you perform several training sessions. Their magnitude largely depends on your weekly training schedule and distribution of loads. If you were to perform very intense workouts on Monday and then another one on Tuesday and then take the rest of the week off, for example, you'd end up with different effects at the end of the week than if you had performed these same workouts on Monday and Thursday.

Lastly, **delayed effects** manifest themselves over longer periods of time and often appear after a decrease in training volume. As mentioned previously, strength is a quality you can see rise sharply after periods of intense loading followed by periods of much lower volume. Delayed effects are extremely important to take into account when programming.

All of these different effects must be taken into account in the organization of training loads. The principles and guidelines laid out in this section were designed with these effects in mind.

Individualization and Management of Volume and Intensity

Along with the training means and methods, the volume and intensity you use in your training program are the primary determinants of the magnitude of effects described above. Too little volume and/or intensity and you will not place enough demand on your systems and they will not improve. Too much, however, and you will end up overtraining and seeing even worse results. This is the fine line between performance and failure and you must learn your individual adaptive abilities and correctly manage volume and intensity if you are to walk on the edges of this line without falling off.

It is in this area of managing volume and intensity that many mistakes in training programs are made. Many athletes underachieve and have poor performances because of poor management in this regard. Trying to follow a generic program or just throw darts at a wall and not have a program at all is where most of the problems begin.

Everyone differs dramatically in their ability to tolerate various volumes and intensities of training. There are many different variables, ranging from genetics to diet, rest, and training experience, that dictate how much volume and intensity is the correct amount for you.

You cannot assume that just because some pro fighter follows a particular program that you should do the same. Even if they had the exact same physical needs as you and the same methods were appropriate, there is little chance that you'd both respond and adapt optimally to the same levels of volume and intensity.

Your program must be optimized around your own individual ability to respond and adapt to stress. You must take into account your training experience and work capacity, your nutritional intake, mental stress levels, sleep patterns, overall training schedule, etc. There are endless different variables that factor into how well your body can adapt to various levels of volume and intensity. You must do your best to understand them and individualize your program accordingly. This is a learning process and the longer you train, the better at this you will get.

Overtraining

No discussion on the management of volume and intensity would be complete without a brief overview on the subject of overtraining. First, the most important point to cover to begin with is that overtraining, on the physiological level, is much more complex than many make it out to be. In other words, overtraining is more than just getting run down from training or working too hard for too long. There is also more than one type of distinguishable category of overtraining that can result depending on the type of work being done.

The best way to define overtraining is the chronic inability of the body to adapt properly to the stress imposed upon it through the physical and mental demands of training. This happens when the body is under more stress than it has the ability to adapt to and over time, the result is a general breakdown in the different systems that regulate the body.

The important thing to know and understand is that the type of stress the body is under will be the determining factor in which category of overtraining results. The three general categories of overtraining relate to which branches of the body's nervous system are primarily affected by the excessive stress and can be broken into **sympathetic, parasympathetic, and central nervous system overtraining.**

Sympathetic overtraining is probably the most common type of overtraining and typically results from excessive loading of activities and exercises used most often in strength and power type sports. Usually, sympathetic overtraining occurs in athletes who do an excessive amount of strength training and explosive power/anaerobic dominant type exercises without giving their bodies a chance to recover. It's also well correlated to excessive mental stress as well.

These types of activities place a great deal of stress and demand on the sympathetic nervous system and when done with more volume and intensity than the athlete can adapt to, sympathetic overtraining results. The most common symptoms of this type of overtraining are disturbed sleep patterns, loss of appetite/weight loss, increased resting heart rate, irritability, decrease in performance and fatigue.

Parasympathetic overtraining, on the other hand, is much more commonly seen in endurance type athletes and high volume sports and typically results from an excessive volume of aerobic activities. In this case, it is the parasympathetic branch of the nervous system that becomes overly dominant, more or less, and this leads to a different set of symptoms.

Athletes who are in a state of parasympathetic overtraining will likely feel tired, lethargic, heavy, and they may often feel depressed and unmotivated to train or compete at all. Many often decrease in resting heart rate, increase in HRR as well, and feel like they just want to sleep all the time. True parasympathetic overtraining is less common than sympathetic overtraining but it is also more difficult to get out of once an athlete reaches this state.

The last category of overtraining, **central nervous system (CNS) overtraining** is rarely discussed in common training literature, but it is distinguished from the previous two types of overtraining in that the central nervous system itself that is affected. This type of overtraining occurs primarily from a chronic overload of activities that place a very high demand on the central nervous system.

Exercises and activities such as maximum effort strength training (90% of 1RM and above), high intensity plyometrics, explosive speed and power drills such as sprints and jumps, etc. are all very taxing on the CNS and can lead to this type of overtraining when performed with too much frequency, volume, and intensity.

This is common type of overtraining in the strength sports such as Powerlifting and Olympic Weightlifting, but it can also be seen in high speed/power sports such as the sprints and jumps in track and field. I have also seen several cases of this type of overtraining in MMA athletes who do more explosive drills and training than they are prepared for.

Again, an athlete whose CNS is in a state of overtraining will see unique symptoms such as a noticeable decrease in reaction rate, significantly lowered strength and power levels, poor motor coordination, inability to concentrate and mentally focus, etc. When you see two or more of these symptoms become chronic over time, chances are good the cause is related to a measure of CNS overtraining.

It is fairly common to see CNS and sympathetic overtraining occur together as there is some overlap in the causes, but this is not always the case. It is also possible for an athlete to be in a state of both CNS and parasympathetic overtraining at the same time. This can occur in sports that have very high endurance and explosive speed/power requirements such as MMA.

Understanding the causes and symptoms of the different kinds of overtraining is an important first step to preventing it, but the best prevention comes from designing your program properly to begin in accordance with all the principles laid out in this book. In addition, taking care of yourself and making sure you eat properly, get enough rest, avoid mental stress as much as possible, etc. will all go a long way towards help your recovery ability.

Design your program correctly and listen to your body throughout your program to manage volume and intensity and you should be able to avoid ever getting yourself into a deep state of overtraining. True overtraining, the kind that takes weeks to fully recover from, really only occurs from persistent and chronically overworking. This is something that should be avoided simply by following all the guidelines given to you in this and in previous chapters.

Putting it All Together

When it's time to sit down and write your own training programs, it's important to follow a straightforward process that takes into account all the criteria and principles discussed above and throughout the book. This process can best be summarized in the four following steps:

1. Perform basic tests and assessments to determine areas of weakness/strengths and select the correct training block accordingly.
2. Select means, methods, exercises appropriate to specific physiological goals of block.
3. Organize daily, weekly and monthly training schedule and distribute loads accordingly.
4. Monitor progress and manage individual volume and intensity based on adaptations.

In these four steps to programming, you will inevitably have to answer many questions that arise do to the highly individual nature of training and adaptation. The best weapons you have to come up with the right answers and design the most effective programs are information and training experience. The more information you can gather and track and the longer you train and learn how your body responds to different training strategies, the more precise your programming skills will become over time.

Outsourcing Your Programming

There is no doubt that following the programming guidelines laid out in this chapter and basic process above will lead to better results in performance than you've ever seen before. If you are just training recreationally in MMA and/or don't compete in the sport, these results will likely be all you're looking for or need. In other words, the results you can achieve with this approach will be more than enough to help you meet your casual training needs and goals.

If you are serious about your training, perhaps your livelihood even depends on it, however, then you need to do everything you can to maximize your results. Even if you aren't a competitive fighter and you don't want to spend the time and effort it takes to write an effective program, then the next section is for you as well.

Regardless of whichever the case may be, achieving maximum results in minimal time means you will need to use cutting edge technology and training tools to eliminate the guesswork and individualize your training programs like never before. This technology and the system I'm about to introduce to you were designed to do exactly that and they represent what I believe is the future of performance training. I'm excited to offer you the opportunity to be one of the first to take advantage of it and see the dramatic results that come from this unique and powerful approach.

The Power of Information

We are living in the information age, an era where you can look up just about anything and everything with a few quick keystrokes, and yet most athletes are still in the dark when it comes to their training. They are forced to make programming decisions on which methods to use and how much volume and intensity are appropriate based purely on guesswork, speculation, and intuition. The power of information, however, can change all that and offer new and much needed insight into increasing performance.

For the past 7+ years as a coach, I've had a secret weapon that I've used to my advantage with every athlete I've trained. It's helped me make sure fighters were in peak condition at exactly the right time for their fight, and given me answers to the most important questions of training. I haven't had to guess which methods a fighter should use, how much volume and intensity they could handle, or whether they were adapting well to their program or not.

The secret weapon I'm referring to is information and over the years I've used many different powerful tools of technology to get it. First and foremost, I have relied on the Omegawave Sport technology system to give me an inside look at an athlete's different biological systems.

Using the Omegawave (www.omegawavesport.com), I've been able to see precisely how well their cardiovascular, central nervous, metabolic, neuromuscular, etc. systems are developed and which areas needed to be worked on the most for performance to continue to improve.

Even more, the Omegawave System uses well established medical technology known as heart rate variability to assess how well an athlete is responding to all the physical and mental stress that's imposed on them through their overall training program.

If a fighter is not adapting well to their program and headed down the path of overtraining, I can see this happening before it is too late and make the necessary adjustments to volume and intensity. If their systems are not improving as well as they should, I can figure out what's going wrong and correct it. Armed with this powerful information, programming is no longer just guesswork and intuition, but rather simply a matter of testing, analyzing, and fine tuning.

