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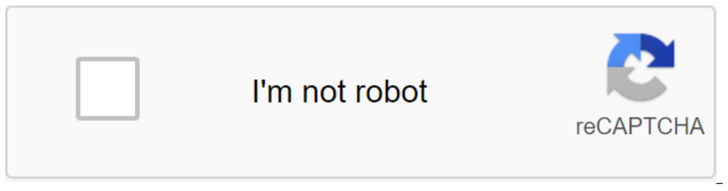

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Always consult with a health care professional before trying to perform these movements and start a training program. ISBN: 1540395421 ISBN 13: 9781540395429 Library of Congress Control Number: 201691919281 LCCN Imprint Title: Squat University LLC Content Chapter 1: Movement First, Exercise Second 1.1 Candlestick Glass Movement 1.2 Learn to squat (squats) 1.2.1 Absolutes squatting Chapter 2: Barbell Squat Technique 2.2. 1 Maintaining postural integrity 2.1.1 Basic stability 2.1.2 Proper Breath 2.2 High Bar Back Squats 2.3 Low Bar Back Squats 2.4 Front Squats 2. 5 Overhead Squats Chapter 3: Joint On-Collaborative Concept Chapter 4: Stable Leg 4.1 Tripod Leg Chapter 5: Mobile Ankle 5.1 Screening for Ankle Stiffness 5.2 Joint Restriction or Soft Tissue Stiffness? 5.3 Mobility Corner Chapter 6: Stable Knee 6.1 Screening for Knee Instability 6.2 Correcting Corner Chapter 7: Mobile Hip 7.1 Screening for Hip Stiffness 7.2 Joint Restriction or Soft Tissue Stiffness? 7.3 Mobility Corner Head Stable Core 8.1 Level 1 (Cognitive Stability) 8.2 Level 2 (Traffic Stability) 8.3 Level 3 (Functional Stability) Chapter 9: Overhead Mobility 9.1 Overhead Mobility Screening 9.2 Mobility Angle Chapter 10: Stable Blade Spade 10.1 Screening for Accumulated Instability 10.2 Corrective Exercises Corner Chapter 11: Debunking Squat Myths 11.1 Deep Squats Bad for Your Knees? 11.2 Should my knees pass by my feet? 11.3 Forward or corners? Chapter 12: The real science of squat 12.1 squat biomechanics 12.2 squat analysis 1.0 12.3 Squat analysis 2.0 Preface I often experience flashes of deja vu. I'll talk to athletes who complain of pain. They will explain how their knees or backs hurt when they move anyway. By the time they came to me, they were usually exhausted almost every way self-medication can be found through a Google search. Ice baths, painkillers, electrical stimulation; I've heard it all. Athletes will try their best to keep their athletic results from crashing. Eventually we'll arrive at the intersection in our conversation, where I'll ask: Okay, let me see what your squat looks like. As a rule, at this point once freely flowing conversation sprays to a direct stop. I was met with bewilderment to look as if athletes were expecting a more scientific medical examination. In the end, the athletes will rise from their chairs, look me in the face, put my feet... and it starts. When I first started writing this book, I was often greeted with the question, Why write a book about squats? One answer that has come to me is that squats are a building block to find their true strength. The ancient Greek philosopher Socrates once wrote: No man has the right to be an amateur in the matter of physical fitness. It is a shame for a man to go through life without finding the true power he is capable of. When most of us first think about strength, we instantly imagine a colossal athlete lifting huge weight. I usually imagine bodybuilding monster Ronnie Coleman. He was known for his weighty antics, which spurred millions of YouTube views. My friends and I are constantly replaying Ronnie's video of shouting: Yes, Buddy! (loud enough for the whole weight room to hear). He was literally throwing hundreds of pounds of dumbbells as if they were plastic toys. There is no denying Ronnie is strong. In many ways, it is the American definition of force. Today we live in a productive society. There is no doubt about that. Everyone from the workplace to the sports field is judged and judged by how much we can achieve. How much can we do. On ESPN, we are constantly barraged with physical highlights. Who ran the fastest forty-yard dash? Who lifted the last world weight record? Who got in homeruns? The way athletes live, train and compete today echoes our productivity-oriented society. We base everything on the mantra of becoming faster and stronger. Unfortunately, there is an ugly downside to this approach. Every year, thousands of athletes around the world suffer traumatic injuries ending in the season. According to experts, this year alone more than a hundred thousand young athletes will break their ACL in the United States alone. The scary thing is that the rate of these injuries is only increasing. In our quest for physical performance rewards, we have lost sight of the ability to move our athletes. We have changed our sporting priorities to such an extent that only our performance matters to many. In doing so, we have successfully turned the potential of many athletes and led to this epidemic of injuries. You see, the problem isn't that athletes today are too big, either too strong, or too fast. The problem is that athletes have become so much so that not enough quality of movement is maintained. That's the problem. Too many athletes are not moving well today. The foundation on which the performance potential is built is the same one that also supports and keeps the athlete injury-free. In fact, the strength and conditioning professionals and sports medicine practitioners have a common language. It's the language of movement. Instead of turning to sophisticated research and expensive technology, we should take a step back and consider the cornerstone of our movement foundation. Without mastering the simplest patterns of movement, there is no way to reach the peak of the physical potential Socrates wrote about. And we will continue to see an increase in injuries. All these changes begin with a squat. On the following pages, you will find an easy way to assess your squatting movement and understand how to fix these problems before an injury occurs. After mastering the weight of squats, you will learn how to improve the exercise of barbell squats. When Steve Jobs introduced the world of Apple I, he did so with the desire to put the power of a personal computer in the hands of everyone. By expanding the individual's capabilities in such a technological way, he was able to change the world. The same empowerment can be found through the teachings in this book. Let me use a real example to help reinforce this point. Recently I had a discussion with a young Olympic weightlifter. She told me how she had dealt with knee pain over the past few weeks every time she squatted, brushed, or grabbed a barbell. I asked her what she was doing to help fix the pain. She said, I've lashed my knees, stretched my quad bikes, and rested. She went on to say that the pain had become so bad that she even had to change her usual workout schedule. Her performance began to suffer, and her coach was not happy to say the least. To make matters worse, she was national competition in a few weeks. She had it. The end. When she asked if I could help her on her knees, I smiled and nodded my head. Without hesitation, we began a survey to find out the cause of her pain. Once again, I found myself in the same situation, I seemingly end up in time and time again. Was it deja vu? When the conversation stopped, I said, OK, let me see what your squat looks like. Welcome to the Bible squatting. Start. Chapter 1 Movement First, Exercise Second 1.1 Looking Glass Motion If I had one goal for this book, it would inspire you to look at the body differently. I want you to take a step back from the conventional wisdom and how we have viewed and analyzed the body in the past. It's time to take off the curtains and really understand our body through a new environment: the ingestion of human movement. Today we live in a culture governed by performance. Each year, Fortune magazine boasts the famous Fortune 500 list, occupying the first five hundred corporations in the United States based solely on their total income. Our current paradigm is focused on what we can achieve and what we can achieve if we just make X, Y and Y. No wonder that American winat-all-cost culture has penetrated into every aspect of our lives, including sports. The mantra is bigger, faster, stronger echoed in all aspects of sports performance today. The idea of lifting more weight, working faster time, and setting the next record has consumed us for decades is a testament to who we are as a society. Was it effective? Of course. Just look at the 2012 Olympic Games and look at how many world records have been set. The answer to this question is thirty-two new world records. However, even after all the performance achievements we've done over the years, the faster the times, the more weights are lifted, and the gain of yards ran, there was still something missing. Despite the praise and honors, the athletes continued to be injured at an alarming rate. For example, an anterior cruciate ligament injury (ACL) has been flagged as one of the most serious seasonal injuries in all sports today. Let me throw a few numbers to explain this phenomenon. It is estimated that 100,000 ACL tears will occur this year in the United States.1 - Nearly two-thirds of these injuries are non-contact, meaning the injury is not related to any contact with another player.2, 3 - Girls who play football and basketball, currently tear their ACL three times as much as boys.4 - Studies have shown that about 5 percent of all girls who play round basketball and play football are three times more likely to play football. The problem is not that our athletes are too big, too fast or too strong - they are all part of a normal human evolution in a performance-driven society, but it's something they've become so strong that they're not supported. fundamentals of the movement. Ask yourself if any of these situations sound familiar to you. You. You'll notice a large powerlifter in the gym that can squat seven hundred pounds in a back squat but struggles to perform basic front squats due to its poor mobility constraints. You know, a football player with a sore knee, he can return a squat five hundred pounds but can't carry a basic squat gun without his knee reeling around uncontrollably. You watch a weightlifter who can clean and jerk four hundred pounds, but allows his knees to roll on the rise of some pure movement. The strength coach tells you that learning how to carry a squat gun is a waste of your time because you will never need to get into that position while playing football. Any? Unfortunately, such situations are all too common in our productivity culture. What if I told you we could eliminate about seventy thousand torn ACL injuries each year by teaching our athletes how to squat properly? As a physiotherapy doctor, I have the opportunity on a daily basis to observe the quality of movement with athletes of all ages and skills. Working in Boost Physical Therapy and Sports Activities in Kansas City, I was able to accumulate over ten thousand hours in contact time understanding and rehabilitation of athletes with this devastating injury. From a high school female nfl football player to a cornerback, there's one constant that connects them all. For a young female footballer, a torn ACL can be extremely debilitating, both physically and mentally. A season-ending injury like this eliminates roughly 25 percent of that athlete's high school career. Competitive football today is one of the most popular and time-demanding sports for today's youth. It is common for an athlete of this caliber to sacrifice at least six hours each week to participate in numerous practices and games. A typical schedule for a competitive football player would include three two-hour practice sessions a week, two-hour practice sessions at the top of practice, all followed by two or three one-hour games every weekend. Playing at this level requires a high level of skill, and most young people at this level spend hours every week improving their ability to play the sport they love. The NFL is full of the country's best athletes hands down. The only select ones are lucky and talented enough to don the NFL jersey and stand on the sidelines on Sunday afternoon. Less than 1 percent of high school football players end up doing so in the NFL. They're big, they're strong, and they're very fast. The NFL is the quintessential pillar of elite athleticism in American society. At this level, performance on the field can mean the difference between being cut and sent home or getting a million-dollar deal and a company endorsement that will set the player on a lifetime of financial stability. ACL tear can therefore be quite mentally, and financially. While both of these athletes suffered the same injury in the Stages in their sporting careers, they also had one common bond, which is usually less recognized: They couldn't squat well. They could not perform deep squat body weight with adequate ankle and hip mobility, proper joint alignment, or muscle coordination. The vast majority of each of their rehabilitations was spent on training how to perform squat body weight and one-legged gun squats. Most people think that these athletes, both advanced in skill within their sports, will be able to perform these simple movements with ease. The thing I'm trying to do with these two athletes is the same phenomenon I see with almost every athlete I've seen who got the same injury. These athletes couldn't stand the injury because they are weak. These two athletes, as well as the thousands who maintain the same ACL tear each year, spend hours on hours during a week at the gym or on the training field working to improve their physical ability to work faster, jump higher, and lift more weight. We, as a society, value quantity and objective figures over quality and process. Too often, we will pay too much attention to how much weight is on the bar when an athlete can't even perform a basic body squat or a gun squat to full depth without falling. Our performance-driven culture has placed such an emphasis on performance that we have conceptually changed our sporting priorities. More often than not, athletes are willing to sacrifice movement to perform. Once all is said and done, we cannot escape the need for competence of movement. This concept of motor competence can be described as a person's ability to move without pain or discomfort and with proper joint alignment, muscle coordination and posture.6 Now, I'm not saying that the grind of performance preparation is not important. What I am saying is that we need to provide our physical capabilities (our strength, our strength, our stamina) and our skills do not exceed our ability to move. This starts with strengthening the foundations for our sports bodies, starting with movement competence. Being able to show competence in our fundamental and functional motion patterns, such as our ability to perform deep squats with proper joint alignment and muscle coordination, creates a framework for which strength and skills are based on. Food for thought: Barbell training is one of the most important ways in which we can challenge our bodies to maintain the competence and integrity of our functional traffic patterns. Move first and do the second. If we are not able to move effectively with good technique in the squat (especially without the barbell), we essentially adjust ourselves to failure. Performance-wise, we limit our potential to produce effective power and power. We also our susceptibility to injury because our physical capabilities rest on a faulty platform of fundamental movement. No matter how big, fast or strong we are we need a fundamental basis for movement. With this fundamental base, we can ensure that what we recruit strength and skills when we train can be maintained safely and efficiently. The cornerstone of this foundation is one simple movement: squat. It's like building a house without a proper foundation. You can build a beautiful house that is filled with expensive furniture in every room. This house may even seem safe and sound in terms of an outsider. However, an inexperienced person with little knowledge of architecture can tell you a house built on a faulty base is set for a possible failure. The proper functioning of our physical home requires that we move primarily with movement competence before we speak. Instead of adapting to our limitations or simply ignoring them all together, it's time to fix our traffic problems. It's time to shift our learning efforts that have focused on renovating our physical home without even fixing a large crack in the foundations of our home. It starts with the fact that the athlete sees the athlete in a different way - through the closing of the glass of movement. 1.2 Learn to squat (Bodyweight Squat) When we talk about squats, many people often want to go straight into the discussion of squat barbells. We forget about the basics of body weight squats. If we don't turn to the squat movement before the squat version, we put ourselves on the wrong side. If we can fix the problems that present ourselves during body weight squats, we give ourselves more opportunities to carry the load of the barbell. We should all be able to perform full depth ass-to-grass squats without any weight. Period. We all want to live, play and compete painlessly as long as we live. This starts with learning how to squat properly with the weight of movement. 1.2.1 Absolutes of squats In this chapter we will discuss five absolute squats. It doesn't matter how high you are, your level of experience in the weight category, or your goals with sports training. These absolutes must be observed in order to squat properly and remain painless. Toe Corner Most people have a pretty good idea of what a perfect squat looks in the lower position. What if I told you that setting and motion squats are actually more important than the lower position itself? A common misconception is that people should place their feet at exactly the same width during squats. The width of our position is not one of the absolutes squatting. Most people will have small differences in how wide they place their feet. Individual mobility limitations and anatomical differences will affect the width of your position. The goal is to place the feet in a position that will allow for full squat depths and still feel That being said, placing your feet on around shoulder width is a good starting position for most. The position you are suggesting should be able to other movements that you can perform all day long or on the playing field as an athlete. This is the reason why the squat was called functional movement. Think of the defensive ready position of a basketball player or third baseman just before the pitcher winds up. The starting position of the squatting position is a universal position, which is transferred to many other models of movement. For this reason, we want to use a fairly simple leg position to start this weight squat. The almost simple position of the foot with a very small five to seven degree outside of the leg angle while squatting the body weight is ideal. If you have difficulty performing motion at full range from this leg position, it may mean you have certain mobility problems that require attention. This is our first absolute weight of squat. Some trainers will signal their athletes to squat with a much larger angle outtoeing during body-squatting. Training athletes to create in this way is likely to be transferred to other patterns of movement that are derived from squats. You'll probably never see a good midfielder stand in his ready position with his feet turned like a duck. This position is not only ineffective, but also increases the risk of injury. That midfielder would not be able to move quickly from that position or unleash an extreme amount of power in his next tackle with his feet turned. For weight squats, a simple position is ideal. For a squat barbell, it is acceptable and advisable to get out a little more. This will allow the lift to descend to a greater depth and increase stability. The specificity of the movement on the squat barbell will be the theme of another chapter. Tripod feet Once we have our feet out of the corner of the set, let's discuss what we do with our feet. When we create a good arch in our feet, we inevitably shape what we call trivial legs. The three points of the tripod consist of the heel, the base of the first hole and the base of the fifth hole. Our foot is basically like a tricycle. Our goal is when squatting should be to maintain the arches of our feet and our weight is distributed evenly. If all the wheels are in contact with the ground, we get more energy. If one wheel is off the ground or if the body is bottoms, power is lost and the motorcycle breaks down. When our foot is out of position (arch collapse), stability and strength are lost. The distribution of body weight on three points of contact of the foot allows to get the most effective basis of support. Mastering a leg tripod is the second absolute squatting. Hip Hinge Once we have created a comfortable leg position (as close to a simple as possible and in a tripod position), we are ready for our next step and signal: drive your hips back. Each squat should start with a hip hinge. By driving our hips back and bringing the chest forward in hinging, back chain and hamstrings) is properly engaged. Hips are the locomotive of our body. During squats, these specific muscles drive us up and out of the hole, allowing us to lift huge weights. It is therefore imperative to make sure that these muscles are used effectively. This sets our third absolute squatting. Creating an external torque twisting moment Our last signal before starting our descent for a squat body weight is creating an external turning torque on the hips. Creating this tension creates spring tightness in our hips that will provide our knees track with perfect alignment throughout the squat. To create this torque on the hips, I use signals to squeeze the buttocks and kick out the knees. By doing these actions, we are, in fact, ingingast the spring mechanism of our hips. If you try this, you will instantly feel the outer thigh muscles to deal with. Immediately the knees will be drawn into a good position to match the legs, and the arch will be set up in the foot. If we look at the arch of our foot, we notice that it is moving relative to the rest of our lower body. If the knees lean outwards, the whole leg moves to full arched positions. When the knees fall inside, the leg subsequently collapses and the arch is leveled. For this reason, the correct position for our lower body can be achieved by the proper action of our hips. We must remember not to compromise the tripod of the legs during this step. For this reason, make sure not to push your knees too far. Some athletes will abuse the signal to drive their knees too far aside. This will cause the leg to lose stability and roll on the outside. The goal is to align your knees with your feet. Creating this torque on your hips is the fourth absolute squatting. The postural integrity of the correct technique in the squat relies on every part of our body working in perfect coordination. This includes keeping our torso and neck in a neutral and straight position. The concept of postural integrity is our fifth and final absolute. In order to remain balanced during squats, we require our center of gravity to be above the middle of our feet. This requires a more forward chest position. However, just because the trunk is required to lean forward does not mean that our breasts should collapse, as if we have a turtle shell on the back. A signal that can help maintain the perfect position of a straight barrel to hold your hands right in front of the body. Holding our hands in front of our body, our trunk naturally takes a more direct position. Maintaining a neutral neck position will depend on the angle of the torso. During weight squats, our trunk is usually tilted forward over the knees. It requires the athlete to look forward or a little (at a point from ten to fifteen feet forward on the ground). If the trunk should be in a more upright position (front squat or overhead squats), the view can now be focused more forward or even even up (at five feet above the horizontal point). Time Review Let's now consider our five absolutes for weight squats. 