I personally believe the Omegawave is on the cutting edge of technology out there for training and performance and this belief is shared by many around the world who also use it. Many of the premier soccer clubs around the world rely on it with all their athletes. Countless universities and professional organizations from many different countries do so as well. Unfortunately, the powerful information that the Omegawave system provides has also come with a fairly high financial price tag that puts it out of reach of most athletes who are not part of the professional teams or organizations that have vast financial resources.

This is all about to change shortly, however, and soon you will be able to take advantage of this secret weapon in your own training and improve your performance faster than ever before. This will also save you the time and effort of having to go through the challenging process of effectively applying all the principles in this book.

The Future of Training

The future of training lies in shifting the training process from one of guesswork and trial and error to one of objectivity and the information that can be harnessed through the use of technology. Along these lines, I've quietly been working behind the scenes with two of the original developers of the Omegawave system, Val Nsesdikin and Leo Masakov, to finally develop a way to offer each and every athlete the ability to have a training program developed and fine tuned for them based on their specific physiological development and goals.

In simpler terms, we've developed a system that uses a variety of direct biological tests and assessments to answer the questions of A) which training means and methods are the most appropriate for you and B) *how much volume and intensity your body is ready to respond and adapt positively to*. As discussed before, answering these two questions as accurately as possible is the real key to effective programming and improving your performance.

What this means to you is that the work of programming is completely done for you and is based on objective criteria and assessments rather than trial and error and guesswork. You won't have to spend time trying to figure out exactly which training block is most appropriate, how to distribute your training loads, which exercises you should do, even or how much volume and intensity your body can handle. For the first time, this will all be done for you quickly, affordably, and more effectively than ever.

The Optimal Training Solution

The system we have developed was designed with the singular purpose of providing you with a truly individualized training program based on all the principles discussed throughout this book. All you have to do is perform a series of tests and then let the system go to work creating a custom training program for you.

We have very carefully chosen the direct testing protocols the system relies on based on a great deal of biological research and many years working with athletes. This system is truly a joint effort with the world renowned coaches/scientists from Omegawave and I believe it represents a quantum leap forward in scientifically based programming.

In close association with the information the Omegawave system itself provides, the tests we've selected will determine seven key areas of physical preparation:

1. Strength Abilities
2. Speed/Power Abilities
3. Speed/Power Endurance
4. General Endurance
5. State of CNS and Reaction Rate
6. State of Cardio-Pulmonary System
7. Resistance to Hypoxia

Many of the specific tests utilized to determine these areas of preparation have been previously discussed, but several are also unique to this assessment and will be more thoroughly detailed for those who are in the program. An overview of the tests that can be used in the physical preparation assessment includes:

Strength Capacity/Evaluated using strength exercises (1 rep max)

- Upper extremity strength and chest muscles—bench press
- Lower extremity strength – squat
- Back – deadlift

Speed/Power Abilities are evaluated using the following explosive exercises:

- Upper extremities—push-ups (max amount per 10 seconds)
- Lower extremities—standing long jump

Speed/Power Endurance is evaluated using activities with body weight

- Core Endurance – full sit-ups (max repetitions for 2 minutes)
- Upper Extremities—chin-ups (max reps); push-ups (max reps)

General Endurance is evaluated by modified Cooper Test

- Distance covered in yards per 6 minutes of running

State of Cardio Pulmonary System is evaluated using the body weight squat test

- 30 squats per 45 seconds
- Heart rate measurements before exercising, immediately after, and at the end of the first and second minute of recovery

Resistance to Hypoxia is evaluated by a breathing test

- Length of time breath held on the exhale and the inhale

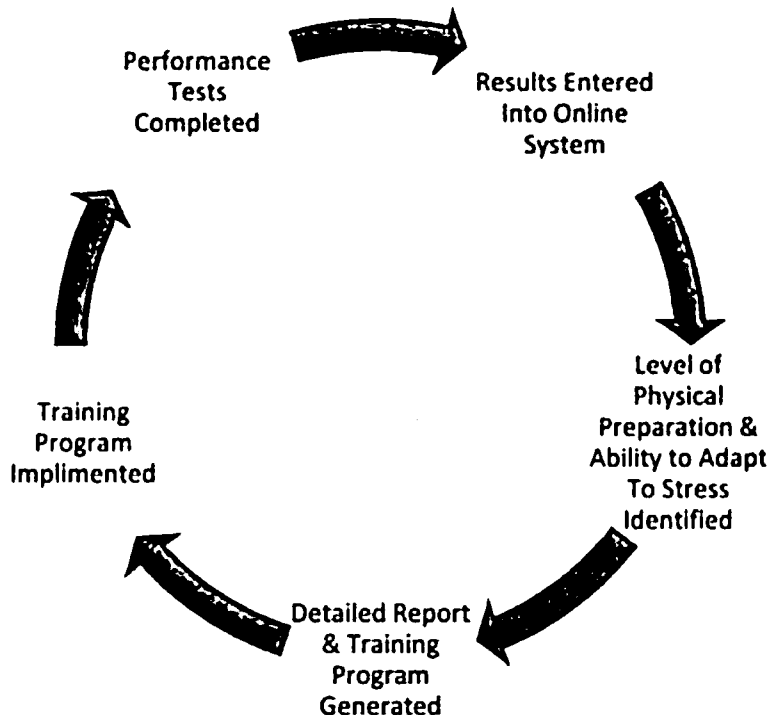
State of CNS and Reaction rate is evaluated by the stop watch test

- Starting and stopping a stop watch in the fastest time possible

Once the necessary testing results have been obtained, our proprietary system uses a complex algorithm to determine your **individual level of physical preparation** along with your **ability to adapt to stress**. You will receive a detailed analysis and breakdown of your performance and grades in each of the different areas evaluated. Along with this report, a completely individualized training program will be generated based on your specific assessment results.

The training program provided will include a weekly breakdown of your strength and conditioning sessions along with important guidelines to follow for your MMA training as well. Not only will you save all the time and effort that it takes to develop an effective program, but you can also be confident that your training program was designed to meet your individual needs and maximize your performance. An overview of this entire process can be seen below.

Optimal Training Solution (OTS) System Process (fig. 19)



Coming Soon

Over the last few years, I have been asked countless times if I offered online training or could help write programs for various fighters that I did not have direct access to and could not personally work with. I have almost invariably turned such requests down because, without access to the necessary assessments, I too would be forced to do little more than make educated guesses when it came time to write out their training program.

When someone's career is on the line and thousands of dollars can be won or lost in a split second, making educated guesses isn't good enough. Even if I was right almost all the time, I wouldn't want to be responsible for the one fighter who over trained and lost their fight because they couldn't handle the volume and intensity I prescribed. I also wouldn't want to have fighters say my programs didn't deliver as promised because I had been too cautious about really pushing the edge of training for fear of the risk of pushing too hard either.

The truth is that there is often a very fine line between training hard enough to dramatically improve performance and training so hard your body can't recover properly. I've been able to use the Omegawave system to help my athletes walk along the edge of this fine line without going over, but until now I didn't have a way to offer the same level of individualized programming to fighters I couldn't test and work directly with.

This is a problem I have long sought to solve and as of this writing, I'm working hard to launch this revolutionary program to the first beta testers in the fall of 2009. The first phase of the program will revolve around the use of the testing protocols discussed above. Eventually, these will be complimented with a new piece of hardware being developed based on the same heart rate variability technology that the Omegawave System itself uses in the near future.

This is where the future of training truly lies and where technology will make things exciting. For the first time ever, you will have a way to objectively measure your body's response to training on a daily basis. There is no doubt this will take individualized training to a whole new level as each day you can receive a workout specifically suited towards your individual ability to adapt to various levels of volume and intensity at that precise moment.

Never before has this kind of program individualization been available, all the way down to the daily level. With just a couple of minutes of testing performed at rest and a quick wireless interface with our online software, you will have the ability to get an inside look at the performance capabilities. You'll see how well each your body's different systems are adapting to training and get a precise training program for that day based on the results.

This powerful information is what is needed to be able to truly push your body to the very edge of its training limits without going over. Overtraining and undertraining will become a thing of the past as you are able to train on a daily basis with precisely the correct levels of volume and intensity. If you are excited about the potential of this system and want to be one of the first to take it for a test drive, visit www.8weeksout.com and register for the beta testing program.

Conclusion

Designing effective training programs has been the subject of intense study and trial and error since the beginning of competitive sport. As far back as 1977 with Soviet scientist Leonid Matveyev's original groundbreaking text on periodization "Fundamentals of Sports Training" coaches and scientists alike have discussed and dissected various training plans from just about every angle imaginable.

Unfortunately, in the U.S., our discussion of periodization has largely been driven by those who are most vocal on the subject despite the fact that many of them do not seem to understand very basic training principles. Very few "experts" offer models of periodization that are even built around the most fundamental principles of how the body adapts to stress.

The fact that many fighters and athletes have been led to believe by many that the most effective way to program is to throw everything together all at once, seemingly at random no less, speaks volumes to the general lack of any and all scientific validity in many popular approaches to programming. Many athletes and coaches also seem to constantly be searching for the single most effective method (see the Intervals vs. LSD debate). Sadly, this pointless argument seems to miss the point of effective programming altogether. There is no single best method. Each method is just a tool that is only as good as its specific application.

In any event, my sincere hope is that this section on programming has shed some much needed light on the practical implications of developing training programs between fights. Because most people reading this book want information they can immediately put to use rather than elaborate discussion of training theory, I have outlined a simple and yet powerful approach to using the block training system in MMA.

This Block Training System approach to training has been around for many years in one form or another, but mostly it seems to be poorly applied and understood. This has especially been the case in MMA, as many have used the varied physical demands of the sport as a reason to try to improve the whole range of physical abilities together at once.

After reading this far, you should now understand why this approach will only get you so far and why your performance in a fight will be limited by your training efforts between fights, not just in the weeks leading up to it. If you are serious about becoming a better fighter, the time to do so is between fights. This is the time when you can focus all your training effects on systematically improving your level of physical preparation. This approach may take patience and foresight, but I can assure you it will pay off in dividends.

With that important principle in mind, the next and final chapter on programming covers the most effective way to get in "fight shape" using the same block system approach to programming. This is a book about Ultimate MMA Conditioning after all, and I'm sure you're anxious to see the fight prep blueprint I've used to help get many of today's top pros in the best shape of their careers. In Chapter 8, you'll discover how to put this blueprint to work for you.

Getting Ready to Fight

Chapter Eight

If you're a competitive fighter on any level, this final chapter on programming is the one you probably bought this book for. No matter whether you've only had a couple of fights, or you're a seasoned veteran in the fight game, you know that getting ready for a fight is one of the most mentally and physically challenging things you can ever put yourself through.

Not only do you have to work to fine tune your technical skills and develop a strategic game plan, you also have to get yourself in the best possible condition so you can be prepared to last from bell to bell if necessary. There is little doubt that conditioning often plays a role in the outcome of a fight and the last thing you ever want to do is feel yourself starting to gas while your opponent is coming on stronger.

Now that you've read up to this point, assuming you didn't skip ahead to this chapter, you no doubt have a much more thorough understanding of what energy production is all about. You appreciate how the different systems of your body all work together to generate the power it takes to throw explosive punches, kicks, knees, elbows, go for submissions, etc. In the last chapter, you also learned the principles of putting together a training program between fights to increase how much energy your body is capable of producing.

The only thing that's really left to do now is teach you how to apply everything you've learned and turn it into a fight specific conditioning program. The blueprint I'm going to lay out for you in this chapter will give you a working template for developing fight specific programs based on all the principles outlined in this book, as well as more than 6 years of my own experience training many of the best fighters in the world.

If you follow the sport of MMA at all, it's virtually certain you've watched one of the many fighters I've trained in the UFC, Pride, K-1, Dream, etc. and seen the end result the approach you're about to learn. The training blueprint presented in this chapter is the product of years of research, a great deal of trial and error, and endless fine tuning.

Regardless of your individual ability, training experience or opponent you might face, the right fight specific conditioning program will help you be as physically prepared as possible when you step in the ring or cage. Just the same, a poorly designed or executed conditioning program can leave you ill prepared, sucking wind, and vulnerable to an opponent who is better conditioned.

Win or lose, the only thing you can really have total control of in a fight is how well prepared you are for it. I can guarantee that if you follow the basic principles and strategy laid out for you in this chapter, you will square up against your opponent knowing you did everything possible to get yourself physically ready to fight.

Principles of Specific Conditioning

To begin the discussion on developing fight specific conditioning programs, it's imperative to start by making sure you're clear on what getting in "fight shape" is really all about in the first place. The following principles will give you an overview on the specific conditioning process and how you should go about preparing for a fight. Your conditioning program leading up to a fight should always follow all of these fundamental principles and guidelines.

Principle #1: You should never be completely out of shape

As I touched on in previous chapters, the last weeks before a fight is not the time to go from being totally out of shape and poorly conditioned, to being ready for the grueling demands of a fight. Far too many have this idea that it is okay to be in relatively poor condition in between fights and that getting ready for a fight is just a matter of doing some extra cardio after practice.

This approach is exactly why fighters often gas out and end up face down on the canvas. It is also the same reason why certain fighters never seem to get better over time and basically look the same in every fight. You should consider fight specific conditioning simply as the natural extension of the general strength and conditioning work that you're doing year round.

Principle #2: Specific conditioning bridges the gap between general conditioning and a fight

Your conditioning program in the weeks leading up to a fight should not be designed to just get you in shape, it should be designed to teach your body how to take the energy production you are capable of, and specifically apply it to the demands of fighting.

You should look at the MMA technical side of the equation leading up to a fight in much the same way. If it's three weeks out from a fight and you're working on learning completely new MMA skills you've never trained before, you're in big trouble. Getting ready for a fight is not the time to learn new skills. Instead, it's the time to put together all the skills you've learned and work on applying them within the context of a specific fight strategy and game plan.

Remember, your skills are ultimately only as good as your ability to use them in an actual fight. You can be the most technical fighter in the world when it comes to hitting pads and heavy bags, but if you can't use this technical ability in an actual fight, then it won't do you any good.

Along those same lines, your fight specific training program needs to build on the energy system development you've trained so hard for to make sure you can use this development up to its maximum potential in a fight. There is nothing worse than feeling like you had a great training camp and you're in great shape, only to end up completely gassing out in the second round, wondering what went wrong. This is the difference between general conditioning and specific conditioning and this is where a lot of fighters make mistakes in their training.

Principle #3: Specific conditioning must be as specific to your fight as possible

In order to make sure you're able to use every last ounce of energy your body is capable of producing, your fight specific conditioning program needs to be exactly as the name implies and "specific to your fight." The closer you get to your fight, the more specific it should become.

This means that rather than spending all your time and energy doing general exercises like sprinting or strength training and such for conditioning, you should be focusing on specific exercises like MMA technical drills and live sparring. Although there is a time and place for using methods and exercises that aren't completely specific to MMA while getting ready for a fight, everything you do must serve the purpose of preparing you for your fight.

You should not be 3-4 weeks out from a fight and working on improving your max strength. Not only do you not have enough time left to really see much of an improvement, but this type of training will take away time, energy, and adaptation that your body needs to be focused on the specific needs of your fight.

Far too often, I see fighters wasting time and energy trying to train something that there is just not enough time to really improve. Leave this type of developmental training to another time when you don't have an upcoming fight and you have enough time to really concentrate on it properly. Specific conditioning requires you to focus all your training efforts on the specific needs of your fight.

The closer you get to the fight, the more time you must spend in training trying to match the work rate and round structure of your fight. If you remember back to the discussion on the brain and nervous systems role in fatigue, it's clear that the most effective way to maximize your energy utilization in a fight is to simulate the exact energy system demands as close as possible.

In order to do this, you have to use the same round length, rest intervals, and total fight duration in training. If you are going to be fighting for 3x5 minute rounds with 60s of rest between rounds, then you need to start building your training sessions around this structure and matching this work: rest ratio. Later, we'll discuss how to do this properly.

Principle #4: Test and Track Your Conditioning Heart Rates

This is a very important principle that I rarely see anyone implementing in their fight prep process. While using heart rate monitoring in your conditioning is not a completely foolproof or 100% precise gauge of conditioning, it does provide you with a very good overall objective feedback tool and trends that you can use to measure progress.

Without any specific analysis, you are essentially just going by subjective measures of how your conditioning "feels" and this can be deceiving. Using a heart rate monitor is an absolute must.

You should use your heart rate monitor in two ways. First, you should be using it in your conditioning specific drills as a feedback tool to monitor heart rate recovery time between reps and sets. Use specific heart rates, as suggested in the sections on energy system development, as your guide to when to begin the next set.

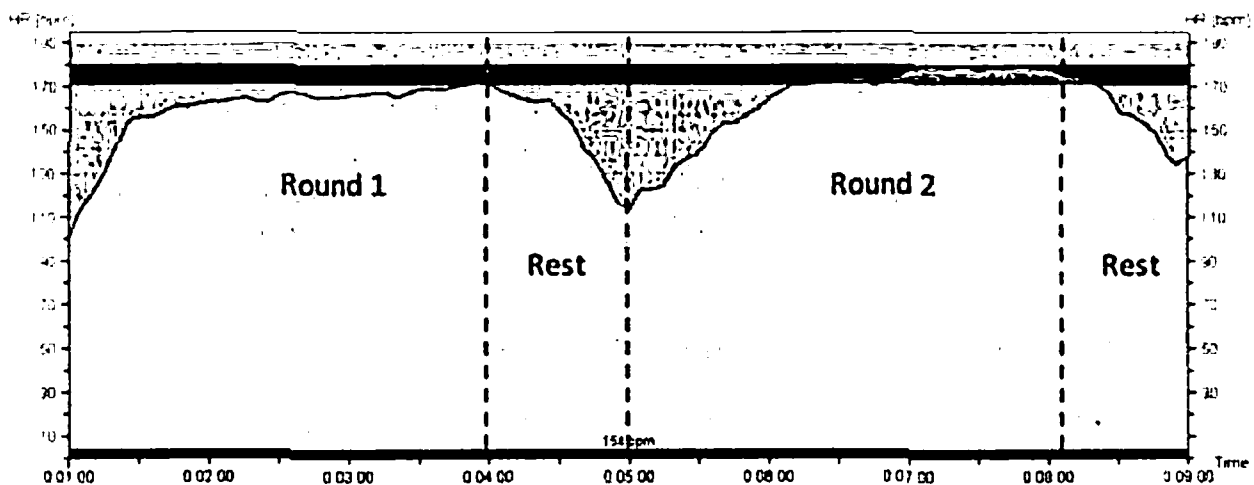
Second, you should be using your heart rate monitor to get a gauge for your specific conditioning by measuring average heart rate, max heart rate, heart rate recovery between rounds or sets, etc. When your heart rate comes down faster, or you can maintain the same work rate at a lower average heart rate, it is a clear indication your conditioning is improving.