1. Pointing the legs is relatively simple. The angle of five to seven degrees is normal. 2. Maintain three points of contact with your feet in relation to the floor by setting a tripod on your feet. 3. Hip hinge engage the back chain (buttocks and hamstrings), pushing the hips back a bit and bringing the chest forward. Your weight should be balanced in the middle of your legs. 4. Create an external twist on the hips, squeezing the buttocks and pushing your knees to the side while keeping the leg tripod. 5. Strengthen your postural integrity by holding your hands in front (parallel to the floor) by looking straight forward. 1.2.2 Weight squats descent After you have completed five absolutes, you can start descending to the bottom of the squat. Don't think about stopping high or dropping too low. Just go down to the bottom position that your mobility will allow. Make sure to stay balanced all the traffic. It is important to use this time to feel where your weight is being held over your feet. This ability to feel the position of the body is called proprioception. During the descent, try to keep the shins upright for as long as possible. When we are unable to keep our shins as vertical as possible, the knees begin to move forward over the legs too soon. This premature forward movement increases the strength on the knee joint and leaves the athlete out of balance. Bottom position When you have reached full depth in a squat, you should feel solid and completely balanced. Your weight should be evenly distributed between the front and back of your legs. If we have drawn a vertical line from the center of gravity of your body in this position, it should pass right through the middle of the foot. Climbing Standing From the Bottom of a Squat is all about a hip drive. This is achieved by pushing the hips up and back. While driving the hips, also visualize pulling the shins back upright. This allows you to use the back chain effectively. This relieves pressure from the knees and puts the thigh muscles in position to create tremendous strength. Make sure the chest rises at the same speed as the hips. If your hips rise too fast, your chest will reflexively fall forward and your body will be out of balance. While squatting, the knees should remain in a stable position. This means keeping your knees in line with your feet throughout the movement. Improving this control allows us to avoid injury while improving the efficiency of our movement. By increasing the efficiency of our movements, we increase the potential for greater power and strength. Who wouldn't want more power, more strength, and means avoiding injuries? Take Away Weight Squats Often Movement Passed Over Athletes Coaches. Too often we assume that we have the ability to perform the perfect squat. Do not take for granted that everyone can perform this movement just because he or she is athletic. Squats are the first movement and the second exercise. Notes 1. C. C. Prodromos, Y. Han, J. Rogowski, et al., Meta-analysis of the incidence of anterior cruciate ligament tears as a function of sex, sports, and knee injury reduction regimen, Arthroscopy 12 (December 23, 2007): 1320-25. 2. T. Krosshaug, A. Nakamae, B. Boden, et al., Mechanisms of anterior cruciate ligament injury in basketball: video analysis of 39 cases, American Journal of Sports Medicine 35, No. 3 (2007): 359-66. 3. B.. Boden, G.S. Dean, D.A. Feigin et al. 4. M. Critz, J. Cronin, and. Hume, Squat Body Weight: Motion Screen for Squat Pattern, National Association of Strength and Conditioning 31, No. 1 (2009): 76-85. Chapter 2 Barbell Squat Technique 2.1 Maintaining Postural Integrity In the last chapter, we discussed how to teach the perfect body weight squats. We talked about a strategy to maintain stability while squatting weights by holding hands in front of us. By doing this, it brings our lower back (lumbar spine) into a good neutral position. In order to maintain the integrity of our posture when we squat with a barbell, we need to adapt our technique. The bar puts a higher demand on our body to stabilize our trunk. In order to meet these demands, we must find a way to improve our stability. A stable core is a platform for which we can perform effective, powerful movements. 2.1.1 The basic stability of the quality of our movement during squats is dictated by how consistently we support our trunk. Naked spine, without any muscles, is nothing but a stack of bones. Without the continuous collaboration of the twenty-nine pairs of muscles that make up our trunk and the fascia that holds them together, the weight of our upper body alone would be enough to roll our spine.1 Very often, we see athletes believe they can improve trunk stability through exercises such as squats or crunches. In fact, these movements build isolated muscle strength rather than stability. There is a difference between strength and ability to stabilize. Strength is the ability to produce power. The harder you can push or pull the weight, the stronger your muscles. Stability is the ability to resist movement in one part of the body while movement occurs around it. The stable spine resists being bent into two massive weight bars. Strengthening the stabilizer (e.g. abdominal muscles with crunches or low back erkuls with endless hyperexperts) will not result in these muscles necessarily stabilizing more effectively. Basic stability synchronous action of abdominal muscles along with the muscles of the back, hip, pelvic girdle, diaphragm and environment Working together, they keep their spine safe and stable while we move. Thus, the stability of the kernel has nothing to do with how much crunch you perform or hypers from the excess ham machine. The essence of stability is based on two things: timing and coordinated recruitment. In order to gain our core muscles before squatting, a signal to brace for impact is recommended. This action increases the stability of our lower back and locks it in a good neutral position. When we turn on these muscles before the squats go down, we actively prepare our body to handle the load we are trying to carry. 2.1.2 Proper breathing is not enough just a brace to kick when we squat. If you want to move the massive weight in a safe order, you should also learn to breathe properly. For too long, experts in strength and medicine have been unable to turn on proper breathing during lifts. Many of them essentially approached our core like a balloon, trying to strengthen the outer rubber walls instead of learning how to increase the pressure inside. Fitness and medical professionals are taught, breathe on the way down and exhale on the way up. This is great for exercise involving light weight and higher reps (i.e. bench press three sets of ten reps). This breathing mechanic, however, is not fully recommended when performing a squat barbell. Can you imagine what would happen if a powerlifter let go of all your breath on the way up from a squat of a thousand pounds? When we have a squat heavy weight with a barbell (for example, anything more than 80 percent of your single representative maximum), it is recommended to take a big breath and hold it through all repetition. Normally, this type of breathing is not needed for higher low-weight repetition sets. However, when you are squatting heavy for multiple reps, this is crucial. This breath should be taken before and in coordination with the signal to prepare for the impact. This allows us to significantly stabilize our core. To learn how to breathe properly while squatting, try this simple test. Place one hand on the abdomen and the other on the side (near the lower ribs). Now take a big breath. If you have done it right, you will feel your stomach grow and fall. You will also feel that the lower chest expands to the side (to the side). Essentially, you feel an increase in volume inside your core. When we take a big breath, the diaphragm is just below our lung contracts and it will go down to our stomach.2 If you breathe incorrectly, you will instead notice your breasts grow and fall. Breathing thus does little to increase the volume of our intra-abdominal cavity, because the diaphragm is never fully used. So why is this volume growth so important? When we properly inhale into our stomach and combine the action with the attachment of our nucleus, we find that something Happens. With your hand on your stomach again, take a big breath of another one Once the breath is taken, brace your core muscles as if you are about to get a kick to Mike Tyson's gut. The combination of these actions increases the pressure inside the abdominal cavity (intra-abdominal pressure or MAP). This is because the volume can no longer expand. An increase in IAP has been shown in studies to be the most effective method for stabilizing the lower back during barbell training.3, 4 This should be done in a step-by-step manner. If we first brace and then try to take a big breath, we limit how much pressure we can create. This is because the diaphragm cannot fully contract and go down if the core is already maximally braced. Increasing IAP in this way helps stabilize the lower spine to an even greater extent than with invigorating alone.5 To experience the link between the pressure in your nucleus and your overall strength, try this simple test. Place the barbell on your back and exhale all the air from your lungs. Feel how the bar feels on your back. Next, take a big breath and brace your core. Try to create pressure in a 360-degree manner around your core, as if wearing a tight corset. Remember that breathing should be taken to extend the front, side and back of your core. Have you noticed anything else? The weight of the bar should now feel a lot lighter on the back. Does it make sense that using this maneuver may have some use for lifting heavy scales on squatting? So the strongest weightlifters and powerlifters are able to squat huge weights without breaking in half. Holding this breath while performing squats often causes a forced grunt on the rise. This happens when we try to limit the natural desire to exhale on the way up. This forced retention is called the Valsalva maneuver. Limiting our breathing from escaping in such a powerful way is essential to maintaining our cerebrosdal stability. To properly perform the valsalva maneuver, the breath is exhaled by force against the closed airways. This is where the saying to inhale on the way down and exhale on the way up takes a turn. Exhaling your breath completely while squatting can lead to a serious fall in IAP. As the pressure in the abdomen drops, the stability of the spine will decrease. No matter how hard you brace your core muscles. If you allow your breathing to completely, you will instantly lose stability. This transmits harmful pressure to small, vulnerable structures of the spine (intervertebral discs and ligaments). It's still too quick to let the air out of the balloon. As the air leaves the balloon, it will be less stable. The same goes for our bodies. However, if we only allow a small amount of air to avoid the balloon by keeping our compression on the hole, the balloon stays stable for longer. In order to keep the pressure in the abdomen and our spinal cord untouched, the exhalation must be forcibly stopped from a complete escape. In fact, we have to keep our fingers on the opening of the balloon. There are ways to do that. Some lifts will use a method of grunting or tss sound as they slowly exhale through a small hole in the lips. Both of these methods allow abdominal pressure to remain at a high level throughout the lifting. Breathing should never be held for more than a few seconds during squats. It can significantly increase blood pressure and cause blackouts and other cardiovascular injuries for those at risk. While the Valsalva maneuver (even with time for short periods) has been shown to cause an increase in systolic blood pressure, it is very safe for healthy athletes. For most, this temporary increase in blood pressure is not harmful. That being said, the elderly and anyone with a history of heart disease should use it with caution.6 Take Away a proper squat is all about maintaining proper spinal stability. When we combine the coordinated invigorating abilities of our core muscles and harness the power of our breathing, we allow our body to move properly and lift huge weights safely. 2.2 High-Bar Back Squat High Back Squat Bar is usually one of the first barbell exercises young athletes are taught today. By perfecting the technique, the athlete has the potential to lift more weights with less risk of injury. It doesn't matter how hard you push. It doesn't matter how well the training plan is written. Any flaws in the technique will limit your maximum potential. Lift Off The first part of the successful bar seating is on the rack. The bar should be installed around the chest height. Setting the bar too high or too low can cause the lifts to put themselves in a dangerous position to decompose and overwork the weighted bar. The next step is to get the bar in the right position on your back. Pull yourself under the bar and trap it tightly against the top of the shoulders and back of the neck. Pulling the shoulder blades together, the shelf appears through the contraction of the upper back muscles. The bar should be located on top of this shelf. The type of clutch taken on the bar will be a personal choice. Some will hook the thumb under the bar while others will keep it on top of the bar (monkey grip). No matter how you decide to grip the bar, a neutral wrist alignment is perfect. A simple wrist allows you to safely fasten the weight of the barbell on the back without putting too much pressure on the elbows. It's time to untangle the bar. Spread yourself under the bar with your legs evenly positioned around the width of the shoulders. Take a big breath while attaching your core. Expand your hips and knees at the same time (even the pressure between both legs) and get up with the bar. Often athletes try to untangle the bar with their legs staggered. With a lighter weight on the barbell, it's easy to get away with this step. However, once the weight increases to high levels, unracking so can be dangerous. It is also common to see athletes trying to design a bar without Main. Without fixing your core, it is difficult to organize and create the appropriate stability necessary to complete the elevator. Example: you don't see many nine hundred pounds of squats where an athlete unracks the weight in a casual manner. The huge weight of the bar will instantly crush the athlete. The descent of the squat bar follows the same principles as the_bodyweight with two small changes: leg placement and breathing mechanics. Now that the athlete is squatting with the barbell, he or she can turn his or her feet a bit. This allows some athletes to squat deeper while maintaining stability. After unracking the bar properly, take three slow steps back and set your squat position. The width of this position should be comfortable and provide a full range of motion. For this reason, each athlete will have a small difference in the width of the position. Further, tripod_foot should be involved. All three points of the foot should be in equal contact with the ground. If done correctly, the foot will move in a full arched position. This allows the foot to stay stable and maintain the rest of the body just like the base layer for the house of cards. The next step is to create an external torque of rotation on the hips. By squeezing your buttocks, the torque is generated on your hip joint and your knees are matched to the right foot. Some trainers will use cue to drive their knees wide. This signal is great for a number of athletes, especially those whose knees collapse inside during squats. For others, it can cause an athlete to become unbalanced. Thus, it should be used on a case-by-case basis. Driving your knees too far outside can cause the leg to turn on its side. It's like a tripod trying to stay in balance on just two of the three points. Regardless of the signal you use, make sure the entire foot stays in contact with the ground and knee tracks to match the feet. Next, take another big breath into your stomach and brace your core as if Mike Tyson is going to hit you. The final step is to attract the back chain (buttocks and hamstrings). This comes with a proper thigh hinge. Push your hips back a bit and bring the chest forward. During a high squat bar, this hip engagement will be quite small. If the hips move too far, the chest will reflexively fall forward. It will leave you in balance. Once your hips are engaged a bit and your body is in balance, start squatting while sitting butt right on your heels. Don't think about going to a certain depth. Just squat. Bottom position In order to produce effective power and power during squats, we must remain balanced. This requires our center of gravity to remain directly above the middle of our feet. During the weight squat, our center of gravity is located near the middle of our Depending on the physical composition of the athlete (height, weight, leg length, etc.), this place may change In order to remain balanced during body weight squats, the torso must be tilted over the knees. During the squat barbell, however, the bar now becomes our center of gravity. Because of the weight position during the high bar back squat, a more upright torso position will be used. This change of technique will result in the knees eventually moving forward past the feet in order to reach full depth. This shift balances the load between quads and buttocks. It also requires an athlete to have adequate ankle mobility. For this reason, athletes with stiff ankles can often show the perfect squat technique without weight, but will struggle during high bar changes. The high back squat bar is usually performed to a greater depth than the low bar version (usually used by powerlifters). In the competitive sport of weightlifting (i.e. snatch and clean and jerk), weight is often caught in a very deep squat. High bar technique is thus well translated into weightlifting and CrossFit. At the same time, not all athletes will be afraid to compete in weightlifting. For this reason, barbing does not always have to be taken to the grass. The depth of the barbell squat will be specific to the requirements of the sport the athlete is involved in. This means that the thigh fold will be parallel to the tops of the knee. Climbing squatting is all about staying balanced. From the bottom of the squat hips and breasts should rise at the same speed. Elite weightlifters will use the power transition in the lower position from time to time. This is an experienced maneuver that can allow an athlete to lift more weight. The technique is necessary for this powerful step to be taken. The alignment of the knees must be preserved. If performed correctly, the rebound will feel like a spring release, propelling you up with tremendous force. The torso should also be kept in a stable position during this part of the ascent. Often inexperienced athletes will let their back collapse and round forward. If an athlete tries to force a bounce from the lower position without proper control, he or she risks losing stability in the lower back. When this happens, harmful forces are instantly placed on vulnerable back structures. Power transition should always be studied under the direct guidance of an experienced coach. If performed incorrectly, this can easily lead to a breakdown of equipment and possible injury. High bar sequence 1. Attach the barbell tightly to the shelf of the upper back. 2. Install a stable leg tripod. 3. Create an external torque on the hips. (Verbal signal: squeeze the buttocks.) 4. Create a hard barrel by taking a big breath and holding it tightly. (Verbal signal: great breathing and core tight.) 5. Hip hinge to attract Chain. (Verbal signal: hip back.) 6. Stay balanced by keeping the bar throughout the 7. Hips and breasts rise at the same speed on the rise. (Verbal signal: drive your hips up and chest up.) 2.3 Low Bar Back Squats It's time to talk about low back squat bar. Athletes competing in powerlifting sport usually use this variation because it allows them to lift more weight. Liftingoff Taking the barbell out of the rack correctly is the first step to any successful squat. Just like a high back bar squat and front squat, the bar should be mounted on around chest height. The general rule is to set the bar lower, not higher. The worst situation is when you have to tip a leg just to get the bar on and off. Next, we have to spread the barbell

correctly on the back. Pull yourself under the bar and trap it tightly against the back of your shoulders. Pulling the shoulder blades together, the shelf appears through the contraction of the muscles of the middle part of the back. The bar should be located on this shelf. It will end up being two to three inches lower than where the bar is held during a high back squat bar. If you've never made a low back bar squat, it can feel uncomfortable and unusual. The grip width you use on the bar should be based on comfort. Most powerlifters are visible with a wide grip on the bar (around the cutouts). However, it is not absolute that everyone should follow. Taking a standard grip on the barbell (only outside the shoulder width) can be used with a low squat bar. That being said, you should have enough upper body mobility to do so. Taking too narrow a grip when you lack flexibility in your chest/shoulders can increase the load on your elbow joint. It's time to untangle the bar. Spread yourself under the bar with evenly spaced legs (around the width of shoulders from each other). Take a big breath while attaching your core. Once you are ready, lift the bar off the rack, driving up with your hips. Take a few short steps back from the rack. Always back off the counter. Stepping forward means you have to overwork the weight after the set by stepping back. This can be very dangerous (especially if you are tired and lifting heavy weight) as you will not be able to clearly see the rack hooks to safely set the bar down. Once the weight on your back comes to rest, it's time to establish a solid foundation for your squat. Always make sure you are in complete control of your body and the weight has stopped moving. Now you're ready to squat. The descent position you take during any squat should allow you to remain balanced and reach full depth. Athletes who compete in powerlifting often use a wider position when using low bar techniques. The degree of angle the wearing is out will vary depending on human anatomy and mobility. the recommendation is to indicate that they go a little (ten to twenty degrees). The next step is to squeeze your buttocks and drive your knees to match your feet. Take another great breath into your stomach and brace your core core If you're going to get hit in the stomach. The final step is to attract the back chain (buttocks and hamstrings). Push your hips back and bring the chest forward. Once the hips are engaged, start squatting. Always go down in a controlled manner. Don't think about dwelling at a certain depth. Just squat. Bottom position Although no two squats will look exactly the same, you still have to line the bar in the middle of your legs (it's an absolute squat). To keep the bar (which is currently located below the back) centered in the middle of the foot, the chest will be prone to knees more than other squat methods. Depending on the physical composition of the athlete (height, weight, leg length, etc.), the number of tilts of the torso will vary. Some athletes will have more upright torso while others will be very prone. In the book Starting Strength, Mark Rippetoe explains that most balance problems in low bar squats are usually due to the back corner, which is too vertical.6 If you feel out of balance with squats, make sure you sit your hips back enough and allow your chest to lean forward. The lower position of this squat will not require the knees to move forward too much. A low squat bar essentially places more load on the back chain (hamstrings and buttocks) compared to the front squat and high squat bar. You don't need to have amazing ankle mobility to perfect a low squat bar, so powerlifters often wear flat sole shoes like classic Chuck Taylors compared to weightlifting shoes with a raised heel. Climbing squatting is all about hip drive. From the bottom of the squat, the hips should be driven straight up. In order to keep the bar from tracking to the feet, make sure to also drive the chest at the same time. Failure to do so will cause the hips to grow excessively and the torso to stay forward. This often results in the bar tracking to the feet. This position places harmful forces on the lower back and can easily lead to injuries. Low bar sequence 1. Attach the bar tightly to the shelf of your midback, just under your shoulder muscles (back deltoids). 2. Install a stable leg tripod. 3. Create an external torque on the hips. (Verbal signal: squeeze the buttocks.) 4. Create a hard barrel by taking a big breath and holding it tightly. (Verbal signal: great breathing and core tight.) 5. Hip hinge to attract the back chain. (Verbal signal: hip back.) 6. Stay balanced by keeping the bar over the half-legged throughout the squat. 7. Use a hip drive to get up from the bottom position. (Verbal signal: drive the hips and chest up.) 2.4 Front squats While the rear squat is often labeled as the king of all exercises, the front squat usually follows close behind. Like many other elevators this is often done incorrectly. Lift Off The first step in performing the perfect front squat starts on the rack. Rack. Start, the bar should be set at shoulder height. Inexperienced athletes often place the bar too high in the rack. This requires that the athlete overextend in order to unravel the bar. While many may get away with this early on, it can be dangerous when trying to squat heavy weight. The next step is to position the bar properly on the chest. Start by grabbing the bar at shoulder width. For weightlifters and CrossFitters, the same grip is used to perform the rod of pure movement. From this position, pull yourself under the bar and at the same time pushing your chest through the ceiling. The elbows should be raised together in the highest possible position. If done correctly, it will create a bar for the bar to sit comfortably on top of the shoulders and chest. It will also increase the stiffness of the upper back. This will help you maintain the vertical position of the trunk throughout the ascent. Leaving your elbows in a low position can result in a rounded upper back. This greatly increases the chances of losing weight as it becomes heavy. You will also put your body at risk for injury. Mobility problems on the shoulder and/or thoracic spine (upper back) may result in the lift not being able to reach a high position of the elbow. It is acceptable to leave your fingers in contact with the bar and have an open palm to reach a high elbow position. This allows the weight to remain balanced on top of the shoulders. Athletes who are new to the front squat often try to maintain control of the bar when they do not have the appropriate mobility. Over time, it can place unwanted loads on your wrists and elbows. It can also lead to pain and end up being injured when trying to lift a heavy weight. It's time to take the barbell. Spread yourself under the bar with your legs evenly positioned around the width of the shoulders. Take a big breath while attaching your core. Expand your hips and knees at the same time (even the pressure between both legs) and get up with the bar. Filling your lungs with air and attaching your core before lifting the barbell out of the rack is important, especially when trying to squat heavy weight. This great breathing and invigorating technique can make heavy weight feel easier when bar on your chest. Stabilizing the core with great breath will allow you to lift the massive weight without breaking in half. Just like a high back squat bar, the front squat will also use a simple or slightly upward eye look. This will keep the harmful force from being placed on the neck during the climb. Descend with a bar secured properly on your shoulders, take three steps back in a slow and steady manner. Set your feet in a comfortable and stable position. The placement of the feet should mimic the same position used during a high back squat bar. The legs can be directed a little outwards and the position should be at a comfortable width. Every athlete will have different position width depending on his or her personality and the level of mobility. Before you start squatting, set the proper foundation with your feet. Next, squeeze the buttocks in order to bring the knees in good alignment with the legs. Stabilize your back by inhaling into the stomach and preparing the main muscles. In order to perform a proper thigh hinge during the anterior squat, the hips will push back very slightly. This allows you to use your body's power plant (the buttocks of the back chain). By hinging the hips back slightly, the bar also remains over midfoot. This allows the body to remain in balance. The amount of movement back will be even less than the high back squat bar. It is a misconception that with the front squat, the knees must move first. This misconception will cause an athlete to potentially overload his knee, get off balance, and tip over his or her potential to lift a heavy weight. The knees will still bend during this hip engagement. However, they should not push forward from the beginning. The lower position of the lower position of the front squat will closely mimic that of the high back bar squat. The torso will remain quite vertical to keep the bar on the shoulders. The depth of the front squat will be based on the specific requirements of sports choice of athlete and goals. An athlete, competing in football or baseball, for example, will only need to go down to a parallel position. This means that the hip fold will be parallel to the knee joint. For those who train in weightlifting or competitive CrossFit, the hips should go down to the highest possible depth. This will allow these athletes to develop the strength needed to meet the demands of their chosen sport, where clean and snatch are often taken in deeply squat positions. This deeply squat position would eventually lead the knees to move forward over the legs. As we have discussed in previous articles, the body can cope with the stresses of this position forward the knee as long as the two requirements are met. First, knees should not move forward prematurely in this position. Secondly, proper training should be used for proper recovery. We should be more concerned when the knees move forward in a squat rather than if. ClimbIng After we have established a stable bottom position, it's time to start climbing. Lifting is all about keeping your torso in a good upright position. Often inexperienced athletes let go of their backs during this part of the elevator. Often trainers will use a cue to hold elbows during the ascent. This can be a good signal to the point. We also have to cue athletes to drive their breasts up. A good front squat requires both high elbows and a vertical trunk. Otherwise cue as it can lead to rounded upper back and end up injury. Front sequence 1. Spread the bar securely on the chest and shoulders with high elbows. 2. Install a stable leg tripod. 3. Creating an external rotation rotation on the hips. (Verbal signal: squeeze the buttocks.) 4. Create a hard barrel by taking a big breath and holding it tightly. (Verbal signal: great breathing and core tight.) 5. Slightly hip hinge to attract the back chain. Keep the barrel upright. (Verbal signal: push the hips back just a little bit.) 6. Stay balanced by keeping the bar over the half-legged throughout the squat. 7. Maintain the upright position of the chest with the elbows raised high. (Verbal signal: drive your chest straight up.) 2.5 Overhead squats before the beginning of the century, overhead squats were mainly used by competitive weightlifters. Olympic weightlifting coaches use overhead squats as a training progress for beginner athletes. Overhead squats are used to strengthen the lower position of the s urge bar. After the recent boom in CrossFit, the use of overhead squat has become more widespread. It has been transformed into a major exercise for the preparation of many sports and has even been used in competitions. In order to perform this elevator correctly, the athlete must have a high level of coordination, balance and mobility. Bar or PVC pipe? For inexperienced athletes or young children, for the first time to learn overhead squats, the barbell may be too heavy. For this reason, a light pipe made of PVC or broom can be used on the spot. To find the right grip with a PVC pipe that is unmarked, try this simple method. Stand high and pull your elbows aside. Your hands should end up in a ninety L degree position. Measure the distance between your right and left hands. Now we can separate this distance from the PVC pipe. Place your index finger on this line while grabbing the pipe during overhead squats. When going to the bar, athletes tend to take their grip a few inches from the end of the bar. This will be the same capture taken for the barbell to snatch the elevator. Athletes with longer arms can take grip almost to the end of the rod, near the collars. Those with shorter arms may only need to place their grip around the outer noting bar. Set up to start, hold the barbell on top of your back. It will be the same starting position as a high back squat bar. After unracking the bar properly, you will need to lift the weight to the top position. This can be done in different ways depending on the amount of weight on the bar and individual preferences of the lift. When an athlete first learns to perform overhead squats, most trainers will teach a simple push-press to lift the barbell to the top position. Once the weight increases to a significant load, push-jerk or split-jerk is recommended for experienced weightlifters. To start pressing, pull your elbows under the bar. This will put your hands in an effective position to steer the bar upwards. Hands should be at the width of snatchgrip. Then take and great breath. Get ready for the main muscles as if you are about to get hit in the stomach. Plunge and drive drive then used to push the barbell over your head. Throw your hips straight down a few inches while keeping your torso upright. The cue that is often used to maintain this direct fall is to imagine the sensation of the back sliding down the wall. If the hips drive backwards during the fall, it will cause the chest to push forward. This will set you to push the barbell forward in a bad overhead position. During a controlled fall, the knees should be in proper alignment with the legs. This will effectively transfer energy from the legs to the hands during the jolt. If your knees collapse inside on the fall, you will limit the potential up the driving force you can create with your feet. After the dive, press the bar directly upwards, extending the hips, knees and ankles in a powerful motion. The bar should end up in a stable overhead position just over the back of the neck. Your head may be slightly pushed forward to ensure this stable position. Be careful not to push your head too far ahead. This will cause the breasts to lean forward excessively and throw you out of balance. To keep the barbell above your head in a firm position, the elbows must be completely locked. You will find it difficult to keep the barbell from oscillating around if the elbows are not completely straight. In this position above the head, the barbell should rest in the center of the palm. The wrists should be slightly dilated. This is a position of stability that will not cause too much stress to the wrist joint. Do not try to keep a neutral straight wrist during overhead squats. Make sure to look straight ahead or a little up. This will place the neck in a neutral position and limit any unwanted stress. Looking up excessively or down to your feet can throw you out of balance. Descent Once you have stabilized the bar over your head, it's time to start the descent. Push your hips back a little to engage the back chain. As you start your squat, think about sitting thigh on your heels. This signal helps to limit the large hip hinge that can throw you out of balance. Manage the descent to full depth. The bar should always remain aligned in the middle of the foot for balance and stability. The right technique is crucial, as a missed climb can lead to injuries. If at any point the elevator becomes unstable, press the bar forward or backward and throw the bar to the ground. Both are absolutely safe alternatives for missing weight. I recommend using bumper plates whenever you do overhead squats. Keep up to date with your surroundings. Lower knee position should be allowed to move forward over the legs in the deepest part of this squat. This will allow you to maintain the desired vertical position of the trunk to hold the bar over your head. Climbing hips and breasts should rise at the same speed while climbing on If your hips rise quickly and your chest stays forward, the barbell will drift towards your noses, probably causing you to fall off Weight. Once you have reached a stable standing position, slowly control the bar up to the shelf position on the upper back. Letting the bar fall too quickly can lead to serious neck injuries. If the weight is heavy, a slight drop can reduce the intensity of getting a bar. Overhead Squats Sequence 1. Create a safe starting position. The bar should rest on the upper traps (as with a high back squat bar) with elbows pulled under the bar. 2. Create a hard barrel by taking a big breath and holding it tightly. (Verbal signal: great breathing and core tight.) 3. Use a controlled dip and drive to push the bar into the top position. (Verbal signal: slide your back down the wall and drive up with force.) 4. Stabilize the barbell. (Verbal signal: prepare your hands to the ceiling and lock your elbows.) 5. Use a small thigh hinge to tap into the back chain. 6. Stay balanced by keeping the bar positioned over the middle foot all squat. 7. Hips and breasts rise at the same speed on the rise. Notes 1. J.J. Crisco, M. M. Panjabi, I. Yamamoto, and T. R. Oxland, Stability of the Human Lumbar Spine. Part II: Experiment, Clinical Biomechanics 7 (1992): 27-32. 2.. Kolar, J. Neuwirth, J. Sanda, et al., Analysis of the movement of the diaphragm during tidal breath and during its activation during breath-holding using MRI synchronized spirometrics, Physiological Studies 58 (2009): 383-92. 3. D.A. Hackett and C-M. Chow, Valsalva Maneuver: His influence on intra-abdominal pressure and safety issues during Resistance Exercise, Journal of Strength and Conditioning Studies 27, No. 8 (2013): 2338-45. 4. S.G. Grenier and S.M. McGill, Quantitative Assessment of Lumbar Stability with 2 Different Abdominal Activation Strategies, Archives of Physical Medicine and Rehabilitation 88, No. 1 (2007): 54-62. 5. J. Cholewicki, K. Juluru, and S. M. McGill, Mechanism of intra-abdominal pressure for stabilizing the lumbar spine, biomechanics 32, No. 1 (1999): 13-17. 6. M. Rippeto, Initial Strength: Basic Barbell Training, 3rd Ed. (Wichita Falls, Texas: Aasgaard, 2011). Photo Attribution 1. Aperture: Designua / Shutterstock.com Chapter 3 Collaborative Concept In this chapter, we will talk about one of the most thought-provoking and influential approaches to understanding the human body: collaborative concepts. Now, before we start, I want to know that this concept is not new or my own creation. Physiotherapist Gray Cook and Strength Coach Mike Boyle formed this concept based on their observations and history of working with athletes. They have written a lot about this in the past and I definitely recommend checking out their extended writings on the subject. Their simple and simple concept changes the rules of the game when it comes to how we, as coaches, practitioners and athletes, view the human body. This influenced the way I approach and treat my athletes as a doctor Therapy. A collaborative concept is an idea that I would like to share with you. We will also discuss how this relates to squats. Human movement is extremely difficult. It is so complex that it lends itself to the illustration of a symphony orchestra consisting of hundreds of simultaneous and complex muscular actions. Some muscles create movement, while others stabilize and hinder movement. Just as the orchestra changes the tempo and shapes its sound in a single manner, our body must move and flow in a single manner as well. Each joint in the body tends to have a certain function and purpose that is necessary for effective movement to take place. In this folded series of joints there is a tendency to alternate a number of mobile joints moving on top of stable joints. With an understanding of what each joint requires, we can then connect the dots in our understanding of how the body works together to produce effective movement. First, let's define two terms that describe how our body functions. Mobility: describes the ability of the joint complex to move freely in an unlimited way through full range of motion. In basic terminology, this is our ability to move in a particular segment. Stability: describes the ability of the joint complex to maintain a position while the movement occurs somewhere else. It's just the ability to control movement in a particular segment. Stability can also be synonymous with the term engine control. Let's look at a simple breakdown of the basic needs associated with each joint in a collaborative concept. Legs - Stability - Mobility - Knee - Stability - Mobility - Mobility - Lumbar Spine - Stability - Thoracic Spine - Mobility - Spade - Stability - Leverage - Mobility These labels are based on common trends, patterns and problems that we, as practitioners, have found over time. What we see is that athletes who develop injuries have similar mobility and stability problems. The overwhelming consensus in practical experience shows us that when the body is unable to adequately demonstrate mobility and stability in certain parts of the body, there is a movement disturbance and trauma occurs. Let me explain. The leg is an area of the body that can benefit from increased stability and engine control due to its tendency to become unstable while driving. A recent paper published in the British Journal of Sports Medicine compared the stability of our core provides our lower back to the role of the smaller muscles of our legs that work to maintain the same type of motor control while driving. 1 This control inevitably creates the stability of the foot on which all human movement is based, such as squats. While proper shoe wear plays an important role in performance and processes, there is no doubt we could all benefit from increased leg stability. When the foot has stability problems, it will directly affect the ankle joint. The ankle is an area of the body that increased mobility and flexibility. At its core, we see a lot of sports injuries that occur when the ankle develops stiffness and loses flexibility, especially in the movement of dorsiflexion (moving the knee forward over the legs during the deepest part of the squat). The tendency for the ankle complex to become immobile then affects the role of the joint directly above (the knee) and the area below (leg). The knee joint is an area of the body that would benefit from increased stability. Obviously, the knee has to be mobile when we squat in order to reach a solid bottom position. Unfortunately, the problem we see is that athletes who develop pain tend to have unstable knees, especially when they squat. When we squat, jump, run and cut, we have to be able to control the knee. The knee should remain in proper alignment (stability) to avoid injury. Many injuries occur because the knee tends to bow instead of staying aligned over the leg. - The hip joint is an area of the body that shows a tendency to benefit from increased mobility due to its tendency to become immobile and stiff. If the hip loses mobility, it will affect the role of the joint complex directly above (lower back) and below (knee). What we have come to find is that the all-too-common lower back pain is caused by a lack of hip mobility.2 For this reason, it doesn't matter how much strength and stability work you perform on the core, if hip mobility is never addressed, no changes in pain will occur. The lower back (lumbar spine) is a joint complex that requires stability. Very often we see that the lower back loses stability. When this happens, our body develops compensation that leads to stiffness, reduced electricity production, and ultimately pain. When looking at squats, a stable lower back is a necessity; otherwise, you risk injury. Food for thought: Ensuring this stability is more than just performing boards and endless squats. Strength is not the same as stability. A strong core and a stable spine prevent excessive movement. From the middle to the upper back (thoracic spine) is a joint complex that requires mobility. This area of the body is inherently very stable thanks to the support it helps to create with ribs for our vital organs. However, we could all benefit from increased mobility and flexibility in the region. For most people, the thoracic spine will stiffen due to excessive sitting all day at work and playing on the computer and smartphone. Most Americans have crappy posture. Crappy posture limits the ability to perform movements levels such as overhead squats and snatch/jerk. Not to mention that poor posture/inflexible thoracic spine increases the risk of shoulder snug and other shoulder injuries. The process goes on and on up the body, in a simple alternating picture. Stable joints stacked on top of mobile joints. When the mobile joint becomes stationary, the stable joint is higher or lower below and move as compensation. This is how trauma occurs in our body. The simple format of the collaborative approach allows us to better understand the body. Recently, we have seen a significant change in the way athletes are trained and rehabilitated after injury. In the past, the paradigm of learning and rehabilitation has focused exclusively on one part of the body. We basically looked at the body through a microscope. Fueled by the golden era of bodybuilding and the desire to look like Arnold Schwarzenegger, athletes will enter workouts to train their back and biceps or chest and triceps. This thinking was based on a thought process that stronger and more muscles would lead to increased performance. Athletes who have injured their back will go to the physiotherapist and perform hours of basic work while lying on the bed. Rarely would