If you have my suggested heart rate monitor for MMA, the Polar RS100, you can use it to generate fight specific profiles of your sparring rounds. If you don't yet have this monitor, you can buy one directly from my website, 8weeksout.com, and I'll even send you a more detailed guide on how to use it effectively.

The reason I highly recommend this specific heart rate monitor is because it gives you a lap function and this allows you to keep track of average and max heart rate for each round or set you do. From there, you can use this information to build graphs in excel that give you a profile of what your heart rates profile looks like.

In the graph below, you can see an example of what one of these heart rate profiles look like. From the Polar watch, you will want to record and write down the max heart rate and average heart rates in each round and rest interval, as well as what the heart rates were at the time you pressed the lap button.

Heart Rate Profile - 2x3 min. Kickboxing Rounds (fig. 19)



As your conditioning improves, you will see your average heart rates per round going down, as well as your heart rate recovery improving between rounds. Later, we'll discuss the details of this further, but the important thing is that you take the time to use a heart rate monitor and track all the information it gives. This is an essential part of making sure you're ready to fight.

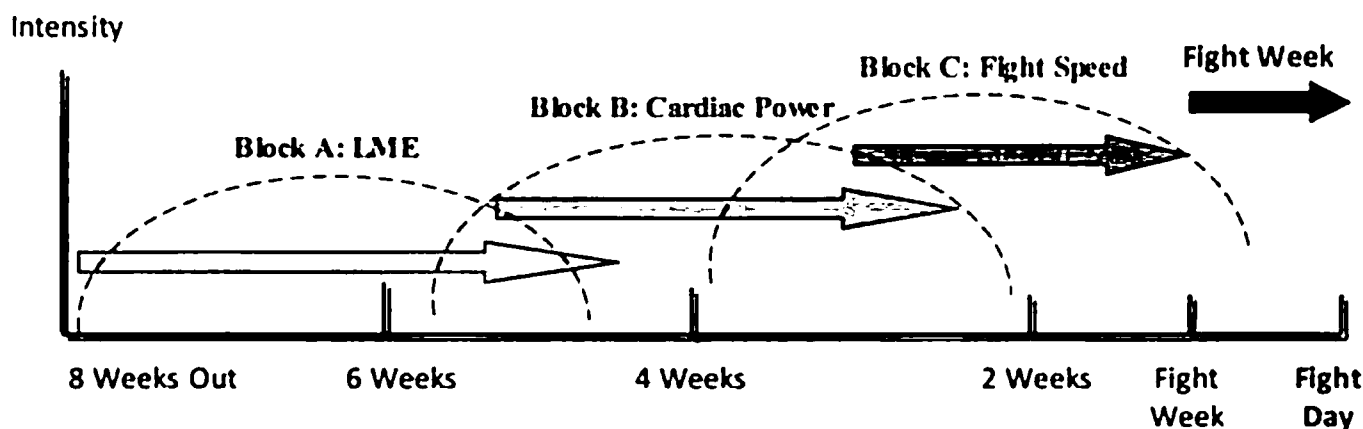
Principle #5: Follow the Plan

The rest of this chapter will be devoted to outlining the fight conditioning training blueprint that I've developed over the last 6 years. It incorporates all of the previous 4 principles, as well as everything else you've learned in this book, into one cohesive training strategy designed to make sure you're in absolute peak physical condition on the day of your fight.

I developed this training strategy around three specific training blocks, each with a unique purpose and goal. The adaptations you will see from the methods used in one block develop the necessary level of physical preparation for the next training block. This makes it absolutely essential that you follow the training timeline exactly as I've outlined for the best results.

As you can see in the timeline below, the three blocks will take you right up to the week of the fight. You should note that the blocks are overlapping. You don't simply stop one block and then begin the next. Instead, there is a smooth transition where the methods from the next block gradually replace those of the preceding block. In this way, continuity in training is maintained and you will see continued improvement through each specific phase of training.

Fight Specific Conditioning Program Timeline (fig. 20)



Over the next several pages, I will outline the basic training principles and methods for each of the three blocks as well as for the week of the fight itself. From this blueprint, you will then have all the tools you need to create your own specific fight conditioning training program.

Now, I know you may be wondering why I don't just give you a day by day training plan to follow, but the answer is because there are simply far too many variables and the one size fits all approach never leads to the best results. Everyone is different and has different work capacity, training experience, different rules to fight under, schedule limitations, etc.

The only way to truly take your conditioning to the next level is to take all of these into consideration when developing your program. Don't worry, though, once you understand the principles of each training block, designing your own program becomes a much easier process.

Block A: Local Muscular Endurance

The first training block, focused on increasing explosive power and local muscular endurance, should begin approximately 8 weeks out from your planned fight date. It marks the beginning of the transition from general to specific conditioning and the start of your specific fight program.

This block is extremely important because it lays the necessary foundation, namely an overall increase/optimization in the oxidative and contractile properties of both slow and fast twitch fibers, necessary for the performance increases that you'll see in the later training blocks.

The primary training goals and specific adaptations of **Block A** are:

1. Oxidative capacity of slow and fast twitch fibers
2. Contractile properties (speed of contraction/relaxation) of slow and fast twitch fibers
3. Peripheral vascular development

All of these specific adaptations result in increased oxygen utilization in the working muscles used primarily in MMA. In other words, local muscular endurance improves in the muscles most specific to MMA. By design, some of the methods used to achieve these adaptations utilize the alactic system and this will stimulate an increase in the potential for explosive power and speed in these muscles as well.

As part of this goal, this block features the highest volume out of the three in terms of strength training exercises, and exploits what is known as the Long Lasting Training Effect (LLTE). Put simply, this principle means that when you use concentrated loading blocks – phases of training where you're using high volume and high intensity –you will see a temporary decrease in strength and power followed by a subsequent and continued rise in these abilities once you reduce the volume.

In other words, the LLTE is basically a big rebound effect and if you've ever taken a brief layoff from training and then come back only to find that all your lifts actually went up, you've experienced this effect first hand. By concentrating the highest volume of strength training exercises in the first few weeks of the training camp, we can then cut the volume of this type of work significantly over the following weeks and still see a continued increase in strength and power leading right up to the fight.

If you're coming into your training camp with a fairly solid foundation of aerobic development, you can distribute the majority of your volume in Block A around these strength training methods and see an increase in explosive power and local muscular endurance. If you've made the mistake of letting yourself get out of shape or don't have a solid foundation of general endurance in the first place, however, you will need to spend more time on the cardiac output and vascular development. This is a very important principle and must not be neglected or your performance in the rest of the blocks and your fight will be compromised.

Training Principles

In order to see the best results during this first training block, you must adhere to several *overall training principles*. These principles will ensure that the correct adaptations are being stimulated and you're not doing anything to compromise the training effects.

1. Always remember that it is absolutely essential to your success that during each block all of your training needs to be focused on the specific goals and adaptations. That means the MMA training you do during this time must also reflect and adhere to the key principles of each training block as well. I cannot stress enough that if you fail to use this coordinated approach in all the training that you do, your performance will suffer.
2. The vast majority of your training during this first block needs to be done in the aerobic development zone. This means that the majority of your training will be done with heart rate under your anaerobic threshold. During your MMA training you will likely exceed this threshold at times, but if you can minimize this and focus mostly on fight specific drills and technical tactical aspects done at lower intensities this is the best approach.
3. If you have a poor level of aerobic development, you will need to perform a higher volume of low intensity work to increase eccentric cardiac hypertrophy and improve cardiac output. Also, if you lack general strength then you will need to decrease the volume of explosive power/local muscular endurance and instead use more general strength exercises. This is not the optimal approach, but if you are coming into camp completely out of shape, then it's really the only choice you have.

Training Methods

The most effective methods for Block A are, of course, those that target local muscular endurance and explosive power. You can also use some more general aerobic training methods during this block as well, but this work should take place closer to the beginning of the block than the end.

1. Explosive Repeat Method
2. Aerobic plyometrics
3. High Resistance Intervals
4. *HICT*
5. Tempo Method
6. Cardiac Output

These six methods are the most appropriate for this block and should make up the majority of your training volume. If you're coming into training camp with a solid foundation of aerobic development and general strength, you should focus your efforts primarily on the first three methods. If you're not, however, you'll need to spend more of your time on the last three methods instead. Make sure to always follow the recommended guidelines for each method.

Training Volume

Block A should be comprised of three to three and a half weeks and should include a total of **8-10 focused training sessions** designed around the goals of the block. Generally, I recommend distributing these workouts in the following manner:

Week One: 2 training sessions

Week Two: 2-3 training sessions

Week Three: 3 training sessions

Week Four: 1-2 training sessions

You should also slightly increase the volume of work done in each training session in weeks 1-3 and then decrease it in the last two training sessions. Exactly how many reps and how many sets you should do during each session will depend on your individual work capacity, your MMA training schedule, and how well you are recovering and adapting to your training program. More volume is only better if you are able to adapt positively to it and you should not increase training volume if you notice yourself recovering poorly from training.

Some of these training sessions should be performed entirely separate from your MMA skill work, and some of them can be integrated into one workout of both MMA and conditioning. If you have more time to dedicate for training and a higher work capacity and training experience, then you can separate them out and do them in separate workouts. If you have a demanding work schedule, less training experience, etc., then you can integrate the conditioning sessions into your MMA training.

In the first few workouts, you can use more generalized training exercises, while in the last few workouts you should begin using more MMA specific exercises instead. Make sure to follow the recommended guidelines for which exercises to use depending on the specific training method you are using.