a therapist make a compound that limited ankle mobility can have a potential link to a lack of basic stability. However, in the end, a more intelligent approach to the athlete began to appear. Mantra train movements are not muscles started to penetrate the world of sports training and rehabilitation. Today, athletes enter into training to work on an explosive movement through the power of the clean and back squat. The physiotherapist will now spend most of the time helping an injured patient with back pain recover through training basic stability principles during various patterns of movement such as squats or lunge. Now we have a connection to understand that in order to solve the damaged area of the body, we must also evaluate the joint above and below the pain point. As a society, we are beginning to see that the missing link between optimal performance and trauma lies in how we move in general. We finally laid the microscope and looking through the circuit of motion. I recently worked with a CrossFit athlete who complained of knee pain - one of the most common injuries to an athlete in any sport. She could run without pain. She could jump with a rope without pain. However, she could not squat with the barbell, snatch, or perform gun squats without pain. During our first meeting, I asked her to perform two simple body weight movements - a deep squat body weight and a gun squat to the fullest depth. Instantly, I noticed a theoretical crack in its foundation movement. Simply put, she couldn't squat with good technique. During the weight squat, it over-turns out the arms and allows the knees to roll slightly in the lower position. Her gun squat was even worse as she was unable to even pass a parallel hip depth position without her knee collapsing inside. Right from the bat, this athlete had a movement problem that causes her pain. By applying a collaborative concept to this broken motion model, we were able to identify several problems that were related. - Solid ankles - knees and immobile thighs The combination of these deficits has led to knee pain. The most important aspect of a collaborative approach is that it allows us to broaden our understanding of how we approach the body. Given this CrossFit athlete has knee pain, many coaches and coaches can approach this injury by focusing solely on the knee itself. The doctor hand out painkillers and tell her to rest. Next, the therapist will prescribe a flurry of foam rolling, stretching and icing the knee. Does that sound familiar to you? Even if we recognized that there was a problem of instability on the knee and started some stability training, the consequences would be short-lived. The stability we create will not be real whenever it needs to squat, clean or snatch again. Until the immobility of the ankles and hips are examined (the joints directly above and below), the knee will never fully stabilize in real situations. In his book The Movement, Gray Cook wrote: It's not about finding what was first, chicken or egg-you have to catch either or you can't manage either. Let's return to our analogy from the very beginning of this chapter. Body movement is synonymous with an experienced orchestra with dozens of musicians playing in a coordinated and synchronous fashion. Our usual reaction to pain is like saying violins to stop playing because they sound bad. Pain, like bad-sounding instruments, is our warning that something is not working properly. Taking painkillers and placing ice on your knee because it hurts before ever examining the hip and ankle is just like silencing a part of an orchestra that plays out of sorts. After all, you don't fix the problem. The instruments of the musicians are still out of sorts. You just covered it up and stopped their game at the moment. Recognizing that each joint complex plays a specific role, we can take a systematic approach to understanding how movement breaks down and injuries occur. By doing so, we can get rid of the pain, but also maximize our capacity to move and perform at the highest level possible. I encourage you to take a look at the picture of the day. When dealing with pain, look at the joint above and below. You may be surprised by what you find. Notes 1. P. O. McKeon, J. Hertel, D. Bramble, and I. Davi, Foot Core System: A New Paradigm for Understanding The Inner Function of Leg Muscles, British Journal of Sports Medicine 49 (2015): 290. 2. S. M. Roach, J. G. San Juan, D. N. Suprak, et al., Passive range of hip movement decreases in active subjects with chronic lower back pain compared to control, International Journal of Sports Physical Therapy 10, No. 1 (February 2015): 13-20. Chapter 4 Stable Foot In this chapter, we're going to cover a topic that is a little less understood by the majority. We're going to talk about your legs. Our feet set the foundation for every functional movement. They a stable platform for the rest of our body to move. Very often I find that athletes do not feet properly. Many coaches and physiotherapists overlook how important the legs are when it comes to movement. Whether we're squatting, lunging, running, or jumping, a stable foot provides a platform for effective and powerful movement for the rest of the body. For this reason, it is important to establish a simple basis for understanding our feet. The first thing we have to establish is that the foot is naturally mobile. There are more than twenty-five bones scattered across four different joints in the leg. This allows a ton of movement. Therefore, the role of our muscles should be the role of stability. Once we brace our bodies to lift that heavy rod out of the rack, we want our mobile legs to be instantly stable. When we squat, we need a leg to be stable and maintain our natural arch. When we look at the main arch of our foot, we notice that it is moving towards the rest of our lower body. If the ankles, knees and hips are leaning outwards, the whole leg moves to full arched positions. When the ankle, knees and hips fall inside, the leg subsequently collapses and the arch is leveled. We can manipulate the position of our feet by placing our hips and knees in a good position before starting our squat. This connected movement of the lower body is a physical representation of the joint concept that we reviewed in the previous chapter. If one link in the human chain of motion breaks, the entire structure will be affected. When we create a good arch in our foot, we inevitably shape what we call a leg tripod. The three-point tripod consists of the heel, the base of the first hole and the base of the fifth hole. Our foot is basically like a tricycle. Our goal is when squatting should be to maintain the arches of our feet and our weight is distributed evenly - like a three-wheel motorcycle. If all the wheels are in contact with the ground, we get more energy. If one wheel is off the ground or if the body is bottoms, power is lost and the motorcycle breaks down. When our foot is out of position (arch collapse), stability and strength are lost. Try this simple test at home. Take off your shoes and take on a squat position. With our shoes, we should all have our feet relatively simple. Notice the position your feet are in. Do you have equal weight on each of the three points of the contact tripod? Is your arch in a good position or has it already collapsed? The goal is to realize how your foot functions. From this position, squeeze your butt muscles and drive your knees to the side while keeping your big feet in contact with the ground. Notice the position your feet are in right now. Has anything changed? By placing our knees in a stable position, we naturally tie our feet in a good position. As you are squat, don't just think about keeping your knees in line with your feet. Do your best to keep the arch and tripod legs. Here you go strong and stable. You don't have to. arch of collapse. Notice what it's like? Your squat should feel more stable. If you can pass this weight squat test, try again with a squat gun. Pistol squat body problems more than squat body weight. The purpose of this activity is to raise our awareness of our foot position during squats and gun squats. Each athlete, regardless of the type of leg, should be able to perform a double and one leg squat barefoot, while maintaining a stable leg. Failure to do so highlights the crack at the heart of the movement. Left unzing, this crack will wreak havoc on athletes' barbell lifts and affect his or her skilled field movements. Once we can get our athletes to take a better position with their feet, many other movement problems they will have to take care of themselves. The body naturally starts to take better positions because it is now moving from a stable platform. At the same time, we not only improve the quality of movement, but also reduce pain and improve their performance. It all starts with strengthening our base. Chapter 5 Mobile Ankle 5.1 Screening for ankle stiffness In the last chapter, we discussed how creating a tripod leg provides proper stability for our squat bottom-up. If you remember the collaborative concept, a stable leg lays the groundwork for our mobile ankle. This is the topic of the current chapter. Despite the occasional ankle sprain, our ankle is naturally a fairly stable joint. He is prone to stiff and immobile. For this reason, the role of ankle movement or mobility. When our ankle loses the ability to move, it affects the rest of the body. The foot below becomes unstable, and therefore the natural arch of the foot is destroyed. The knee above also becomes unstable. When we squat, an unstable knee often wobbles and fall inside. These are only the immediate effects of a still ankle. After all, a stiff ankle can negatively affect the rest of the body. Entire patterns of movement can be thrown out of the impact because of a stiff ankle. In order to perform a full squat, our bodies require a certain amount of ankle mobility. If you perform a low back squat bar, your knee should be able to move forward on your nose. This forward knee movement comes from the ankle and it is called dorsiflexion. You can measure dorsiflexion by drawing a line with the shin and the other line from the outside of your leg. The smaller or more closed the angle, the more ankle dorsiflexion the athlete has. The restriction is in this movement where most athletes run into trouble. Solid ankles are often the culprit of our squat problems. Do your feet point outwards when you're squatting, even if you're struggling to keep your feet forward? Can you stay upright at the bottom of your snatch Clean? Do your knees constantly fall inside when you perform a squat gun? All of these movement problems can be associated with poor ankle mobility. I want to present a present way to assess our ankles. This screening will show us if we have full mobility or if our motion problems are the result of a problem elsewhere in the body. This test is called the semi-knee dorsiflexion test. This specific test has been used many times in studies to assess ankle mobility.1 Physical therapist Dr. Mike Reynold recommended this screening for its ability to provide reliable results without the need to prepare a specialist.2 Find a wall and kneel next to it with shoes. Use roulette and place a large nose five inches from the wall. From this position, press your knee forward while trying to touch the wall with your knee. The heel should remain in contact with the ground. Movement Checklist: Pass Fail knee can touch the wall on the knee unable to touch the wall five inches or more distance on the five-inch distance heels remain firmly heels take off with planted ground knees collapse inside the knees aligned with the legs (Valgus collapse) in order to touch the wall No pain noted Pain noted Lee you have a tick in the aisle column? If you could touch your knee to the wall at a distance of 5 inches while keeping your knee in line with your foot, you show adequate mobility in the ankle.3 However, if you have had any checks in the no column for this screening, you keep the dorsiflexion fertilization restriction. This restriction can be either a soft tissue restriction or a joint mobility problem, or both. With a collaborative concept, we can learn to evaluate the body differently than we have in the past. Always rate the movement first. If you find a problem in one- or bipedal squats, we can use a variety of tools (such as semi-standing dosyflexic screening) to find out the cause of the breakdown. By addressing ankle mobility issues, we can improve the overall quality of our movements. 5.2 Joint restriction or soft-tissue stiffness? Let's now discuss the results of ankle mobility screening. After doing the test, what did you notice? Have you passed? Don't worry if you fail. You are part of the vast majority of athletes with stiff ankles. It is important to understand the various reasons for developing ankle stiffness so that we can properly treat this problem. There is no one-size-fits-all approach to fixing stiff ankles. Solid ankles are primarily caused by two different factors. (1) The joint limitation (2) Soft Tissue Restrictions Joint Restriction Joint Restriction is simply defined as the loss of space between the bones that connect on the ankle. In fact, they stop moving properly over each other. Bone spurs or abnormal calcifications in the joint are among the main causes of this type of block.4 They usually develop after an injury such as an earlier sprained ankle. Old age can also contribute to the bony block. the result of joint restriction is encroaching on the ankle joint. It usually feels like a pinch or blocked sensation in the front of the part during the ankle mobility screen. In the book Anatomy for Runners, physiotherapist Jay Dicharry uses the perfect metaphor to describe how these types of restrictions change our traffic patterns.5 If you've ever driven your car through a European-inspired roundabout, you know you can't just drive straight through an intersection. You have to go around the center of the island. The ankle with full mobility will allow the shin to move freely on the leg. Think about it as a car able to move right through the intersection. The bone block is like a roundabout at an intersection. When the car enters the intersection, it must now bypass the island to continue its previous route. In fact, our lower leg unscreths from its normal route and falls inside. As our lower leg goes around the bony block, the knee is pulled inside. The movement breaks down. If you couldn't pass the ankle mobility screen and you felt like a pinch or block in front of your ankle, chances are that you have a bony unit. We can use ankle mobilization exercises in order to correct this type of stiffness. Soft tissue restriction of soft tissue restrictions on the ankle joint include muscles (gastrocohne, soleus, tibialis posterior) and fascia. These structures can become rigid and inflexible over time. For example, a sedentary lifestyle or wearing high heels can often cause these muscles to become stiff and stiff. Fascia, a type of connective tissue, weaves its way around our entire body. Fascia is like a cobweb that covers from the top of the head to the bottom of our legs. It wraps around and envelops bones, muscles, organs, nerves... Basically everything! When we move frequently and with good technique, the fascia surrounding the muscles remains flexible and elastic. If you have viewed the fascia under a microscope, it will appear in an organized weave pattern.6 This weave design allows the soft tissues in our body to easily slide over each other in a smooth fashion. Inaction and bad movement disrupts this weave pattern. The once organized pattern ended up more like a random doodle drawn on a two-year-old child with pencils. Not only are the fascial fibers now in complete disarray, but they actually lose their elasticity and stop easily gliding over each other.7 When this happens, natural flexibility is limited and movement is limited. I mentioned the analogy of a bony block as the equivalent of a roundabout; Well, soft tissue restriction is more like a cork. As your knee tries to move forward over the toe, it runs into congested chaos and is basically stopped in its wake. When this happens, our body will do one of two things. First, the knee will stop moving forward and somewhere else in the body will have to move. This is what happens when we see the chest lift collapse to deeper into his or her The other option is even worse. The knee will follow the path of least resistance and fall inside. It's basically like how going without roads to get around the traffic jam. When the ankle rolls, he takes a knee with it. Again, the movement breaks down. These types of restraints are usually felt as tightness in the calf or heel cord during the ankle mobility screen. If this is the case for you, we'll go about addressing this limitation later with two different tools: stretching and foam rolling. 5.3 Mobility Corner there are many great ideas available today to improve ankle mobility. In this section of the chapter, I want to share with you some of my favorites as part of my three-step process in dealing with ankle stiffness. 1. Mobilize 2. Foam roll 3. Stretch ankle Mobilization Restriction in Joint Mobility should be the first area to address. During the ankle screen, a pinch or block sensation felt in front of the ankle usually means this type of restriction. These types of restrictions will not resolve on their own with the usual stretching and foam rolling. Therefore, if you have had the feeling of pinching during ankle mobility screening, it should be resolved before you move on to possible soft tissue stiffness. One of the easiest ways to create mobility in limited joints on your own is to use a mobilization band. The rubber strip material is elastic and strong enough to affect rigid joint capsules. The group's distraction joint mobilizations just help increase the way our bones glide over each other. The joint slip is supported while the athlete actively moves within a certain range of motion we are trying to change. If we look at the ankle, the thalus leg bone moves backwards as the shin moves forward in dorsiflexion as we squat. In order to help improve this movement to increase mobility, the group must help push the talamus bone back.8, 9 Often, athletes will have the band placed too high on the ankle. This reverse pull on the shins will actually do the opposite of what we want to achieve. These types of mobilizations (simply called mobilization with movement) have been used for years by physiotherapists. The goal is to relieve any once painful or pinching feelings deep in the joint. Foam Rolling Once the joint restrictions have been resolved, the next step is to clarify any softness of rigidity. This starts with the use of the foam roller. I usually recommend that athletes spend at least two minutes on each area they try to handle with a foam roller. Every athlete should spend time every day using this tool. Start by moving slowly up and down the muscles of your lower leg until you find a gentle area. Pause on this area and attach it down with the opposite foot for about ten seconds before moving to find another place. You can also add in some ankle pumps during this pause to increase Soft tissue stretching After the foam rolling is completed, muscle stretching is the next step to addressing soft tissue limitations. The classic ankle stretch is a good go-to in order to do some some Improve. Before starting a workout, using this stretch after foam rolling is a great way to reduce any amount of stiffness in the bottom of your leg. Another version of this stretch is one I would like to use before training sessions that include any form of barbell squatting. This is a very specific position and therefore has a good transfer to the exact movements that we are going to perform. For a start, drop into a deep squat cup. This can be done either with a bell kettle or a weighted plate. From this position, transfer your weight to one leg. Push your knee far forward over your leg until you feel a sprain in your lower calf. After holding for about ten seconds, jump on the other leg. Test-Retest Once you've turned to stiff ankles, it's time to check the progress you've made. We always simulate a testing strategy when performing mobility exercises. This allows you to see if the tools you use are effective in addressing the changes you want. Performing ankle mobility screening is a great way to measure and see if you have made any changes. However, in the end our goal is to make a lasting change in our overall squat motion model. For this reason, it is just as important to see how any improvements in ankle mobility have affected your squat. After working on ankle mobility, perform deep squats. Then perform a deep one-legged squat gun. Have you noticed anything else? While not everyone has the same reasons for ankle stiffness, using these tools can be the first step in helping to make lasting changes and improve your squat and gun squat technique. Notes 1. K. Bennell, R. Talbot, H. Weiswelner, W. Techovanich and D. Kelly, Intrarater and Interrather Reliability of Lung Dosiflexia, Australian Journal of Physiotherapy 44, No. 3 (1998): 175-80. 2. M. Reynold, Ankle Mobility Exercises to Improve Dorsiflexion, accessed december 1, 2015, MikeReinold.com. 3. G. W. Hesia, Ankle Extinct Syndromes: Review of Etiology and Related Effects, Foot Ankle Specialist 4, No. 5 (2011): 290-97. 4. J. Dicharry, Anatomy for Runners (New York: Skyhorse Publishing, 2012). 5. R. Schleip and D.G. Mueller, Principles of Learning Facet Connective Tissues: Scientific Foundation and Proposed Practical Applications, Bodywork and Movement Therapies 17 (2013): 103-15. 6. T.A. Jarvin, L. Jozsa, Kannus, T. L. Jarviinen and M. Jarvinen, Organization and Distribution of Intramuscular Connective Tissue in Normal and Immobilized Skeletal Muscles: Immunohystochemical, Polarization and Scanning of Electronic Microscopic Research, Journal of Muscle Research and Cell Life 23, No. 3 (2002): 245-54. 7. B. Vicenteino, M. Branjerdporn,. Teys, and K. Jordan, Initial in the back of Talar Glide and Dorsiflexion ankle after mobilizing with movement in individuals with recurrent ankle sprains, Manual Therapy 9, No 2 (May 2004): 77-82. 8. A. Reed, T.B. T.B. and G. Alcock, Efficiency mobilization with movement for patients with limited Dorsiflexion after ankle sprain: crossover trial, Physiotherapy Canada 59, No. 3 (2007): 166-72. Photo Attribution 1. Human foot bones: BlueRIngMedia/Shutterstock.com Chapter 6 Stable knee knee is basically a hinge that is stuck between the ankle and hip joints. In order to reach full depth, we require that the knee is completely hinge open and close. This movement is described as bending and expanding. It can be measured by drawing a line on the outside of the femur and lower leg. The smaller or more closed the corner, the more

flexing the knee. Most athletes have no problem achieving a complete knee flexion. The main problem we see is the inability to control the knee during dynamic movements like squats. When I speak unstable, I mean that often athletes have a hard time keeping their knees in a stable and unwavering position. Athletes who develop knee pain or withstand traumatic injuries (such as torn ACL) tend to have unstable knees. When we see squats in the front, we see the knee tend to hover around like crazy and sometimes rotate inwards, collapsing to the middle line of the body. The ideal position of our knees is to be in direct alignment with the legs. An effective signal is to drive your knees wide. With this signal, the athlete can set the knee-foot alignment during squats. The knee is considered unstable at any time its position deviates from this ideal alignment. The inner cave in the knee (marked with valgus collapse) is the most common mistake we see. If the foot is in a stable tripod position throughout the climb, there is no way for the knee to collapse in or out. Thus, the knee joint would benefit from increased stability to limit this internal collapse. Improving control of the knees allows us to avoid injuries while improving the efficiency of our movement. By increasing the efficiency of our movements, we can produce more energy and increase strength. Who wouldn't want more power and more strength and to avoid injury? 6.1 Knee screening let's talk about knee screening. Before we enter into this discussion, I would like to point out one point. If an athlete poses with a stiff ankle and/or hip, this issue is likely to result in an unstable knee. For this reason, always address the hip and ankle before knee screening. If you miss your hips and ankles, any knee stability we try to set will be short-lived. After cleaning the ankles and hips, we can now focus on knee stability. We have to consider our squats in a double and one foot position. A two-legged squat can sometimes mask any stability problems. That's why I would look at the squat gun on one leg. Often, an athlete can be experienced in two-legged squats, but then demonstrate valgus collapse with a squat gun. To start our assessment, stand with your feet in a comfortable comfortable With your feet in a relatively simple position. Perform a deep squat. Next, take on a one-legged position and perform a deep squat gun. What do you notice? Does your knee hover around and fall inward or can you keep it in line with your feet? It can be helpful to also check the loaded squat. The weighted barbell allows us to check the competence of our movement. The more weight on the barbell, the higher the demand for the body. Very often I see athletes who can perform perfect body weight squats, but when they perform weighted back squat, their shape turns into crap. It is never good or justified to lose a good technique to achieve a new single rep-max personal best. Weight on the bar means nothing if our technique goes to shit! If the knees break down during the maximum squat attempt, the risk of injury increases significantly. Period. Last year, a number of world records in weightlifting were set. The huge weight moved in the blink of an eye. All of them were made with good technique. These weightlifters spend day after day improving their movement with the barbell. No matter if you are performing a world record snatch or a simple squat body mass, a good technique is a necessity. If you want to stay healthy and achieve your true strength potential, focusing on knee stabilization is vital. 6.2 Corrective Exercises Corner I now want to introduce you to my three-step process to improve knee stability. 1. Correct technique 2. Touchdown Progression 3. Strengthening the hips Is the Right Technique Our first step in solving unstable knees is working on the right technique. Some athletes have never been shown how to squat properly. At times, fixing the technique of squat is all they need to stabilize the knees. One of the most common signals that I would use is to kick out my knees. This hint teaches athletes to handle their hips properly and keep their knees from collapsing inside as they squat. However, it must follow with keep the legs firmly planted. Pushing your knees too far without supporting a tripod of your feet can be a problem as well. Their weight will shift on the outside of the leg, allowing the base of the big legs to become unglued on the floor. As long as the foot remains firmly planted on the ground in a tripod position, the knee cue is an excellent starting point. The second signal I will use to help stabilize the knee is to drive the hip backwards. One of the absolutes squatting is the proper involvement of our back chain (primarily our gluteal max) before the descent begins. This happens by driving the hips backwards in a movement called a thigh hinge. You need more hip hinge with low bar squats compared to overhead squats or front squats. If you perform low bar back squats overhead squats, you have to deal with the back chain before starting to squat. Loading our hips (the powerhouse of our body) will take pressure off our knees. Not attracting the back chain will be chance that the knees oscillate around. Touchdown progression If an athlete fails to correct knee instability with cueing, it's time to take a different approach. This means switching to one leg and sagging the gun squat. You would be surprised at how many powerful athletes are capable of squatting a huge amount of weight, but unable to perform a simple one-legged squat. In power games, we often forget about training on one leg, because we spend so much time working on improving our numbers on the main main lifts: squats, dead lifting, cleanliness and jerk. It is easy to unknowingly develop weakness in certain areas of our body. Defying yourself one-legged squats can illuminate any deficit you have. Not only that, but the one-legged activities will work on the balance sheet. Every athlete should work on the balance sheet. Starting small and progressing properly, we can see a dramatic change in the ability to control the knee. To do this, we will use a small box or weight plate. From the bottom surface, we can work our way up to a full squat gun. Start by using a four-0 box. If you are in the gym, you can stack two weighted plates on top of each other. Suppose a one-legged position on top of a box or plate. From this position, drive your hips backwards and bring your chest forward. This movement allows you to use the back chain. If you do it right, you should feel a slight strain in the gluteal and hamstring muscles. Bringing your breasts forward while driving your hips backwards will lead you into a balanced position with your body weight in the middle of your leg. Keeping the knee in line with the foot, squat until the opposite heel gently taps the floor before returning to its original position. If you do this exercise correctly, you will feel your muscle butt work hard after a few reps. You should not feel pain or stiffness in your knees. When you perform this exercise, try to keep your shins as vertical as possible. Allowing the knees to slide forward too early will increase the pressure on the joint and the susceptibility of the caving in. However, there should be little movement forward of the knee during this initial small box. As the four inch box becomes easier and easier, increase the difficulty by moving to a higher box or adding more weights. A higher box will require more control from the knee. In the end, the goal will be to carry a full squat gun with good technique. Strengthening the thighs of the side muscle of the thigh (primarily the gluteal medium) play an important role in stabilizing our knee. When we squat or land from a jump or run, these muscles so that the knees remain in line with the foot and not give in. Strengthening these muscles can improve the ability to stabilize the knee. My favorite exercise for strengthening the hips is called called side group to walk. This exercise is done exactly as it sounds. First, place the rubber band around your ankles. I'm a fan of exercise strips from Run Better. If you can't find one, a larger monster band can be used (the voltage will just apply through the hold). The starting position is the same three-step process that we go through every time we squat. Place your feet in a comfortable position with your feet relatively simple. Next, make sure your feet are in a stable state of life. Drive your knees aside to bring them into line with your feet. Finally, engage in the back of the chain, driving your hips a little backwards and bringing the chest forward to stay in balance. From this position, start walking sideways with small steps. Make sure that constant voltage is applied all the time from the group. After walking from fifteen to twenty feet, stop and return the other way. Eventually, you should start to feel tired in the lateral thigh muscles. Test-Retest Improvements in Knee Stability are not always easy to achieve. Instability is something that has been studied and programmed in the body for some time. The longer you move badly, the longer it will take to learn how to move properly. Chapter 7 Mobile Hip Hip is another area of the body that tends to develop stiffness. Sedentary lifestyle and excessive sitting are several reasons why we develop tight hips. A limited range of movement on our hips can limit our ability to squat to full depth. Most of us could benefit from working on our hip mobility problems. When the hips lack adequate mobility, a few things can happen. First, the knees will lose stability and begin to bow inwards. Secondly, the lower back will not be able to remain stable and will collapse into a rounded position. Each of these traffic problems wreaks havoc on our power and increases the risk of injury. Adequate hip flexion is necessary to reach the full depth of the squat (hips below the parallel). You can measure hip flexion by drawing a line with the torso and the other line from the outside of the upper leg. The smaller or more closed the corner, the more flexing the hip of the athlete. 7.1 Screening on hip stiffness If you are unable to squat at full depth with your feet relatively simple, hip mobility is probably a limiting factor. Now I want to introduce one of my favorite tools for assessing hip mobility. It is called Thomas test.1 This test is performed lying on your back. The main purpose of thomas' test is to look for tightness oropsoa (thigh flexor muscles), straight femoris (quad muscle), or iliotibial strips. All of these soft tissue structures can contribute to hip mobility problems. Start with next to a bed or a bench. Your hips should be in contact with the edge. Take one of your lap and pull it to your chest as you gently fall backwards. The knee you grab should be pulled as close to your chest as possible. As you lie on your back, holding on to your knee, let the other others completely relax. What is your position? Having a friend help you with this screening is extremely helpful. Once you screen one leg, perform the same movement on the opposite leg and see what you find. Movement Checklist: Pass Fail Able pull the knee completely to the chest In a position to keep the opposite leg flat on the bed opposite leg lies in a straight position on the bed Opposite knee bends and relaxed Unable to pull the knee in the chest Unable to keep the opposite leg flat on the bed opposite leg ended up in the side of the body opposite knee relatively straight and hard Do you have checks in each box to pass the column? If so, you show adequate hip flexivity. However, if you have had any checks in the fail column for this screening, you have a hip mobility restriction. If you have been unable to pull your knee completely to your chest, we are dealing with a possible issue of hip flexivity. This can be caused by a number of factors including hard or limited soft tissue or even hip capsule limitations. If you have not been able to pull one of your legs as far to your chest as the others, you have possible asymmetry in the mobility of the hip joint. It's a red flag. Asymmetry is very important to take care of as they can negatively affect barbell squats. Often these small differences from side to side are not diagnosed. Left untreated, asymmetry can lead to excessive injuries. The Thomas test also allows us to check mobility limits in the opposite hip. Failure to keep the opposite leg flat on the bed and in a straight line can also indicate hip stiffness. Remember to always evaluate the movement first. If you find a problem in a one-legged two-legged squat, we can use various tools (such as the Thomas test) to find out the cause of the breakdown in motion. 7.2 Joint restriction or soft-tissue stiffness? With adequate mobility on the hips, our knees and lower back remain stable. The basic idea of the joint concept is that our bodies are made up of constantly connecting parts. A weak link in our chain of motion will break the entire system. Solid hips limit our ability to squat with good technique. Let's now discuss the results of Thomas's test. After doing the test, what did you notice? Have you passed? Don't worry if you fail! It is important to understand the various reasons for developing stiffness on the hips, so that we can properly treat this problem. There is no one-size-fits-all approach to fixing stiff hips. Solid hips are primarily caused by two different factors. Joint limitation 2. Soft Tissue Restrictions Joint Restriction Of Joint Restriction Simply like the loss of space between the bones that connect on the hip. In fact, they stop moving properly over each other. This tightness creates a roadblock in the joint. This bony blockage stops the femur (thigh) moving forward in the hip when we try to bring the knee into the chest (as in Thomas's test). Thomas). restriction of movement called FAI or femoroacetabular impingement.2 This mobility problem is usually the result of repetitive deformations such as wear effects pushing through pinch pain at the bottom of the squat. It can also be caused by long-term adaptation to sedentary lifestyles. If you are having difficulty pulling your knee up to your chest and felt a pinch in your hip, chances are that you have an FAI. Previously, we discussed the analogy of a roundabout in a limited ankle. With the FAI, the femur actually hit the blockage, causing a pinching sensation in front of the thigh. Our bodies, however, are a little smarter than we think and naturally compensate for our movement patterns in order to get the job done. Because of the hip restriction, the lower back is forced to move! This movement of the lower back reduces our stability during squats, preventing optimal strength and strength gains. We can solve this problem in two ways. First, we can use joint mobilization exercises to increase the space in the hip joint. Secondly, we will ensure the effective operation of our back chain (muscles of the buttocks and hamstring). The inability to properly activate the buttocks during movements is as squat is usually seen. The limitations of soft tissue soft tissue in the hip joint include muscles (oropsoa and quadriceps), IT range and fascia. These structures can become rigid and inflexible over time. For example, a sedentary lifestyle, such as sitting for long periods of time, often leads to stiffness and tightness. Excessive inactivity can cause the fascia to lose its elasticity, making it difficult to easily slide the surrounding tissues over each other. Simple and simple, excessive sitting reduces our natural hip flexibility and impairs normal patterns of movement (such as squats). This type of restriction is usually felt as tightness in the front or side of the free thigh during the Thomas test. Some common findings during the Thomas test is that the free leg stays out of bed and falls out to the side or the knee is unable to relax in a bent position. If this is the case for you, we'll go about addressing these types of restrictions with two different tools: stretching and foam rolling. Hip mobility is a very important aspect in achieving the full depth of squats. Solid hips reduce our ability to properly activate the appropriate muscles in the hips. In fact, we bleed out a good amount of energy during heavy squats. Understanding the cause of our limited hip mobility is the first step in creating effective ways to address this problem. 7.3 Mobility Corner I now want to share with you my four-way process in dealing with hip stiffness. 1. Mobilize 2. Foam roll 3. 4. The back chain activation of hip Mobilization Restriction in Joint Mobility should be the first area to address. During Thomas's test, the pinching sensation felt in front of your thigh when pulling your to the chest indicates a possible encroachion. This feeling is felt when the femur gets into a joint blockade, a burying motion on the hip joint. These types of restrictions will not be dealt with with the usual stretching and foam rolling. Thus, any feeling of pinching in the hip joint should be resolved before moving on to possible soft tissue stiffness. One of the easiest ways to improve joint restrictions on your own is to use the band to mobilize. The rubber strip material is elastic and strong enough to affect the stiff joint capsule of the hip. A group of distraction joint mobilizations help with the way our bones glide over each other. The joint slip is maintained while the athlete actively moves within a certain range of motion we are trying to improve. During squats, the end of our femur slides back into our hip joint as our hip moves towards our chest. These types of mobilizations (simply called mobilization with movement) have been used for years by physiotherapists. The goal is to relieve any painful or pinching feelings deep in the joint. Start with a group pulled close to the hip joint. Suppose a lunge position with a band around the forward leg. The group must pull sideways in this position. The study describes lateral striped mobilization as the most effective way to ease the pinching sensation in front of the hip during a deep squat.3 Out of this position, rock the knee inside and back ten times. With enough tension on the strip, this should cause a slight sensation of stretching in the side thigh. You perform a slight side slip of the femur in the hip socket. This provides more room for the femur in the socket and eliminates the amount of bone on the bone contact, which creates a pinching sensation at the bottom of the squat. Next, press the knee to the side and back. In these positions, squeeze the gluteal muscles for a few seconds and then relax. Foam Rolling Once the joint restrictions have been resolved, the next step is to clarify any softness of rigidity. This starts with the use of the foam roller. I usually recommend athletes spend at least two minutes on each area they are trying to solve. Every athlete should foam a roll on a daily basis! Our goal with the foam roller is to reduce the stiffness the Thomas test has been able to expose. This means tackling our hip flexors, quads and lateral hips. Start by moving slowly up and down the muscles of your lower leg until you find a gentle area. Pause on this area and attach it down with your body weight for about ten seconds before moving again. I like to use the analogy of kneading bread with a rolling pin. You want to use a foam roller to knead your fabrics, rolling back and forth into small, rhythmic Lying on a roller and moving quickly in large aisles will have little effect on your tight fabric. You can also add in active knee movement during this pause to increase efficiency. Soft fabric stretching once Rolling is complete, stretching the muscles is the next step. My first goto stretch is to open our hips and improve our mobility before a squat is called the greatest stretch in the world. This section has four parts to it. First, start by saying that you can take a deep lunge position with your left foot forward. Squeeze the buttocks and drive the thighs to the floor. This movement should cause a sprain to be felt in front of the right thigh. Second, lower your left elbow to the ground. Hold on for five seconds. Then use your elbow or arm to push your left knee to the side. Make sure to keep your foot firmly planted on the ground. Finally, turn the entire upper body up and left, ending with your left hand in the air. This last movement helps to solve the mobility of the chest (middle), which is also prone to stiffness. Another stretch I would use is a half-knee-high thigh flexor stretch. It is a great tool for tackling the muscles in front of the thigh. Hip flexors and/or quads can become excessively dense as an adaptation to sitting all day. To start this movement, take a knee position. Keeping the breasts upright, squeeze the buttocks and pull the pelvis under the body. This should cause a good patch in front of the thigh. Hold this area for ten seconds before you relax. The last plot I want to share with you is more position-specific traffic and therefore has a good shift to squat itself. For a start, drop into a deep squat cup. This can be done either with a bell kettle or a weighted plate. Keeping the weight in front of us allows us to worry less about balance and more at the deep-squat position we want to improve. After reaching full depth, drive your knees towards your feet as much as possible with your elbows. Make sure all the time that your feet remain firmly planted on the floor in a good tripod position. Driving your knees to the side with your elbows will increase the stretch felt in the hips. As you open your hips in this position, you can also work on activating the buttocks. The buttocks are the main muscle group that forces us up and out of the bottom of the squat. While you sit at the bottom of the cup squat, try to squeeze the buttocks and drive your knees to the side as hard as you can for a few seconds (make sure to keep your feet flat). Then relax and let your body fall again on the stretch. This particular type of stretching is called contract-relaxation technique. Physical therapists and strength trainers usually use these techniques because they are so effective in improving our mobility compared to classic long-term sites. After spending about thirty seconds per minute, stand up and take a break. I like to do this movement two or three times before moving on. Rear Chain Activation Failure to activate correctly chain (buttocks and hamstrings) during squats is a common withdrawal in athletes. For The For The reason I recommend athletes perform quick exercises is to prime these muscles after solving their mobility problems. The movement I want to show you is called a one-way kidnapping. The term layman for this exercise is striped side legs. First, place the rubber band around your ankles. Next, let's say sports one-legged positions. Once in this position, press your hips backwards and let the breasts move forward. This small movement allows us to engage our back chain and stay balanced. The cue I would use for every squat (even small as it is) to reinforce this idea is squat with hips rather than with knees. Once we are in position, kick the nonstance leg to the side and back in a slow and controlled manner. The distance to which the foot goes to the side is not our main concern. Focus on keeping your leg position in a stable and unwavering position throughout the exercise. This exercise not only premieres the buttocks for the squats we will perform after, but it will help solve the underlying and knee stability problems. Complete two or three sets of fifteen reps. This should leave your side hips tired. Test-Retest Once you've turned to a stiff hip, it's time to check and see the progress you've made. We always simulate a testing strategy when performing mobility exercises. This allows you to see if the tools you use are effective in addressing the changes you want. Performing a deep weight squat is a great way to assess any changes. It's also an attempt at deep gun squats. Have you noticed anything else? Our goal is to make a lasting change in our overall pattern of squat movement. Mobile tools are only effective if they are transferred to an exercise we are trying to work on. I hope this chapter is to give you the tools you need to solve any hipstiffness problems. If you want to stay competitive or move around painlessly, it is important that you improve and maintain good hip mobility. Notes 1. D. Harvey, Assessment of the flexibility of elite athletes using the modified Thomas test, British Journal of Sports Medicine 32, No. 1 (1998): 68-70. 