Summary

The first training block is, in many ways, the most important because it sets the stage for your development over the last several weeks leading up to the fight. If you do not do the right things in this block, you will not be ready to perform more intense work in subsequent blocks and your entire training program will suffer. If you train correctly however, you will reap the benefits over the weeks to follow and be in the best condition possible come fight time.

Unfortunately, many fighters use the first few weeks of their training camp just to get their aerobic development up to par and thus they can't really take advantage of the correct training sequence. If you've spent the necessary time in between fights building a solid aerobic foundation, however, your first few weeks of training camp can be much more productive and you can see a marked increase in your explosive power. In the next training block, Block B, you will take advantage of this power and develop it further into an increased speed of movement.

Block B: Cardiac Power

The second training block shifts the focus from local muscular endurance, to the power and endurance of your most important muscle, the heart itself. Developing the heart correctly is an extremely important component of conditioning because it serves as the engine that drives the entire aerobic system.

If the heart is not conditioned properly, it will ultimately not be able to deliver as much blood and oxygen to the working muscles as you need and you'll fatigue much faster. The training principles and methods in Block B will prepare your heart and entire aerobic system for the intense demands of fighting.

As such, it's important to note that Block B represents an increase in intensity from the previous training block. In order to train the heart properly, you will need to take it to its outer limits and maximum heart rates. This type of training is mentally and physically challenging, but it is also absolutely essential to your conditioning and must be done.

The specific goals of Block B are:

1. Increase in contractile properties and endurance of myocardium (heart muscle)
2. Development of maximum VO₂ (aerobic power)
3. Reduction in mechanisms of central fatigue

Together, the adaptations that result from these goals will increase how much power you're able to generate aerobically and make your heart more resistant to fatigue at higher heart rates. *The end result is greater aerobic conditioning and a level of improvement even in the upper end of anaerobic heart rates.*

Achieving the third goal in particular, reducing central fatigue, means this block also marks the progression into more specific conditioning. In other words, a greater percentage of the work done in this block should come in the form of MMA specific conditioning drills such as pad and bag work for striking, along with wrestling and submission type drills. You will also begin to use sparring itself, as one of your conditioning methods. Towards the end of the block, the vast majority of your conditioning work should be completely MMA specific.

Following this guideline is essential because in the next training block, Block C, your conditioning will be virtually 90% MMA specific. This means it is absolutely vital to build the foundation for this work properly by beginning this transition in Block B. This will ensure a smooth and continued level of improvement in your fight specific conditioning and will allow you to train much harder in the last and final conditioning block.

Remember, the principles and methods in each block were designed to compliment and build on each other. Your improvement in each block depends on the work you did in the previous block and sets the stage for your performance increase in the next block as well.

Training Principles

There are three primary principles that must be strictly followed in order to ensure the necessary adaptations are achieved. Failure to follow any or all of these principles will lead to less than optimal results.

1. When doing the cardiac power training sessions, you absolutely must use 100% intensity. The goal of these sessions is to achieve the maximum heart rate possible and sustain it for as long as possible. By doing this, you stimulate the heart to increase its power and endurance so it has the ability to deliver oxygen to the working muscles longer. It can be extremely mentally challenging to sustain such high heart rates, but without 100% intensity you will not see the same results.
2. Because the cardiac power intervals must be done at such high heart rates and intensities, you run the risk of decreasing mitochondria and thus the oxidative abilities of the muscles that you developed in Block A. The best way to mitigate this is through the incorporation of methods like HICT and HRI, and even aerobic plyometrics, in moderate volumes to keep a high level of mitochondria within the muscles.
3. In this block you will be using a good volume of MMA specific conditioning drills. You should get creative in this aspect and use drills that are also as fight and opponent specific as possible. For example, if you are going to be fighting an opponent who is a good wrestler that you know will be going for takedowns, then incorporate drills defending the takedown, getting up off your back, etc. This is where you and your MMA coach should work together to analyze the specific training needs of your fight and develop a fight specific game plan. Whatever your plan might be, the more of it you can incorporate into your MMA specific conditioning drills, the better off you will be.

Training Methods

You will be using less training methods than in the previous block as your training becomes more targeted on specific areas of development.

1. Cardiac Power Intervals
2. Threshold Training
3. HICT & HRI
4. Strength-Aerobic (low volume)

Although there are five primary methods you can use in this block, the majority of training volume will be comprised of the first two methods. These three methods will stimulate the necessary adaptations to take place in the heart, while the second two are used more for maintaining the qualities developed in previous blocks and will be done at much lower volumes. It is essential to use these methods in the correct sequence over the entire training block while managing volume and intensity appropriately as outlined.

Volume & Intensity

In Block B, you will begin to tightly integrate your conditioning sessions and your MMA training so you must manage the volume and intensity of all your training as a whole. This training block should last about three weeks and the first workouts should begin about five and a half weeks out. This means that this training block should take you right up to about two and a half weeks out from your fight.

In each of these three training weeks within this block, you will want to increase both the volume and the intensity of your training sessions to ensure continued progress. You will also begin to more closely integrate your MMA training and conditioning sessions and by the end of the third work, all your training will focus around the use of specific methods.

It's also important to note that exactly how much training volume you use during this block, and the next one as well, is very individually specific to your training experience and recovery abilities. If you're more experienced and capable of greater overall work and recovery, then you can use a much higher overall training volume.

If you are fairly new to the sport and don't have many fights under your belt, however, you need to be aware of how your body is recovering from training and make sure you are not using more volume than you can recover from. It can be very easy to for an amateur to feel like they have to be killing themselves in the gym every day to get ready for a fight. Keep in mind, though, that all the training in the world won't do you any good if you can't recover from it. You can easily end up feeling flat and overworked come fight day if you don't use an intelligent approach to managing your overall training program volume.

In order for this training block to be the most effective, you'll want to follow precise training guidelines for each week.

Week One

The first week of Block B overlaps with the end of Block A so you'll want to start with a lower volume of training in the first week. In addition to the training of Block A, You should perform:

- 1 session of Cardiac Power Intervals – should be done separately from MMA training
- 1-2 sessions of Threshold training – this should be done in the form of sparring or MMA drills and circuits
- 1-2 sessions of HICT – good for recovery purposes and maintaining oxidative abilities

Because you are getting in 1 session of high intensity work in the form of the Cardiac Power Intervals outside your MMA training, your sparring and MMA training should be done at lower intensities and volumes. This means if you are going to be fighting in 5 minute rounds, you should be using 3 minute rounds in training at this point. Try to maintain a good work rate, but you should only be around 75-80% of your max intensity in this first week of the training block.

Week Two

In this second week of Block B, your training in Block A will be finished and your program will focus entirely on methods of Block B. You will also begin to increase the Intensity and volume of training by performing more overall training sessions and higher intensities. Your use of MMA specific drills and sparring rounds will also increase as your training becomes more and more specific to your fight.

This second training week of Block B should include:

- 1-2 session of Cardiac Power Intervals – Should be done as part of MMA training using specific MMA drills
- 2-3 sessions of Threshold Training – should be done as sparring or MMA specific drills Begin to increase the length of sets and number of total sets in this week
- 1 session of Strength-Aerobic – should be done to at moderate volumes to maintain strength and stimulate hormonal production. Perform on non MMA training day
- 1-2 sessions HICT/HRI – Can be used as active recovery in between training sessions

During this week, you should also increase your work rate during MMA training drills and sparring and add rounds. If your sparring was 3-5x3 minute rounds in the previous week, you should increase this to 5-8x3 minute rounds in this week. In other words, pick up your training pace up to the 80-90% Intensity range and increase your training volume in this week.

It's also important during this time to make sure you are using a heart rate monitor to measure your recovery between rounds. You can use slightly longer recovery times than you'll have in your fight during this week, with the goal being a recovery to heart rate of 130-140 between rounds. This should be taking no more than 60-90 seconds between rounds at this point and if it's taking much longer than that, slow down your pace and/or decrease the number of rounds.

Week Three

At the start of this final week of Block B, you will be roughly three and a half weeks out from your fight. At this point, you will begin to train as specific as possible in terms of work rate and total duration of your fight. Doing this helps your body learn to use its energy production potential to the limits and ensures you are ready for the specific demands of the fight.

In this week you should perform:

- 1-2 sessions Cardiac Power Intervals – Use all MMA specific technique and tactical drills
- 2-3 sessions Threshold Training – Use sparring or MMA specific drills
- 1-2 HICT/HRI – Use as active recovery after intense sessions
- 1 session Strength Aerobic – This will be your last strength workout and should be done at low to moderate volumes

Remember, it's important to make sure that in week three your sparring and MMA specific drills are structured around the same timeframe as your actual fight. If you will be fighting 3x5 minute rounds with 60 seconds rest, then you should use this same structure in the majority of your training. You should aim for 80-90% intensity for every round, and it's important that you get used to maintaining your power for the same duration as necessary in the fight itself.

You should also continue monitoring your heart rate recovery and it should now be dropping faster between rounds, even as you start to increase your training pace. You should be getting down to heart rates of 130-140 within 60-75 seconds after most rounds. Your average heart rate per round should not be more than the mid to upper 160s to low 170s for most people, depending on age and round length of course.

Regardless of where your exact heart rate numbers may be, what you want to see is improvement over the course of training. You want to see your heart rate dropping faster between rounds and your average heart rate staying the same or even going down even as you increase your pace.