2. M. Leunig,. E. Bowl, and R Ganz, Concept femoroacetabular Impingement: Current State and Future Prospects, Clinical Orthopedics and Related Studies 467, No. 3 (March 2009): 616-22. 3. M. Reiman and J. W. Matheson, Limited Hip Mobility: Clinical Proposal for Self-Rechecking and Muscle Reassion, International Journal of Sports Physical Therapy 8, No. 5 (October 2013): 729-40. Photo Attribution 1. Hip Collaborative: AlilaMedicalMedia /Shutterstock.com Chapter 8 Stable Core Too Often, I See that are going about preparing their core in the wrong direction. Many trainers are still under the impression that by strengthening the core muscles, stability will be enhanced. For this reason, it is common to see athletes still perform endless crunches or hypers from the gluteal ham machine. While these muscles must be strong, strong, strengthening in this way is actually little to promote the stability that will carry to helping us squat with better technique. The main stability lies in timing and coordination. The muscles of the abdomen, back and hips should work together to keep our lumbar spine in a neutral position as we move. When we combine the action of fixing our nucleus with the force of our breath, we discover the potential to lift a huge weight. Corrective exercises for the lower back should focus on how well we can keep our back in a stable position, rather than the amount of squats we can perform. Most of us have been learning our core the wrong way all our lives! Before we work on the stability of the core, we must solve any hip limitations we have. Any basic stability we are working on will be short-lived if we do not have adequate hip mobility. 8.1 Level 1 (Cognitive Stability) Each level of corrective basic stability exercises is based on the teachings and studies of renowned experts Peter O'Sullivan and Dr. Stuart McGill.1, 2 The first stage of training is called cognitive phase. It is aimed at improving our sense and perception of stability. We should be able to feel the muscles that need to be activated as we brace our core. Bracing involves activating all the abdominal muscles of our nucleus (abs, spin, diaphragm, and pelvis) to create 360 degrees of stiffness around our spine.3, 4 If fastenings combined with proper breathing mechanics during heavy squat attempts, stability is enhanced to an even greater extent.5 In the past, many experts have argued that we only need to activate the transverse abdomenis (small abdonis, a flat muscle that runs through the front of our nucleus). However, we have come to the view that the activation of transverse abdominis is solely an improper attempt to create basic stability. This muscle is just one member of the abdominal team. This is no more important than any of the others that cover and surround the torso. All of them must be equally activated in order to fully support the lower back. The first exercise I want to introduce is an easy way to learn the fastening process. Focus on feeling the muscles around the entire core activation as we go through this step-by-step process. Step 1: Lie on the ground with your back to the floor. Your knees can remain bent for comfort. Step 2: Activate the muscles on all sides of your core, a process called joint contraction. The verbal signal I would use to brace yourself as if you were going to get hit in the stomach. This should create a feeling of hardness around the entire lower torso. Place your hands on your stomach and on your side. You should feel the muscles under your arms tense as they are activated. Wrong mount only our rectus abdominus (our muscle sixpack). Step 3: Once this model has been isolated, we need to train these muscles to work together for a long period of time (ten to twenty seconds). The stability of our lower back is essential throughout our entire day, not just a few heavy lifts we do in training! Being able to do this invigorating action for a long time allows us to increase our stability to increase endurance. Recommended sets/reps: three sets of frequent reps. 8.2 Level 2 (Movement Stability) After learning how to actively co-contract different core muscles, it is time to learn how to maintain this stability as we move. The exercise I want to introduce for this section is bird-dog progression. During this exercise, focus on how well you prepare your core. Our ability to maintain stability often fluctuates as soon as the movement of the arms or legs is initiated. Step 1: Out of position all four (four-seater), place a PVC pipe or bowl along the back, as shown in the photo. At all times PVC should be in contact with the back to ensure proper alignment of the spine. Step 2: Once you find a neutral position, re-create that joint kernel reduction you learned from Level 1. These invigorating efforts will create the stability needed for the next few steps. Step 3: Next, raise your hands up to your head (one at a time) and back to the starting position on your side. During this hand movement, your lower back should remain in a stable, braced position. It is important to breathe and then brace your core. Do not hold your breath during this movement. Let your breath slowly through your clenched lips (as if you have a straw in your mouth). Step 4: Once this stage is mastered, the second step is to perform a movement with one foot at a time. Extend one leg back as far as possible. Again, this movement shouldn't change the position of the back at all! You have to stay firm at all times. If the athlete moves badly at this stage, his or her lower back will more extend and he or she will lose contact with the PVC pipe. Step 5: The next stage is where both legs and arms move. Start by moving your right arm and left foot at the same time. This is a standard bird-dog exercise that most people are familiar with. This stage is very difficult for most people. Recommended sets/reps: two sets of frequent repetitions at the highest level possible without compensation. 8.3 Level 3 (functional stability) As soon as we develop a good understanding of basic management/stability, we need to translate it into functional movements. In order to fully understand the true stability of the nucleus, exercises must eventually be performed in movements that relate to the sport. One of the functional basic stability exercises I would use is without a hand or a zombie front squat. Step 1: Suppose a front squat position with a bar held on top of the chest and shoulders. Step 2: Take your hands off the bar and them in front of you. This should look like the original position of the squat body weight. Step 3: Use the right breath and invigorating pattern to stabilize your core properly. Take a big breath into your stomach and then a strong strong your core muscles. Step 4: Next, perform the front squats to full depth, trying to keep the bar in the same position. In order to stay balanced, the bar must track the middle of the foot all the time. Failure to adequately maintain basic stability and remain balanced will cause weapons to fall forward. This will cause the bar to roll off its shoulders and fall to the ground. Although this corrective exercise can be loaded to increase the difficulty of movement, the amount of weight added to the bar should be in reasonable amounts. Start with an empty barbell. Once you can do this with ease, gradually add weight to increase the difficulty. Prioritize technique over weight on the bar. Recommended sets/reps: two or three sets of five reps. Take Away Proper Mechanics while squatting is all about maintaining proper core stability. If the stability of the nucleus is compromised, power and power are lost. Notes 1. P. B. O'Sullivan, Lumbar Segmental 'Instability': Clinical presentation and specific stabilizing exercise management, Manual Therapy 5, No. 1 (2000): 2-12. 2. S.G. Grenier and S.M. McGill, Quantitative Assessment of Lumbar Stability with 2 Different Abdominal Activation Strategies, Archives of Physical Medicine and Rehabilitation 88, No. 1 (2007): 54-62. 3. M. G. Gardner-Morse and I.A. F. Stokes, Effect of joint activation of abdominal muscles on the stability of the lumbar spine, spine log 23, No. 1 (1998): 86-92. 4. J. Cholewicki, K. Juluru, and S. M. McGill, Mechanism of intra-abdominal pressure for stabilizing the lumbar spine, biomechanics 32, No. 1 (1999): 13-17. 5. J. M. Willardson, Basic Stability Training: Applications for Sports Air Conditioning Programs, Journal of Strength and Conditioning Research 21, No. 3 (2007): 979-98. Chapter 9 Overhead Mobility If I had to highlight one exercise that most athletes struggle with, it would be overhead squats. There are so many variables that can damage overhead squat appliances. Mobility/flexibility issues on the thoracic spine, shoulder joint, or chest/back can severely limit an athlete's ability to achieve overhead squats. The purpose of this chapter is to explain the two simple screens you can perform at home to highlight possible overhead mobility problems. 9.1 Screening overhead mobility of latissimus dorsi or lats is one of the largest muscles in the body. It runs from your lower back to your hands. Athletes (especially bodybuilders) with well-indefinite lats often have a classic V shape. In his book The Movement, physiotherapist Gray Cook demonstrated the supine lat stretch as an easy way to gauge the flexibility in this muscle.1 Supine Lat Stretch For lie on your back with your hands held above your head. The palms of your hands should be turned to the ceiling. Bring your knees to your chest as much as possible. Lower back be completely flat on the ground. From this position, see if you can move your hands (elbows straight) all the way up to the floor above your head. If you've been able to fold your hands completely flat on the floor, you're likely to have no lat restrictions. If your hands are dangling over the floor, the next step is to straighten your leg. Make sure to keep your lower back flat on the floor when you do so. See if now you can move your hands closer to the floor above your head. What did you find? If you have been able to rest your hands on the floor above your head with your feet now extended, this means that you have a possible limitation of lat flexibility. If you have had only a slight improvement in hand movement and have still not been able to rest your hands on the ground with outstretched legs, lat and/or back chain restriction is part of the problem.2 this means that other factors (hard muscle/tissue and/or joint limitations) in other parts of the body contribute to poor overhead mobility. Wall Angel Screen If you were able to look at a group of kids, most of these kids could reach their hands over the head fully with ease. Whether it's playing on the steering wheel in a jungle gym or climbing a tree, overhead mobility is rarely an issue! However, after many years of sedentary lifestyle (sitting at a table, reading, playing video games, looking at our phones), people develop bad posture. Due to years of poor posture, the thoracic spine will tighten and the pectoral muscles (basic and minor) will adaptively contract. Wall Angel Screening will show if you have any restrictions on gross mobility overhead. To understand how the mobility of the thoracic spine and injections affects the movement of the hands, try this simple test. Sit in a slouch position, with the top back and shoulders rounded forward. Try to raise your hands as far as you can over your head. Now sit as straight as possible with good posture and raise your hands again. Did you notice the difference? When you sit with good posture, you should be able to reach the overhead much higher than sitting with crappy posture. You can also lift more weights with good posture. To start screening, find the wall and stand with your back to it. Your head and your whole back should be in contact with the wall. Your feet should be four or five inches from the base. Next, raise both hands to the side in position L (as if you are making a football goal post with your hands). Without moving your head or lower back from the wall, try to smooth the back of your hands and hands against the wall. Don't let your lower back pop out of the wall! To pass, you must have your entire back flat against the wall. Elbows, forearms and hands should fit against the wall comfortably. Your head should also be in contact with the wall. If you couldn't touch the entire wall with weapons, where did you feel constrained? You may have felt tight in your jabs, the midfielder, or both. If so, you will benefit from upper body mobility work, which we will discuss later. If you have had pain at any time, seek advice from your doctor as something more serious may need to be resolved. Don't be alarmed if you fail; It is a test of difficulty to pass. Final thoughts are clear to see that many factors contribute to overhead mobility. If you can't move your arms into a good position above your head without a barbell, what do you think will happen when you try to perform overhead squats or snatch? If you haven't been able to pass any of these screens, don't worry! Our goal is to emphasize if you had weak links in the upper body. If you could pass both of these screens, congratulations! This means that you have good global upper-body mobility. You probably don't need to waste time stretching and mobilizing your upper body. I would recommend wasting your precious time on solving any other issues that you have in your body. 9.2 Mobility Corner now I want to share with you some of my favorite mobility exercises to address any weak links you may have found in overhead mobility. 1. Mobilization (joint and soft tissues) 2. Stretching 3. The back chain activation Joint Mobilization Restriction of the mobility of the thoracic spine of the joints should be the first to address. This type of stiffness is not always solved with foam rolling or stretching. If you feel any tightness in the midfield while trying to bring your hands to the wall during the angel wall screen, this tool should help! One of the best tools to improve the mobility of the thoracic spine is the use of peanuts. Some growers make fancy peanuts, which will cost you quite a dollar. However, you can save a lot of money by taping two tennis or two lacrosse balls together. To perform the mobilization of the joints of the thoracic spine, lie on your back with your arms crossed in front of you. This will pull the shoulder blades (shoulder blades) from side to side. This will provide space for a peanut place. Tennis or lacrosse balls should rest on both sides of the spine. With your hands on your chest, perform a slight crunch, lifting your shoulders off the ground a few inches. Hold this position for a few seconds before returning to the starting position. Make sure not to hyper-extend your lower back during this movement. We only want to move from the middle. Peanuts act as a mainstay on the spine (just like the middle balance-totter) during this movement. When this force is applied to a stiff joint, it can help improve mobility. Perform two or three sets of fifteen reps on each segment of your midback, which feels stiff.3 If you don't feel stiff in parts of the spine while moving, move the peanuts up or down to another segment. It is normal to have limitations in only a few thoracic joints of the spine. You should not have severe pain during this maneuver. If you do, I recommend recommend from a medical professional such as a physiotherapist or chiropractor. Soft-Tissue Mobilization Once the joint restrictions have been resolved, the next step is to clarify any softtissue rigidity. We can do this with a foam roller and/or lacrosse ball. Athletes with limited lats and injections should be mobilized on a daily basis! To solve lats, start by lying on your side with one hand raised above your head. Work the foam roller into a large muscle on the outside of the armpit. This is where lat muscle works! Move up and down this muscle until you find an area that can be tender. Pause at this place for a few seconds before moving on. Don't move fast during this exercise! Instead, roll in a slow and rhythmic fashion. To deal with jabs, start by finding the wall. A lacrosse trap or a tennis ball between the chest and the wall. Move the ball around the muscle until you can find any gentle areas. We perform slow movements with rare pauses in each area. You can add in some active movement with this mobilization as well. Once you find a gentle area, start moving your hand away from your body. This can increase the effectiveness of the exercise. Stretch Once the soft tissue mobilization is complete, the next step is to stretch. I want to share with you my favorite sites to increase the mobility of overheads. 1. Prayer stretch 2. Corner section 3. Foam-roller pec stretch If you weren't able to pass on the back of the lat-stretch screen, you'd probably benefit from the prayer stretch. It's like a classic yoga pose called a children's pose. Start with a position on your knees. Sit your hips back on your feet and press your hands in front of you (one hand on top of the other). Next, let your breasts fall to the floor. Continue to reach with your hands together above your head until you let your breath slowly. Try to sink the chest to the ground. If you have stiffness in your lats, this should bring out a good patch in the middle of your back. I recommend holding this pose for thirty seconds. If you were unable to pass an angel wall screening, you would probably benefit from stretching the peck muscles (basic and minor). The two simple stretches I use with my patients to clear up the pecking point limit stretch and foam roller pec stretch. Find a corner in the room you are in. Stand with your hands to the side in L. Place your hands on the walls and slowly press into the corner. Make sure to keep your lower back from hyper-expanding during this movement. You should feel good to stretch in your chest the more you push into the corner. This stretch has been shown in studies to be one of the most effective ways to cause changes in pec minor muscle length.3 Be careful not to push too hard with this stretch. This can put harmful torque on the Joints. The goal is to feel just this patch in your jabs, not your shoulders. Hold this position for ten to thirty seconds. For some, the angular stretch may too intense. The foam roller pec stretch is another good option. It is much easier to perform and puts less torque on the shoulders. Start by lying down with a foam roller positioned along the back. The foam roller should rest between the shoulder blades. Take a PVC pipe or broom and raise your hands above your head as far as you can. Make sure to keep your entire back flat on the foam roller. You should feel a very light stretch in your chest as your hands hang in the air. The goal is to relax the upper body in this position and hold the low load stretch for a long time (about thirty seconds to one minute). Do not perform this stretch with a barbell or any other heavy object in your hands. This can easily lead to too much torque on the shoulder joints. If you experience any tingling down your arms or in your hands, this is a sign that you are stretching too aggressively. Back chain activation After performing any of these upper body exercises, you need to strengthen your body in this newly acquired mobility. It's easy to focus on mobility limitations and forget about strengthening muscles that maintain good posture! In my opinion, both are equally important in maintaining good overhead mobility. If you have had stiffness in your thoracic spine, you should keep an eye on your mobility work with some endurance exercises. To do this, start by lying on your stomach with your hands in L to the side. Focusing on the middle line, give a small chin prick and lift your head off the ground. Hold this position by focusing on activating the muscles between the shoulder blades for ten seconds. If you have had problems with flexibility in lats or injections, we should also focus on activating the shovel stabilizers (rear shoulder musculature and lower traps). This will be the theme of our next chapter! Final thoughts Once you have performed corrective exercises, it's time to check and see the progress you've made. Don't forget to always use a testing strategy when doing mobility work. Your overhead movement during the initial screenings should improve after performing these exercises. Mobility work should also lead to improved technique in overhead barbell movements. Checking both of these areas will allow you to see if the tools you are using are effective in addressing the changes you want. Mobility exercises are shared today not magic pills to improve mobility. They will not fix the stiffness in one session. However, if you notice a slight change in the quality of movement using the retesting method, we are on the right track. Notes 1. G. Cook, L. Burton, C. Keesel, G. Rose and M. Bryant, Movement: Functional Motion Systems. Corrective Screening Assessment Strategies (Aptos, CA: On Publications, 2010). 2. K.D. Johnson and T.K. Grindstaff, South Africa: Clinical Proposal, International Federation of Sports Physical Therapy 7, No. 2 (April 2012): 252-56. 252-56. J. D. Borstad and P. M. Ludewig, Comparison of 3 stretches for small muscle pectoralis, Journal of Shoulder and Elbow Surgery 15, No. 3 (May-June 2006): 324-30. Chapter 10 Stable Shovel Imagine for a moment a young boy helps his father create a high staircase. The boy kneels at the base of the stairs, firmly attaching it to the ground. The father then pushes the ladder up, leaning against the side of his house. This illustration is exactly what happens on your shoulder every time you move your hand! The shovel acts just like the boy in this story. Small muscles, which attach and move the shoulder blade, help to manage the hand in place, keeping the base in a stable position. The upper back muscles work together to keep the barbell in a good position during overhead barbell movements. Think about what would happen if a father would work on a high ladder without the help of his son to secure a base. That would be a recipe for disaster. The same scenario occurs when athletes perform overhead squats and scraps with a bad stability shovel. 10.1 Screening for accumulated instability Although there is a lot that goes into assessing your shoulder blade stability, one simple test you can do at home is the T and Y screen. This is an easy way to uncover possible weak links in the muscles that provide the shoulder blade (seventeen, to be exact). Start by taking a knee position with your chest facing to the ground. Hold one hand right on your side (as if to make one side of the letter T). Make sure your palm is facing the ground. Use your partner and then press down on your outstretched hand for three seconds. Try to keep your hand from moving! Then take an outstretched hand and move it to an elevated position (as if now doing one side of the letter Y). Again, have your partner push down on an outstretched hand for three seconds. Try to resist this movement as much as you can. How did you feel? Was it easy or difficult for you to keep an outstretched arm position? If you have had difficulty keeping your hand from moving, it means that you may have poor shoulder blade stability. Final thoughts of athletes who struggle with a bad stability shovel often have difficulty with overhead squats and rods to snatch movements. If left unchecked, this problem may even lead to the onset of shoulder and/or elbow pain. If you want to stay healthy and reach your true strength potential, focusing on stabilizing the shoulder blade during overhead lifts is vital! 10.2 Corrective Exercise Corner I now want to share with you two of my favorite corrective exercises to address overhead instability. 1. External press rotation 2. Kettle Bell Turkish get-ups Focus on your pose when performing each move. Exercise performed with poor posture (i.e. rounded shoulders) only reinforces the problem we are trying to solve. You want to see any long-term improvement in your top stability, you should use good posture! Posture! Rotating Press When athletes struggle to hold a barbell over their heads while snatching or overhead squats, they often allow the bar to fall forward. In order to solve this problem, we need to focus on activating the muscles that resist this forward collapse (blade stabilizers on the back of the shoulder). Step 1: (Rowe) Grab the resistance lane with your right hand. Pull the lane towards you in rowing. Your hand should finish right in front of the elbow with your hand parallel to the ground. This attracts muscles that

stabilize the shoulder blade. Step 2: (External rotation) From this position turn the shoulder back. Your hand must now be facing the ceiling with your elbow bent to ninety degrees as L. Step 3: (Press) Next, press your hand over your head and hold for five seconds. Muscles that stabilize the shoulder blade should work hard to keep your hand from falling forward. Step 4: Next, change the pattern and return to the starting position. Put your hand in L. Turn forward until your hand is parallel to the ground. Finally, press your hand forward to stop the movement. Recommended sets/reps: ten repetitions of five seconds of holds in overhead positions for each hand. Kettle Bell Turkish Get-Up Get Up athlete's challenge to create shovel stability through progression movements. During each transition, every muscle that stabilizes the arm must work to keep the weight from falling forward. Step 1: Start by lying on your back. The left leg should be straight with a bent right knee. Keep a small weight with your right hand. Squeeze the weight to the ceiling. Step 2: Next, turn your body to the left side, propping yourself up on your elbow. Try to keep your left foot from coming off the ground during this transition. To maintain this position, think about forcing your left heel over the wall in front of you as you rotate. Keep the weight from falling forward! To help with this, imagine balancing a glass of water with a hand that holds weight. If your hand falls forward, the water will spill out of the glass. Step 3: Push yourself up into the sideboard. Pause during this transition and feel the position of your shoulder blade. Step 4: Pull your left leg under the body and transfer your weight to your left knee. Pause again in this position for three seconds. Step 5: Twist forward in a split on the lap position. Pause in this position for three seconds. Feel the muscles at the back of your shoulder to work hard. Step 6: Stand up straight up with your hand locked above your head. Step 7: To finish, change the same order of motion while you lie again on the ground. To progress this exercise you can use a heavier bell kettle. You can also switch to using the barbell for added complexity. Recommended sets/reps: three sets of frequent reps. Final Thoughts If you want to perform overhead lift rods with good technique and no pain, it is important that you and maintain good shoulder-to-shoulder stability. Chapter 11 Debunking Squat Myths 11.1 Deep Squats Bad for Your Knees? Squats is a major exercise in almost every resistance training program. Today, athletes of all ages and skill levels use the squat barbell to gain strength and power. However, a large number of controversies still exist on its safety. There are many opinions when it comes to optimal depth squats. Some experts claim squatting as deep as possible (ass to grass) is the only way to perform an elevator. Others believe that deep squats are harmful to the knees and should never be performed. So who should we believe? Used with permission from Bruce Clemen Story 101 To begin with, we need to discuss where the fear of deep squats originated. Let's go back to the 1950s. We can trace the security problems with deep squats against a man named Dr. Carl Klein. The goal at the time was to understand the reason for the increase in the number of college players sustaining serious knee injuries. He suspected that these injuries were partly due to the use of full range motion deep squats during team weight training. Klein used a rough homemade tool to analyze the knees of several weightlifters, who often performed deep squats. In 1961, he published his findings, stating that deep squats stretched knee ligaments.1 He claimed it was evidence that athletes who perform deep squats were potentially damaging the stability of their knees and adjusting themselves to injury. He went on to recommend that all squats be performed only at a parallel depth. Klein's theory was eventually picked up in the 1962 issue of Sports Illustrated. It was the catalyst needed to spread the fear of deep squats and preserve the knees of athletes around the world. The American Medical Association (AMA) shortly after came out with a position statement cautioning against using deep squats.2 Marine Corps eliminated squat jumper exercises from its physical conditioning programs.3 Even the Superintendent at New York Schools issued a statement prohibiting gym teachers from using full-scale squats in exercise classes.4 Some people disagree with Dr. Klein. In May 1964, Dr. John Pulskamp (a regular columnist in the notorious strength and health) wrote: Full squats are not bad for the knees, and they certainly should not be omitted for fear of a knee injury. 5 Despite Dr. Pulskamp's best efforts, the damage to Klein was done. By the end of the decade, power trainers across the country had stopped teaching at full depth. In some cases, squats have been completely excluded from the curriculum.6 Due to advances in exercise science and biomechanics research, learned much more about the forces, having withstood the squats. Let's now look at what we've learned in the last few decades in order to better understand exactly what's going on in the knee joint during deep squats. Squatology When we squat, our knees support two types of strength: haircut and compression. The strength of the haircut is measured by how much the bones in the knee (thigh and shin) want to slide over each other in opposite directions. These forces at high levels can be harmful to ligaments inside the knee (ACL and PCL). These small ligaments are some of the main structures that hold our knees together and limit excessive back and forth movement. The squeezing force is the amount of pressure from the two parts of the body pushing at each other. Two different areas support this type of strength in the knee. The meniscus absorbs the opposite stress between the shin and femur. The second type of compression force is located between the back of the kneecap (kneecap) and femur. As the knee bends during squats, the kneecap is coerched with the femur. The deeper the squat, the greater the connection between the patella and the femoral bed.com. When we look at these forces (haircut and compression), we see that they are usually back bound together. This means that when the knee bends during squats, the compressed forces increase, while the force of the haircut decreases.7 The safety of ligaments Some medical authorities caution against the use of deep squats due to excessive strain on the ligaments. However, these fears do not seem to be based on science at all. Science now tells us that the ligaments inside our knees are actually under very little stress at the bottom of deep squats. The ACL (anterior cruciate ligament) is the most famous ligament of the knee. ACL injuries are common in popular American sports such as football, basketball, football, lacrosse and so on. Stress on the ACL during squats is actually the highest during the first four inches of squat descent (when the knee is bent about fifteen to thirty degrees).8 As the depth increases, the strength placed on the ACL significantly decrease. In fact, the highest strength ever measured on the ACL during squats has been found to be only about 25 percent of its finite strength (the force needed to rupture ligaments).9 PCL (posterior cruciate ligament) is the second ligament that is inside the knee. During squats, it maintains maximum strength just above the parallel squat position (about ninety degrees of knee flexion).10 Just like the ACL, this ligament never fits under excessive stress during squats. The highest recorded strength on this bundle was only 50 percent of the perceived strength in a young athlete's PCL.11 In fact, science has shown that the deeper you are squat, the safer it is on the knee ligaments. The harmful force of the haircut is drastically reduced due to the increase in compression. In addition, the leg muscles work together to stabilize the knee. As we squat, hamstrings work with quadriceps to counteract and limit excessive Deep inside the knee.12 Thus, the ACL and PCL remain unscathed no matter how deep squat! Knee Stability Original Study Study Klein claimed squatting deep stretched the ligaments that hold the knee together, eventually leaving him unstable. However, these allegations have not been reproduced. The researchers even used a copy of Klein's test tool in their own research. Their findings disapproved of Klein's research. They found that athletes who used deep squats had no difference in the weakness of their knee ligaments than those who only squatted in parallel.13 Science actually showed that squatting deep can have a protective effect on our knees, increasing their stability. In 1986, researchers compared knee stability among powerlifters, basketball players and runners. After a hard squatting workout, powerlifters actually had more stable knees than basketball players (who had just practiced for an hour) and runners (who had just run ten kilometers) did. In 1989, another team of researchers were able to show that competitive weightlifters and powerlifters had knee ligaments that were less weak than those who never squatted.15 Time and time again, studies showed that deep squat is a safe exercise to include in a healthy athlete training program. When can deep squats be harmful? Theoretically, much of the damage that the knees will sustain from deep squats will be due to excessive compression forces. Some authorities argue that because deep squats lift compression forces on the knee, they cause the meniscus and cartilage on the back of the kneecap to wear off. While increased compression would lead to greater susceptibility to injury, there was no such cause-and-effect attitude established by science! Healthy knee osteoarthritis If this were true, we would expect to see an extreme amount of arthritis in the lap of weightlifters and powerlifters. Fortunately, this is not the case. There is little evidence of cartilage wear in the knees due to long weight training. In fact, elite weightlifters and powerlifters (who maintain loads of up to six times the weight to the knee at the bottom of a deep squat) have relatively healthy knees compared to you and me!16 Used with permission by Bruce Clemers Considerations for squat Deep Every trainer should consider a few things when determining the optimal depth of squat for an athlete. Everyone should be able to perform squat weights to the full depth, period. At the same time, the depth of the barbell squat should be based on the requirements of the sports athlete. A weightlifter, for example, needs to establish strength in the full depth of a squat in order to lift the most weight on the competition platform. On the other hand, a barbell to a grass squat is not necessary for a footballer. He or she can still gain effective strength and strength from the parallel depth of the squat. An athlete's injuries should also be taken into account when determining the optimal depth of squat. Often athletes will ignore the pain in their quest for performance benefits. Teh Teh No pain, no gain and know the difference between hurt and injured can not apply to the weight room. The pain is like a warning light in a car. Light indicates that something is wrong. Just as ignoring the warning light of your car will lead to engine problems, pushing through the pain in the weight room will cause physical injury. For this reason, if an athlete has suffered an injury and pain in his knee, deep squats may not be the best choice. The depth of the squat should be limited to a painless range if we are to stay healthy and continue to compete without injury. The depth of the squat should also be limited if it cannot be performed with good technique. Poor movement only increases the risk of injury. The body of an athlete is like a finely tuned sports car. Constant pedal driving to metal and aggressive turns will cause the car to break down faster. The same goes for squats. You can only lift so much weight bad for so long before your body sustains the injury. Squatting to full depth is bad is a great way to invite injury. So what have we learned since 1964? Contrary to popular belief, we now know that squatting deep or towards the grass is not really as dangerous as Dr. Klein did it to be. Studies time and time again failed to support the theory that deep squats are bad for knees in healthy athletes. For athletes with healthy knees, performing squats to full depth should not cause injury until heavy loads are not used excessively. Appropriate training programmes should use light, medium and heavy intensity cycles throughout the year to reduce any harmful effects of constant heavy workload. Now that you have a deeper understanding of full-length squats, feel free to get this one to the grass! 11.2 Should my knees pass by my feet? There is a strong belief by many that knees should never go on your feet when squatting. I was recently a guest of a lecture in a physical therapy class of students at the University of Missouri. I asked a simple question. How many people here think we should never have our knees walk past our feet during squats? After my investigation, every student held a hand. Next thing I said: You're all wrong. No one knows where this myth started. However, it has become a mainstay in the modern fitness and medical world. The instruction is even part of the National Association of Strength and Conditioning (NSCA) guidelines on how to teach proper squat.12 However, is it really all that dangerous? Since 2005 I have had the opportunity to watch and compete on the same platform with some of the best weightlifters in the United States. To lift the most weight during cleaning, the weightlifter must catch the barbell in a deeply squat position. In order to stay Upright with the bar secured on the chest, the knees of many lifts will move past their feet. Are these weightlifters putting their knees in a damaging manner every time they lift a barbell? Knees above your feet? Feet? The signal to restrict the knees from moving past the legs while squat is actually nothing more than a quick fix for a deeper problem. In hindsight, the creators of the signal are probably well-intentioned strength trainers or physiotherapists. When athletes do not squat well, they often move away from their ankles first. As the ankles move, it causes the knees to hinge forward. The body weight then shifts forward on the balls of the feet. This type of traffic problem was caused by the kneesfirst approach. Moving in this way leads to more haircut strength on the knee joint and contributes to an increased risk of injury and eventual pain.4 For many people, the issue appears to be a knee problem. Athletes who squat poorly, moving their knees forward, often develop pain. Thus, limiting this movement forward solves the problem ... Right? However, restricting knees from moving only addresses symptoms of a more serious problem. The problem is really with the balance. The knee is just a hinge joint. It will only move forward depending on what happens on the ankle and hip. Instead of focusing so much on what's going on on the knee, we should really be focused on the hip and ankle when we're squat. One of the absolutes of squats is that our center of gravity should remain above the middle of our feet. This allows our body to remain balanced and work efficiently to produce strength and power. During weight squats, our center of gravity is located around our navel. During weight training, the barbell becomes our center of gravity. The effectiveness of our movement is dictated by how well we can maintain this weight in the middle of our legs. When the knees hinge forward at the beginning of the squat, the athlete's center of gravity shifts forward on the balls of his or her legs. Therefore, the signal to restrict the knees from moving forward is actually a correction for the weight shift problem. This has little to do with the knee joint itself and more to do with ensuring that the athlete stays balanced. Sitting back in squats So how can we fix to move off the ankle in the first place? The signal to sit back or push the hip backwards allows the athlete to move away from his or her hips first instead of his or her ankles while squatting. This attracts the body powerhouse (back chain). It also limits premature movement forward of the knees. This allows the athlete's center of gravity to remain above the middle of the foot. However, the signal to limit the knees from moving forward only works to a point. In order to reach full depth in the squat, there comes a time when the knees must eventually move forward. The deeper we squat, the more our knees will have to move forward to stay balanced. This concept can be difficult to understand for many in medical Let me explain. In order to reach full depth in the squat, the hips must eventually be pulled under the torso. This allows us to remain balanced and breasts upright. Because the knee is a hinge joint that moves depending on what happens on the hip and ankle, it will be forced forward at this point. It is very normal for athletes to have their knees move forward even past their feet. It all comes down to the distribution of weight and the ability to maintain their center of gravity in the middle of the foot. We should be concerned when the knees are more forward past the feet, not if. Barbell squats in the sport of powerlifting, athletes usually use low bar back squat techniques. This position provides the bar further down on the back in the middle of the shoulder blade (shoulder blade). The athlete will use a hip back approach while squatting with a sloping trunk position in order to allow the bar to remain balanced in the middle of the legs. This allows us to lift most of the weight through the strength of the hips and minimal movement forward knees.13 Because our hips are extremely strong, athletes use this technique to raise more than a thousand pounds! Used with the permission of Bruce Klemen however, this squat technique can only come down to a certain point. If a squat donkey-tograss is attempted with a low back squat bar, the athlete will end up once in half like an accordion! In weightlifting, athletes typically use high bar back squat, front squat, and overhead squat techniques. These barbell movements resemble the positions an athlete will use during competition lifts to snatch and clean and jerk. These lifts require a more balanced approach between the hips and knees to maintain a vertical trunk. Athletes need to go as deep as possible to effectively lift huge weights. By allowing the knees to eventually move forward, the weightlifter can descend into a deep net or snatch without falling forward. For this reason, the weightlifter cannot perform front squats like a low bar powerlifter technique. Used with the permission of Bruce Clemens While paddle strength has been shown to increase in a deeply squat position with forward knees, the body can handle them properly without the risk of injury.20 If done correctly with a hip-first approach, knees other past the legs are not only safe but necessary. Take Away Next time you watch someone squat, focus on which joint moves first. Those who move badly will move with the knee-first approach. On the other hand, an athlete who moves with good technique will move with his hips back first. Science has shown that the knees of healthy athletes are relatively safe at the bottom of deep squats.4, 14 There is no denying this study. As long as excessive load is limited and good technique is used, the knees can and should move past the feet at the bottom of the squat in order to allow the hips to fall completely. Strength coach Michael Boyle once wrote: The issue is not in where the knee go and where the weight is distributed and what moves in the first place? 15 Remember that the knee is only a hinge joint. As long as it stays stable (according to kicking), we don't have to worry about it. Proper squats are all about moving on your hips first and staying balanced. The rest takes care of itself. 11.3 Forward or corners? During a recent Squat University seminar, I was approached by an athlete who wondered why I asked everyone to show me his or her squat with his or her legs just. It was definitely not the first time I was asked this question. There's a lot of controversy in the fitness world today when it comes to the recommended leg position during squats. Some experts say our feet should be simple all the time. Others are in favour of being angled. So who's right? It's actually a trick question. The answer to this question is both. Let me explain. The argument for foot-forward squats is the movement of the first and the second exercises. When I screen a new athlete, I want to see his or her ability to squat with shoes and feet face forward. My goal is to assess his movement. This method allows me to see any weak connections with the athlete. Squatting with your feet is just harder than pointing a little outwards with your feet. I don't think many would argue with that notion. However, this is the point of the screen. In order to sit to full depth with the simplicity of the legs, athletes must have adequate ankle and hip mobility and sufficient pelvic/core control. They must also have acceptable coordination and balance. Turning the legs at an angle allows most people to achieve a complete squat with a more vertical position of the chest. A few people will always be simply unable to get into a deeply squat position due to abnormal anatomical reasons. Some people are born with genetic abnormalities. With what is said, most athletes should be able to reach to the grass with squats. Weight squats establishes the basis of movement for other sporting activities such as jumping and landing. Many knee injuries occur when you land with a foot pointing and knee spele in. Players who have to jump and cut will break their ACL when the knee caves and rotates. My goal is for athletes to land and jump with good mechanics, so reducing their lack of seasonal injuries. The argument for toes out Once you take the barbell, the squat now becomes an exercise. For this reason, there are small changes in the movement structure that are more sporty specific. This involves turning your feet up a bit. This creates a mechanical advantage for squats. This not only gives us a slightly wider base of support, but also does not challenge our pelvic control and mobility to the fullest.19 That's why some athletes can squat deeper, they twist their leg muscles. By externally rotating the hips, we can usually achieve a deeper and better squat look. When our hips outwardly rotate, the adductor muscles on the our legs are lengthened. As we are squat, these muscles are positioned to produce strength (length-tension relationships). This simply means that adductors are included and recruited more during squats if you turn your hands a bit.17 Adducor Magnus has been specifically shown to help produce hip extension (action standing from squat).18 More help from adductors means a stronger and more effective way to move the barbell. However, by turning out the stretch muscles, only changes the activation of the adducor muscle group. Buttocks and quad bikes (main squatters) are not activated to a greater extent.16 Studies have shown that turning your legs more than thirty degrees is less effective.17 For this reason, you have to perform squats with your legs turned out to be anywhere from ten to thirty degrees. Always use the position that is most comfortable for your body. Remember that not two squats will look exactly the same. This is normal and expected for you and your friend to have different squat positions when lifting the barbell. The final thoughts argument is simple. I believe that we should be able to carry the weights squat off the feet relatively simply. If you can't, chances are you need to work on some things. I recommend turning your toes out when you are squat with a bar for optimal work. That's the difference between training and screening. Screening should indicate and illuminate the limitations in how we move. Training should strengthen and strengthen our current movement potential. When training athletes, it is your job to know the difference between screening and training. Notes 1. T. Todd, Historical Opinion: Carl Klein and Squats, National Association of Strength and Conditioning Magazine 6, No. 3 (June-July 1984): 26-67. 