These markers are a clear indication your fight specific conditioning is improving and if you are not seeing these things happen, then you need to evaluate your training program and determine what changes need to be made. Using the Polar RS100, it is very easy to monitor your average heart rate per round and your heart rate recovery between rounds.

I recommend you use an excel spreadsheet, or just write it out by hand, to keep track of how your heart rate changes during the course of your training. It is an invaluable training tool for future fights to be able to see where your heart rates and training volumes were at various points in your previous fight prep programs.

Summary

By the end of this second training block, you will be just two and a half weeks away from fight day. The specific adaptations that result from the work done in this block will improve the strength of your heart and its ability to deliver oxygen for longer periods of time. This means that when you are in last minute of a round, or the last minute of a fight, your cardiovascular system will still be able to deliver as much oxygen to the working muscles as possible.

The end result, of course, is greater endurance and power-endurance throughout the entire fight. Because your training in this block also becomes much more specific to your fight, your body will begin to learn how to most efficiently use the energy you are capable of producing.

It's important to note that these adaptations in the heart will last for 2-4 weeks even after you stop training them. This means that *even without the continued use of the same methods*, you will still continue to see the benefits over the last few weeks of your fight training program. These adaptations set the stage for the next block, Block C, where all your training will be specific to your fight. This marks the final training block prior to fight week.

Block C: Fight Speed

There is no room for slow in a fight and in this final two week training block prior to fight week, you will be focusing all your efforts on increasing your work rate, i.e. the speed and power that you're able to maintain throughout a fight. To do this, you will need to increase the intensity in this block up to as close to an actual fight as possible, as well as simulate the exact round times and rest intervals that you'll be using in your fight.

All your training in these last two intense weeks of training should be specific, there is no more time left for more general conditioning work. Far too often, fighters will be doing non-specific training right up until the end of their training.

This is a mistake simply because you need all your energy and effort to be going into the specific training that is necessary to improve how well your body can use the energy you are capable of producing. The last thing you need in this stage is to be too tired to spar enough rounds or perform your MMA specific drills because you ran a bunch of sprints or other non specific exercise.

As we discussed before, general conditioning helps increase how much energy you can produce, and specific conditioning teaches your body how to most efficiently use that energy within the demands of an actual fight. Because of this principle, it is wasted effort to be doing general conditioning when you're only a few weeks out from your fight. Not only will this not help your conditioning in a fight, but it will leave you fatigued and unable to put as much energy into your MMA specific work. Don't let yourself make this same mistake.

Given that principle, the specific goals of Block C are:

1. Increase the work rate over the total duration of the fight
2. Finalize the technical and tactical aspects of MMA skill
3. Prepare the body for peak performance on fight day

Accomplishing goal number one means that by the end of this training block, your conditioning should be at its highest level of training so far and ready for the fight. You should be capable of maintaining the same speed and power that you'll need in a fight, for the same total duration as your fight could go. If your fight will be 3x5 minute rounds, then by the end of the block you should be able to sustain a fight pace for that entire time.

The second goal is a matter of finalizing the details of your fight specific game plan and making sure you can properly execute the fight strategy you and your coach have come up with. You should be prepared for whatever your opponent may throw at you, and have drilled over and over again how you're going to counter and react to your opponent's tendencies and tactics.

Finally, although the intensity of this training block will be the highest of any of them, the end of it also marks the end of intense training and the start of your week of fight preparation.

Training Principles

You must pay very close attention to the training principles in this final block as the closer you get to the fight, the less margin of error you have if you want to be in top condition. All of your training and nutrition needs to be dialed in and you must stay 100% mentally focused on the task at hand. Anything less than this and you will not be as physically prepared as possible come fight day. During this final training block you must not stray from the following principles .

1. **Specific, specific, specific.** The closer you can simulate how you see your fight going during the two weeks of this block the better. This goes all the way down to trying to find opponents who present the same type of problems in training as you'll see in a fight. If you will be fighting a strong wrestler, for example, you should be doing your best to train with another wrestler or someone who can simulate the tenancies of your opponent. You must also simulate the round length, rest length, and comes as close to an actual fight pace as possible during this block as well.
2. **It's all about intensity.** The final two weeks prior to fight week should be very mentally and physically challenging. Because you are training at a very high pace and at a high volume, it can be easy become mentally fatigued at points during this block but you must push through this and focus on your training goals. Do not let yourself slow down in training or ease up in your pace or you will not see the same benefits.
3. **Make sure you are recovering.** Given that you'll be training at the highest intensity during this block and you've already been in camp for several weeks, it can be easy to let yourself start to overtrain during this block so you absolutely must use active recovery methods and pay extra attention to your rest, sleep, and nutrition during this block. We often have fighters do pool workouts during this block to help with recovery and still get some aerobic maintenance benefits while minimizing any impact on the joints as well. Swimming some laps and doing some water treading once or twice a week can be very beneficial. Aside from that, things like ice baths, saunas, hot yoga, deep tissue massage, etc. can all be used accordingly to help speed up recovery and prevent you from not recovering fully during intense training.

Training Methods

Because all your training at this point must be specific, you will be using very few methods.

1. Sparring
2. Threshold Training – MMA specific drills only
3. HICT/Cardiac Output – Active Recovery

A great way to help really push the pace in your sparring at this point is to rotate fresh opponents each round. This will up the intensity and force you to fight at a very high pace. Once you can keep up with a fresh opponent for each and every round, you're ready to fight.

Volume & Intensity

As previously discussed, your intensity needs to be at its highest during the majority of this block in order to prepare you for the grueling physical and mental demands of the upcoming fight. You should reach the peak of your volume and intensity in the middle of this block and then gradually reduce volume towards the end so that your body can get a chance to rest and recover for fight week.

Your last intense sparring session should be about 8-10 days out from your fight date. Also, because the beginning part of this block also overlaps with the end of Block B, you'll also want to begin Block C with slightly lower training volume.

Remember, this is a very short high intensity training block designed to get you in peak fight condition and prepare you for the specific demands you'll face in a fight. Your training during these two weeks must be of the highest quality and completely focused on your upcoming fight.

Week One

The first part of week one will overlap with Block B so you will need to manage your overall training volume around the training sessions of that block. By the end of Block B, your training should have become all specific, however, so there should really be a seamless transition between Block B and Block C.

The only real difference between the end of Block B and the training in Block C is that the latter should have a focus using the exact round, rest structure, and intensity of an actual fight. In Block B, you were using less total rounds and slightly lower intensities and work rates, but in the first week of Block C you will crank this up a notch and work to maintain the highest possible work rate throughout the same number of rounds you'll face in a fight.

Week one should include:

- 2-3 Sparring sessions performed at fight pace for same duration as fight
- 2-3 MMA specific skill and drill sessions performed at fight pace
- 1-2 Active recovery sessions – can be HICT, low intensity cardio, swimming, etc.

Keep in mind that some of these sessions include those workouts that will be done at the end of Block B. Also, remember that your training during both week one and two needs to focus on quality over quantity. You should get in the gym, get your training done, and then go home and rest. Spending hours in the gym at this point will decrease your recovery and take away from your training focus.

At this point, you should be able to execute your strategic game plan at fight speed. This means that whatever drills you've been doing should now be performed at the highest speeds and intensities possible to simulate how they will need to be executed in the fight.

Week Two

The second week of Block C is a very important week because it marks the end of your most intense training and the transition to the start of your fight week. Your most intense and highest volume training sessions should be in the beginning and middle of the week, with your last sparring session being roughly 8-10 days out from your fight. This last training session should also serve as a marker for your readiness to fight. You should be able to maintain a relentless pace through the same number of rounds as your fight will be.

You should also be using your heart rate monitor to measure your heart rate recovery between rounds. If you're in top condition, your heart rate should drop roughly to the low 130s between all rounds. Seeing this happen, even after a brutally hard fought round, is a very strong indicator that you are in great shape and ready to fight.

The training in this week should include:

- 2 Sparring sessions performed at fight pace for same duration as fight
- 1-3 MMA specific skill and drill sessions performed at fight pace
- 1-2 Active recovery sessions – can be HICT, low intensity cardio, swimming, etc

For the last few days of this week, you'll want to begin to decrease your overall training volume and begin to let your body recover fully from the last several weeks of training. The last 7-10 days before your fight are for rest, recovery, mental focus, and of course making weight. The last few days of this second week mark the start of this final countdown to fight time.

Summary

Fighting is a brutally intense and fast paced sport. Knockouts and submissions can happen in the blink of an eye and if you want to be the kind of fighter that finishes fights, you must be able to maintain a pace that your opponent simply can't keep up with. I'm talking about the kind of relentless conditioning that will give you the opportunity to capitalize on the sloppy mistakes your opponent will inevitably make as he gets tired and slows down.

Block C is the final and most intense training block and it will increase the pace that you're able to maintain throughout your fight. The higher the pace you can keep, the more likely you are to eventually break your opponents will and get the win. All your training in the previous two blocks has physically and mentally prepared you to be able to perform the high intensity and high volumes in this training block and it represents the final stage of intense training.

In the last week leading up to your fight, you'll be giving your body the chance to fully recover from the last 7 weeks of intense training so that you can be at your absolute peak for your fight. Depending on your weight class, you'll also have to deal with making weight. Fight week is an exciting and nerve wracking time for most fighters, but if you've followed the principles of all three blocks you can sleep easy knowing you're in top condition and ready for the fight ahead.

Fight Week

The week of the fight is where you really separate those who have been training hard and following a strict training and nutrition plan from those who haven't been. Over the years, I've seen many fighters from both sides.

I've been in Vegas and watched various fighters literally passing out in the sauna trying to drop the last bit of water. I've also had many fighters I've worked with who were able to easily drop the last few lbs simply by cutting their water intake the last 24 hours.

You don't want to be that guy who is practically killing himself trying to make weight just one day before the biggest fight of his life. Needless to say, most of these fighters do not end up performing their best come fight time.

If you've followed all the principles laid out in the previous three training blocks and spent the last 7 weeks training hard, training smart, and eating right, you will no doubt be close to your peak by the start of fight week. You should be within easy striking distance of making weight, and have only the last few lbs of water weight to drop.

Aside from mentally preparing yourself for the fight ahead, there are three primary goals you should be focused on during fight week:

1. Making weight
2. Allowing your body to fully recover from the previous 7 weeks of training
3. Maintaining your physical preparation

Achieving each of these goals takes some planning and some work, but the most important component to reaching them is making sure you've done the right things up to the start of fight week. No amount of training in the final week can make up for poor training and/or nutrition in the previous 7 weeks and trying to get in shape in shape and cut a bunch of weight in the last few days leading up to a fight is a recipe for disaster.

Making Weight

Although an entire book could be written on the process of making weight, cutting weight in the last week properly is really about having a detailed system that you refine and perfect over time. You should always take detailed notes of your final week preparation, weigh yourself each and every morning, be precise with your nutrition, know where your weight is at relative to where it needs to be, and make changes accordingly.

As long as you've done the right things leading up to fight week, you should have no more than a few lbs of water weight to drop in the last 24 hours before weigh ins. You should also have began water loading 10-14 days out from your fight date and started drinking 1.5-2 gallons of water per day. This will help your body drop the water weight later when you cut the water.

If you've done this properly, all you should have to do is simply gradually cut back on your calorie and carb intake a few days before you have to weigh in, and then cut your water intake the last 20-24 hours and you should easily be able to drop the last 5-10lbs in water weight. You may or may not have to get in the sauna to drop the last few lbs, but often times if you've water loaded and cut correctly you won't have to be in there for long.

All in all, the most important thing about making weight is to keep it as easy on your body as possible so it doesn't drain you of energy and resources before your fight. Far too many times, I've seen fighters have to drop too much weight in the last 24 hours and the result is that they end up coming out totally flat and fatigued come fight time.

It's also worth noting that another common mistake I've seen fighters make is to eat a huge amount of food, often times junk food, after making weight. The last thing you want to do is stress your body with a huge amount of calories to digest and process, particularly if they are coming from unhealthy high fat highly processed foods. Save them for after the fight.

Make sure to stick to foods you are used to eating and eat several smaller meals after weighing in and the next day and focus on your fluid intake. The idea is to make everything as least stressful on the body as possible and this means eating healthy, high energy, high quality foods that your body is used to digesting. This will go a long way in helping to make sure you don't feel flat and tired even though you may be in great condition when you get in the ring.

Rest & Recover

Along with ensuring you're able to make weight, the next thing you need to focus on during fight week is getting enough rest and complete recovery. Depending on the level you are fighting at, this can be an easy for a very difficult task. In the professional ranks, there are often a great many distractions that take away from your downtime and make it difficult to get as much rest as you need.

Virtually all of the professional organizations require their fighters to attend various promotional events, go through medical screenings, etc. All of these demands can take up a lot of time in the week of the fight and this can be compounded even more if you're in a foreign country or a city far away from home.

When you add in thousands of fans in the area, constantly looking to get a picture or an autograph or whatever, along with family and friends all flying in and wanting to get their tickets and give you their last minute advice on how you should fight, it can make for a busy, hectic and stressful week. This is the last thing you need when you're trying to relax and let your body get the rest it needs after a long hard training camp.

Even if you're not a seasoned pro and just an amateur in your first fight, chances are you are busy working a full time job, dealing with family, are nervous about getting into the ring for the first time, etc. so either way fight week can be very stressful and leave little room to relax.

Although you probably won't be able to get rid of all these potential distractions, the best way to help deal with them is to make a schedule and stick to it during fight week. Make sure you go to bed at a reasonable hour, wake up at a planned time, eat your meals regularly, etc. and try to make things as routine as possible throughout the week.

A good piece of advice is to also turn your cell phone off at night so you don't get late night or early morning calls/text messages that disrupt your sleep. If you're staying in a hotel, take the phone off the ringer as well. Chances are, you're already having trouble sleeping at night *because you're thinking* about your fight and you're stressed, the last thing you need is to be woken up in the middle of the night by a phone call or text message.

Also, if you're going to have a lot of family and friends around for your fight, I suggest appointing one of your coaches or family members to deal with issues like giving out tickets so you don't get caught up such details. You should even strongly consider a "coaches only rule" where your family and friends essentially just leave you alone the last 24 hours prior to a fight to concentrate and focus on the task at hand. More than once, I've watched fighters ignore this rule and end up stressed and completely distracted because they are dealing with family and friends who all want a piece of their time leading up to the fight.

Overall, getting enough sleep and rest throughout the week while avoiding mental stress as much as possible will help make sure you are in peak condition come fight time. The 7 weeks of intense training prior to fight week are enough to wear down anyone, not to mention you have to deal with making weight, so it is absolutely crucial to your performance that this last week give your body the time it needs to heal and completely recover from training. The more you can avoid physical and/or mental stress during fight week, the better your body can recover and be in absolute peak condition when you step in the ring or cage.

Maintain

The final goal of fight week is to make sure you don't lose any of the adaptations that you developed as a result of the last 7 weeks of training. Although most training adaptations are fairly stable, the aerobic system in particular will start to decline if it's not worked fairly consistently.

You also want to make sure your fight skills and technique stay crisp and sharp so you need to get in a few light, low volume/moderate intensity workouts during the week of the fight. These workouts must obviously be specific as well, so the most appropriate activities are things like shadow boxing and footwork drills, *light grappling, bag and pad work*, etc. You can also incorporate things like calisthenics, riding a stationary bike, swimming, etc. as well.

The idea is that you want to get enough of a workout in to maintain your conditioning capacity only, but not enough to place any real demand or physical stress on the body. A good general guideline to follow along these lines is to do about 20-40 minutes of work. You want to get your heart rates up to your anaerobic threshold, but not significantly above for any length of time.

You should do this on 2-3 days during fight week toward the earlier and middle days of the week. If you have made the mistake of coming in too heavy and have a lot of weight to lose, you will have no choice but to do a bit more work than this in order to help drop the weight, but keep in mind that doing too much work the week of the fight will definitely impact your recovery and how well you're able to perform.

If you get in 2-3 light workouts, this is enough to make sure you don't lose any adaptations and should even help stimulate your body to recover fully. Make sure to listen to your body and end up leaving the workout feeling good and refreshed, not tired and run down or sore.

Remember, these are basically active recovery type workouts so be mindful of not overdoing it. Work on going over tactical and technical strategy, mentally and physically going over what you expect to encounter in the fight and how you're going to react. Get in the gym, get your short training session done, and then get out and go home or back to your hotel room and rest.

Summary

Fight week is typically a hectic and nerve wracking experience for most fighters. If you're traveling to another city for the fight, or fighting for one of the bigger pro organizations, in particular, it can be easy to get overwhelmed with everything that has to get done and lose sight of the big picture.

If you don't have many fights under your belt, chances are that you'll spend half your waking hours thinking about your fight and the other half feeling like you need to get some last minute training in. However many fights you may have behind you, it is important that you realize that the last week before your fight needs to be about rest, recovery, maintenance and making weight, not about making last minute improvements.

To perform your best, your body needs to be in its peak physical condition. All your body's many different systems, cardiovascular, neuromuscular, CNS, detoxification, etc., need to be fully recovered and ready to work at their maximum capacity when called upon to produce the energy you need throughout a fight. If any of these systems are still fatigued or still run down from training, you will not be able to fight up to your potential.

Because of this, you absolutely must focus on getting enough quality rest and keeping yourself as stress free as possible throughout the week. Write out a schedule and stick to it. Go to bed at a set time, turn your phone off, and get as much sleep as your body needs. Work on developing a step by step system for cutting the last few lbs to make weight. Each time you fight, stick to your system and refine it until it's like clockwork.

Just as with anything else, the more times you fight, the better you'll get at managing fight week. You'll become better at judging how much weight you can lose in the last week, you'll get better at being prepared for the distractions and demands that invariably come up, and you'll learn that all the hard work you've done in the previous 7 weeks pays off when you get the win.

Conclusion

In this final chapter on training, I have given you a very specific, and yet purposefully flexible to you as an individual, training blueprint that you can use to get yourself in better shape for a fight than you've ever been in before. This fight prep plan is built on sound principles of science as well as years of practical application and experience. It's not just some theory from a book, it has been proven to work and I know how powerful it is because I've used the core principles and plan with many of the best fighters in the world.

Many fighters make the mistake of trying to get in peak physical condition with no real plan at all except to work hard, but this is not an approach that consistently leads to the kind of conditioning that wins fights. MMA is still in its relative infancy and I have no doubt that over the years fighters will become more sophisticated and organized in their training approach. Right now, however, you're guaranteed to come in great shape and have a huge advantage over your competition just by following the plan I've given you.

When it comes time put the plan into action, I recommend you start by writing out your training program just one block at a time. Not only is it incredibly time consuming to try to write out 8 full weeks of training at once, but it's highly likely you'll end up needing to make changes as you go along anyway.

Remember, nothing is set in stone. Follow the principles and weekly layout I've given you, but don't be afraid to take more or less rest, increase or decrease volume, or change things around slightly as necessary. You know far more about your own training experience, work capacity, opponent, strengths/weaknesses, schedule, etc. than I ever will so you need to take all these variables into consideration when it comes time to write out your actual daily training plan.

You also need to keep a detailed training journal along the way. Not only will this help you organize your program and stay on track, it will help you refine your fight prep strategy as you learn from what works best for you and what doesn't. You'll be able to see the progress you've made between fights as you see your numbers improving from one fight to the next. If you are considering trying to make a career out of being an MMA fighter, you need to take your job seriously and put the time and effort into it that it requires to get to the top.

The most successful fighters I've been around have always been those who took the job of fighting seriously. Rich Franklin, for example, weighs all his food during his fight camp, gets on the scale every single morning, doesn't stray from his nutrition plan whatsoever, sticks to a very detailed daily plan, etc. There is no doubt in my mind that his consistency and dedication has played a large role in the success he's had as a professional fighter.

Even if you're just an amateur training for fun, I guarantee you'll have more fun if you're in great shape and winning your fights. Nobody wants to be that guy who was dominating his opponent....until he gassed. Follow all the guidelines and principles laid out in this chapter and I guarantee that come fight time, the only person that will be gassing will be your opponent.

CONCLUSION

Joel Jamieson

Conclusion

Writing this book has been one of the more challenging, as well as one of the more rewarding, experiences of my life. For close to six months, I have spent the vast majority of my evenings and late nights, most of the rare free time I have really, furiously typing away in an effort to make this book something different.

Over the years, I have read countless books and articles on a variety of subjects related to human performance as part of my own education. Although I learned something of value from almost all of them, rarely did I find the *right combination of theory and practical application*. As a reader, I always want to know not just *what* needs to be done, but also *why* it should be done in the first place.

Along these lines, there are a lot of books out there that show you pictures of how to perform endless different exercises. Very few that I have found, however, can explain exactly why the exercises should be performed, or even more importantly, how they should be used in an overall program in the first place. In writing this book, my goal has been to give you the “how” as well as the “why” rather than just one or the other.

In the end, it is my sincere hope that after reading this book, you now understand a whole lot more about what conditioning for MMA really is, why it’s important, and how it is most effectively improved. Rather than just thinking of conditioning as something that you only need to work on for a few weeks before a fight, I trust that you now see a much bigger puzzle of *energy system development and performance*. *You also realize there are many different pieces that all need to be put together properly throughout your entire career.*

Whatever level you may be as an MMA athlete now, putting all these pieces together is the only way to truly improve your performance and fight up to your potential. You don’t want to look back on all your years of training and your endless hours of hard work in the gym and wonder how much better you could have been if only you had trained right. There are already too many “what ifs” in the stories of too many athletes, but your story can be one of success and achievement.

Perhaps one of the best things about the sport of mixed martial arts is that it is a sport of opportunity, one that opens its doors to those who are willing to put in the time and effort. You don’t have to be a genetic freak that is 6’5 and be 300lbs of muscle or run the 40yd dash in 4.4 seconds to be a successful fighter. In fact, many well known and top level fighters only got into MMA after *failing to be successful in another sport in the first place.*

The fighters that I have been around and worked with that have been the most successful in MMA have invariably been those who were the most mentally tough, disciplined, and willing to work hard. They did not miss training sessions because they were out drinking too late with friends, they did not wait until the last minute before they started getting ready for their fights, and they understood that being a martial artist is about much more than just throwing punches, kicks, knees, elbows, or going for submissions.

Along those lines, they also understood that it takes a strategic game plan not just to win fights, but to become a better fighter and reach their goals in the sport. Simply showing up at the gym every day without any kind of overall training plan is rarely enough to get the job done. If you want to get to the top, or stay at the top if you're already there, you must take your training program seriously and treat it as every professional athlete should.

In the previous three sections of this book, I have given you a strategic game plan to achieving the kind of long term physical development that you need to get to the top of the sport. You now have a guide for how to train in between fights to become stronger, faster, more powerful, and better conditioned. You also have a strategic blueprint for making sure these qualities will translate into performance come fight time.

The training principles and specific plans I have laid out for you have been proven to work time and time again with all the fighters I have personally trained. By now, I also hope you've been able to see the important details behind how and why they are so effective. You can use this plan to give yourself the advantage of being the better prepared fighter each and every time you square up and get ready to fight.

Armed with all the information and knowledge laid out in this book, there is no reason you should ever have to step into the ring or cage and hope you can get the fight over quickly because you're unsure of your conditioning. Your opponent should be the one worrying as the fight wears on and they feel themselves fighting fatigue while you seem to be getting stronger in every round.

Now that you've reached the end, the next step to winning the conditioning war and turning yourself into a fighter your opponents will fear is just beginning. The knowledge you've gained will ultimately only prove as useful as your ability and desire to get to work and apply it. Reading about the methods to improve your different energy systems won't do your conditioning any good until you put them to use and experience their effectiveness for yourself.

It is in this application of the information I've shared within these pages that I believe you will find the true value that I have done my best to bring to this book. Few things are more satisfying than working hard and seeing the results pay off as you transform into a much more explosive and much better conditioned fighter. This is especially the case if your conditioning has traditionally been a weak area. Even if you've always had good conditioning in the past, you now have all the knowledge, the tools, and the roadmap you need to make it even better. All that is left to do now on the road to Ultimate MMA Conditioning is to get to work.

Help Spread the Word

If you have enjoyed reading this book and want to help other fighters like you get the most out of their training as well, I'd like to ask you to help spread the word. This can be as simple as just letting your friends and teammates know about the book and recommending they pick one up for themselves. If you are active in online discussions and forums, feel free to review the book and let everyone know what you thought.

For those who are gym or website owners, there is also an affiliate program you can join to help promote the book while making money at the same time. Even if you don't own a gym or a website but are active on various discussion boards or have busy blogs, myspace/facebook pages, etc., you too can help get the word out about Ultimate MMA Conditioning.

First and foremost, I am a coach and gym owner with a busy dally schedule filled with training athletes and the endless demands of running a business. I am not a full-time internet marketer who never really trains anyone or a publishing company with endless pocketbooks and publicists.

I wrote this book for fighters and coaches who wanted a fresh, honest, and scientifically accurate look at MMA Conditioning. If you believe in this message and helping others cut through all the misinformation and marketing hype that plagues the fitness industry in general, you can join in the effort to let other fighters and coaches know there is a better way.

Closing Thoughts

I'd like to personally thank you for spending your hard earned money on this book and taking your valuable time to read it. I truly hope you have benefited as much from reading it as I have from writing it. Nothing makes my time spent writing feel more well spent than when I receive an email letting me know how much of a difference my methods and programs have made to a particular fighter.

Whether you are getting ready for your 1st fight or your 20th, I'd love to hear how this book has impacted your training and your performance. I'd also like to invite you to join my free website www.8weeksoout.com, if you are not already a member, to stay informed and to stay in touch as you continue to put everything you've learned to good use.

I started the website in late 2008 to help fighters from all over the world learn the principles presented in this book and the community is growing rapidly. Feel free to join and post any questions you have about this book or any other topic of performance that you may have and you will likely get an answer as well as an intelligent discussion. In addition to myself, there are several other well known authors, scientists, coaches, therapists, and trainers all taking part.

You can also email me directly at joel@8weeksoout.com and I'll do my best to get back to you as quickly as possible. Thanks again and I look forward to hearing of all your success!

About the Author

Joel Jamieson lives in a Kirkland, WA, a tiny suburb of Seattle, and is the owner and operator of his training facility, EndZone Athletics. Since opening his gym in 2003, he has become widely regarded and recognized as one of the world's leading experts on Strength & Conditioning for MMA and has worked with over 20 of the *biggest names in the sport*. He also *formerly served* as the Director of Strength & Conditioning for Pride FC and previously spent time working with the Seattle Seahawks and University of Washington.

In 2008, he launched the website 8weeksout.com to serve as an online community for fighters and coaches to discuss and explore various topics of training. In less than a year, the site has grown to be one of the premier resources for MMA Strength & Conditioning and has attracted several other well known coaches, scientists, and authors. Joel has also written several articles on training featured in MMA publications and online resources.

In his spare time, Joel enjoys training, traveling, writing, researching, boating, skiing, and spending time with friends and family.

Joel is available for seminars and consulting and can be contacted the easiest via email at joel@8weeksout.com

DISCOVER THE MOST EFFECTIVE WAY TO GET IN THE BEST SHAPE OF YOUR LIFE

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ULTIMATE MMA CONDITIONING is the only book that covers every aspect of training to prepare for the grueling physical demands of mixed martial arts from the inside out.

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MATT BROWN, UFC FIGHTER

"Any fighter who is even considering stepping into a ring or cage to fight should read Ultimate MMA Conditioning from cover to cover before they do. This book is the **most complete guide to getting ready for a fight** there is. Before working with Joel I made a lot of mistakes when it came to my training program but he helped straighten me out and get me in shape. Get this book before it's too late!"

SPENCER "THE KING 2012" FISHER
UFC VETERAN, LIGHTWEIGHT CONTENDER

"I started training with Joel in 2005 to get ready for my fights in Pride. His training helped me get **more power and more stamina** everything went up. When I train with him my conditioning is very good and I feel confident in my fights. Every fighter should use his training and this book will teach you how. It is number one in training."

HAYATO "MACH" SAKURAI
PRIDE 2005 LW GRAND PRIX FINALIST
FORMER SHOOTO WORLD CHAMPION

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