2. J. Underwood, Knee Not for Bend, Sports Illustrated 16 (1962): 50. 3. J. R. Pulskamp, Ask Doctor, Power and Health (May 1964): 82. 4. B. J. Schoenfeld, Squats of Kinematics and Kinetics and their application for performance, Journal of Strength and Conditioning Studies 24, No. 12 (2010): 3497-506. 5. G. Lee, S. Seyontks, E. Most, L. E. DeFrante, D. F. Suggs, and H. E. Rubash, Knee Kinematics at High Bend Corners: In Vitro Study, Journal of Orthopedic Research 27, No. 6 (2004): 699-706. 6. J. C. Gullett, M. D. Tillman, G. M. Gutierrez, and J. W. Chow, Biomechanical comparison of back and anterior squats in healthy trained individuals, Journal of Strength and Conditioning Study 23 (2009): 284-92. 7. R. F. Escamilla, G. F. Fleisig, N. 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If you are a car person, you will probably want to know exactly how your engine works. You've probably read articles describing the differences between the Chevy Corvette and the Ford Mustang. You understand how horsepower and torque production differ between a turbocharged V6 engine compared to a standard V8. This is your introductory for body mechanics. We will discuss the differences in generational torque between squat techniques and what it means for your training. As a word of caution: This chapter can be a little hard to understand. However, I will do my best to teach these concepts as easily as possible. Welcome to squat biomechanics 101. 12.1 The squat biomechanics term biomechanics simply refers to the study of forces and how they affect the human body. Biomechanics is the science of how we move. When sports scientists analyze athletes, they often explore the different forces that are produced during movement. Torque is one of the different parameters that are being studied. Torque is a force that causes rotation around the joint. To explain what torque is and how it affects our body, I wanted to use a simple illustration that I first learned in my college physics class. Many strength and conditioning specialists have used similar examples in their exercises. In particular, the work of Mark Rippito in his book The Beginning of Power together with the research of Professor Andrew Fry are two great examples that are worth reading.1, 2 Try to keep the dumbbell in front of you at the height of the shoulder. Do you feel the weight of dumbbells trying to pull your hand down? What you feel is gravity. He always pulls straight down. As gravity pulls down on the dumbbell, it causes rotational force in the shoulder joint. This power is torque. The muscles of the shoulder must be activated to overcome this force to keep the weight from moving. In order to calculate how much torque is generated on the shoulder, we need to know a few things. First, we must find the length of the hand of the person holding the weight. This length between the point of rotation (shoulder in this case) and the line of force acting on that joint (gravity) creates what we call the arm lever. You can also think of the arm lever as a wrench turning bolt. When the wrench is pulled down, it creates a torque of the rotation force that turns the bolt. Let's go back to the physics class and see how we can calculate this rotational force in the joint. A simple equation to write this down: Torque moment and moment arm x strength you will notice the word point hand in the equation rather than the arm lever. The moment the hand perpendicular distance from the beginning of the arm lever (joint axis) to the vertical gravity. It always works at ninety degrees. For this reason, it will vary in length depending on the angle of the arm lever held. In our example, the hand is being held right in front of the body. This means that the hand is already perpendicular to the vertical force of gravity. For this reason, the length of our arm (hand lever) will be the exact length of the arm the moment. Let's say your hand is about seventy-five centimeters long (about thirty inches). Yes, most mathematical equations also use a metric system. in order to torque, we also need to know how much force acts on the lever arm. Let's say a dumbbell weighs ten pounds; now convert that ten pounds to 44.5 newtons (a unit for strength). To get 44.5 newtons, you need to convert ten pounds to 4.54 kilograms. It is then multiplied by 9.8 m/s2 (standard gravitational acceleration), resulting in 44.5 newtons. A heavier weight will therefore lead to more Newtonian strength. The torque equation on the shoulder will look like this. Torque - The moment the arm x strength of 0.75 meters x 44.5 newtons and 33.4 nm or Newton meters of force acting on the shoulder this means that the muscles of our shoulder need to overcome 33.4 newton meters of strength (approximately 24.6 ft-pounds of strength) to lift the ten-pound weight past the extended position straight from the body. You might ask yourself, What happens if I raise my hand in a different position? This is because the hand is no longer perpendicular to the vertical gravity. While the length of our arm (lever) is still the same, the moment the hand is now shorter than when our arm was extended right in front of us. This reduction at the time of arm length changes the torque placed on the shoulder joint. Let's say we raised our hand at a 130-degree angle. Because we do not know the new moment arm length, we have to use trigonometry to calculate this distance. The torque equation on the shoulder will look like this. Torque (moment hand x email protected) (strength) (0.75 meters x sin130) (44.5 newtons) - 25.4 nm or Newton meters When the hand rises to a higher position, the moment the hand becomes shorter. The guntel creates less torque on the shoulder joint. This is why it is easier to keep the dumbbell close to your chest rather than right in front of you. Another easy way to understand this concept is to perform a slow forward kick with dumbbell. Is it harder or easier to keep the dumbbell away from your body? Obviously, the weight is easier to hold when it's close to your body! This is because the moment the arm (from weight to shoulder joint) is shorter in this position. A small moment the hand generates less torque on the joint when lifting weight. 12.2 Analysis of squats 1.0 When we look at squats, we usually look at three main areas: 1. Knee Joint 2. Hip 3. Lower back We need to know two things when trying to calculate the strength in these joints during squats. First, we need to know the position or angle of the joints. To measure torque, the frame is often frozen or a moving body shot is taken. This allows you to calculate how much torque is generated at a certain point in time. This is called static model.3 Although the static model for determining co-torque is not perfect, most experts suggest that it still produces results within 10 percent of the true values moment.4 When squats are suspended in a particular particular then we can measure the angle of the joints. The angle of the back is formed by an imaginary connection between the trunk and the floor. The angle of the hip is formed by the position of the back and hips. The corner of the knee is formed by the hip and the position of the lower leg. Breakthrough tip: The angle of the knee is measured at the point of rotation (knee joint). When the leg is straight, the knee is in zero degree of flexion. As the knee moves into a bent position (as when we are squat), the angle increases. This is why a deeply squat position will be recorded as a knee angle of more than 120 degrees instead of sixty degrees. Next, we have to measure the length of the lever of the weapon. These distances will vary depending on the athlete's anatomy and what kind of barbecue squat technique he or she performs. During the squat, gravity pulls down on the barbell just as it did with the dumbbell from our previous illustration. Gravity is often presented as a vertical line stretched through the middle of the bar. This vertical line then passes through the body and divides the hip. During squat, the barbell should be tracked vertically in the middle of the athlete's leg. We can use this imaginary line to represent the vertical gravity of gravity. The distance from this vertical line to the center of the joint becomes a lever. Just like a wrench bolt, the length of the arm lever can help us determine the length of the arm.5 moment the longer the arm moment, the more torque that will be created in that joint during squat. Often sports scientists will analyze squats in a parallel squat position (the fold of the hip according to the knee).6, 7 In this position (just like the athlete holding the dumbbell directly in front of the body), the arm lever and the moment the arm will be the same length. High-Bar Back Squat Analysis (225 lbs) Let's say we have an athlete squat 225 pounds (102 kg) with a high bar back squat technique. This method places the bar on the top of the shoulders and upper muscle trapezoidal muscle at the base of the neck. It is commonly used by weightlifters as it closely mimics the positions used in the competition lifts snatch and clean. In the parallel position of this squat, we can freeze the frame of movement. For this illustration, say, the knee ends at a 125-degree angle and the hip angle is fifty-five degrees. The angle of the back will also be fifty-five degrees. Since we assume the parallel position of the hip on the floor, the angle of the hip and the back corner will be the same. In order to simplify this analysis (and save ourselves some difficult trigonometry), we are going to measure the moment of the weapon. Suppose the knee point arm in this high back squat bar is 7.5 inches long (or 0.19 meters for mathematical purposes) and hip point arm is 10.5 inches long (or 0.27 meters). Remember that the moment the arm length is perpendicular to the distance from the joint to the vertical gravity line that runs through the middle of the foot. means that the total length of the hip is eighteen inches long (thigh arm lever and knee arm lever and full length of hip). For the purposes of this analysis, the lower back will be presented as a compound of the spine with the pelvis. For this reason, the moment the hand will be the distance from that point to the vertical line of gravity. Since this axis of rotation is relatively close to the hip joint, the rear arm lever will be exactly the same distance as the hip arm lever. In order to make this calculation, we also need a figure in the weight of the barbell so we know how much force pulls down. The weight of 225 pounds is equal to 1000.85 newtons of force. Now we can connect these numbers to our mathematical equation to determine torque. Torque - moment arm x strength 0.19 meters x 1000.85 newtons - 190.2 nm or Newton-meters force acting on the knee joint at 125 Torque moment - moment arm x strength 0.27 × 1,000.85 Newtons 270 nm or Newton Power, Acting on the hip and pelvic complex at 55 Low-Bar Back Squat Analysis (225 pounds) What if the same athlete is being squatted 225 pounds with other appliances? Let's say this athlete is currently lifting with low bar back-squat technique. This variation uses a bar position that is two to three inches lower on the back than a high back squat technique. The bar usually lies in the middle of the shoulder blade. Powerlifters usually use it because it allows them to lift heavy weights.5 To maintain balance (the bar is located in the middle of the legs), the chest should lean forward to a greater extent.6 This does two things to mechanical body levers. First, the forward lean trunk drives the hips backwards. This lengthens the hip and back arm of the moment. It also shortens the knee point arm. Let's say the knee moment arm is now 5.5 inches (0.14 meters) compared to 7.5 inches during high bar technique. This will obviously lengthen the hip point arm from 10.5 inches to 12.5 inches (0.32 meters). In the parallel freezing position of the frame, we see that this lift occupies a slightly different position. The knee angle is 110 degrees (more or more open than the high bar technique) Hip and rear angle 40 degrees (smaller or more closed angle, than the technique of the haibar due to the more sloping position of the chest) Torque arm x strength 0.14 meters x 1000.85 newtons 140.1 Nm or Newton meters force acting on the knee joint at 110 Torque moment arm x force 0.32 meters × 1000.85 newtons 320.3 Hmm or Newton force Acting on the hip joint and lumbar pelvic complex at 40 Front squat analysis (225 pounds) Let's now look at the anterior squat. The front squat loads the joints differently than the previous two techniques. This is because the bar is held on the chest. This will require a more upright position of the trunk in order to keep the bar positioned in the middle of the foot and allow the body to remain in balance. This one also often used by weightlifters as the movement closely mimics pure movement. Hips and knees will inevitably push forward to maintain balance, because the trunk must be held in a more upright position. If you try to front the squat and push your hips back too far, the bar will most likely roll off your chest and end up on the ground. Let's say the length of an athlete's arm on his knee is now 8.5 inches (0.22 meters). It's more than a high back squat bar. This is a general change as the knee often moves a little further forward in front of the squat in order to stay in balance. This larger knee arm moment then creates a shorter hip arm moment, currently measured at 9.5 inches (0.24 meters). If we freeze the front squat in a parallel hip position, we will see a few differences compared to other squats. The knee angle is 130 degrees (less or more closed compared to both rear squat techniques due to the more forward knee position) hip and rear angles are seventy-five degrees (more or more open compared to the rear squat techniques due to the more upright position of the chest) Torque arm x strength th 0.22 meters × 1000.85 newtons joint on 130 torque moment arm x force 0.24 meters x 1000.85 newtons and 240.2 nm or Newton power meters In this chapter, we estimated the athlete lifting the barbell loaded to 225 pounds (102 kg) with three squat changes in technique. After calculating the torque at the same depth at all three squats, we can see a few interesting things: - The front squat placed the highest amount of torque on the knee joint (220.2 meters Newton) and then the closely high back squat bar (190.2 newton meters) and then the low bar back squat (140.1 newton meters). This means that the front squat placed about 15 percent more torque on the lap than the high squat bar and 57 percent more than the low squat bar. The front squat placed less torque on the hip and lower back (240.2 newton meters on the lumbar pelvic bond) compared to both rear squat methods (high bar 270 Newton meters and low bar 320.3 newton meters). This means that the front squat placed 12 percent less torque on the hip than the high back squat bar and 25 percent smaller than the low back squat bar. If an athlete lifts the same weight with all three squat techniques, we can assume the anteri predicted squat will be the most difficult to perform. According to this analysis, a low back squat bar would be the easiest and most effective way to raise 225 pounds. A low back squat bar is the most mechanically effective method. It all comes down to leverage. Mechanically, our bodies can More weight when the moment the arm is long at the hips.5 Many experienced lifts will agree that it is easier to lift more weight with backsquat technique compared to anterior squats. Squats. When viewing a power lifter meet, almost all lifts will use a low back squat bar to compete rather than a hibar squat. 12.3 Squat Analysis 2.0 Now we need to take a deeper look at the three squat methods and compare them realistically. In the first section of this chapter, we did not discuss what happens when the lever changes. The torque can be manipulated, not only changing the length of the handle of the moment, but also changing the amount of force, pulling down on the lever. When carrying a ten-pound dumbbell in front of the shoulder, there is approximately 44.5 newtons of force pulling down on the joint. This value is the force of gravity acceleration, acting on weight. In our illustration, this created 33.4 newton meters of torque on the shoulder joint. We came to this number by connecting the arm length of the moment (0.75 meters or about thirty inches), the arm angle, and the weight of the dumbbells. The torque equation on the shoulder looks like this. The torque arm x strength of 0.75 meters x 44.5 newtons and 33.4 nm or Newton yards of force acting on the shoulder on the other hand, what if we now took twenty pounds of dumbbells and tried to lift and keep it in the same extended position? This weight will then be converted into about eighty-nine Newtonian forces. To get eighty-nine newtons, you must convert twenty pounds to 9.1 kilograms. It is then multiplied by 9.8 m/s2 (standard gravitational acceleration) and eventually amounts to eighty-nine newtons. Assuming, that arm length has not changed, the mathematical equation for calculating the new torque value will be: Torque and hand moment x strength 0.75 meters x 89 newtons 66.75 Nm or Newton meters of force acting on the shoulder Now that we know how torque can be manipulated by changing either the moment of arm length and / or the amount of force pulling down on the lever, let's now analyze when lifting weights with weights that are more natural for each lifting weight. The conservative estimate is that an athlete can squat 15 percent more weight using low bar technique compared to high bar technique. Most powerlifters use low bar variations over a high back squat bar in competition for this reason. We could also make an informed assumption and say that most athletes can squat 15 percent more in a high bar back squat compared to anterior squats. If we assume a single repetition of a high in a low back squat bar to be five hundred pounds, it would mean that this person could theoretically high bar back a squat 435 pounds and front squats of about 378 pounds. Let's see how the change in weight on the barbell changes the torque placed on the various joint body complexes. Low-Bar Back Squat (500 pounds) If we assume a lift capable of a five hundred pounds low bar back squat, that means there will be 2,224.11 newtons of strength presently pulling down on the bar. This is much more value than we saw with the previous 225-pound loaded barbell. That's why. we will use exactly the same lever arm lengths and joint positions from the early illustration. We again freeze the frame squat in a parallel position (hip crease according to the knee).4 The only thing we change will be the weight on the bar. Torque - moment arm x strength - 0.14 meters × 2224.11 newtons - 311.4 nm or Newton-meters of force acting on the knee joint at a torque of 110. 711.7 NM or Newton meters of force acting on the hip joint and lumbar pelvic complex at 40 High-Bar Back Squat Analysis (435 pounds) Let's now see what happens when this athlete lifts 425 pounds (1,934.98 Newtons) with a high bar back squat. With this technique, there is a more closed angle to the knee joint (currently at 125 degrees compared to the previous 120 degrees with low bar technique). The angle on the hip joint will be fifty-five degrees, which is more open compared to the low back bar squat angle of the hip forty degrees. This is a normal change due to the more vertical position of the trunk of this squat change. Torque - moment arm x strength - 0.19 meters x 1,934.98 newtons - 367.6 nm or Newton-meters of force acting on the knee joint at torque 125. 522.4 NM or Newton meters of force acting on the hip joint and lumbar pelvic complex at 55 Front squat analysis (360 pounds) Finally, let's assume the same athlete is now trying to lift 378 pounds (1,681.43 newtons) with the front squat technique. The angles during the frame freezing in the parallel squat position will change again in relation to the previous two methods. The front squat uses a more closed corner of the knee joint (now at 130 degrees). It also uses a more vertical trunk in order to keep the bar balanced on the chest and center in the middle of the leg. This opens the hip joint and lower back to seventy-five degrees. Torque - moment arm x strength 0.22 meters x 1.681.43 Newtons - 369.9 Nm or Newton-meters of force acting on the knee joint at a torque 130 torque 130 torque - force x 0.24 m x 1.68 1.43 Newtons 403.5 Nmm or Newton Force, Newton Acting on the hip joint and lumbar pelvic complex on 75 Comparative Analysis (Different Weights Through Methods) With this analysis, we can see some striking differences compared to the latest study that rated each squat at the same weight. The technique of low bar sitting on the back is much more torque on the lower back (lumbar pelvic joint) and hip joint compared to other methods. In this parallel analysis of the freezing frame, 717.7 newton meters of force were applied to the lower back and hip joint compared to other methods (522.4 newton meters in a high back squat panel and 403.5 newton meters in front squat). By comparison, a low squat bar placed 53 percent more torque on the hip and lower back than a high squat bar and 78 percent more than a front squat. - The low back bar is

squat, however, posted The amount of torque on the knee joint compared to other methods! The high-bared back squat placed relatively the same amount of torque on the knee joint as the front squat. Although the longer arm is the moment in the front squat and more closed angle, the heavier weight of the back is a squat increase of knee torque to the same level. Final thoughts As you can see through this analysis, changing the weight on the bar can significantly change the amount of torque that is generated on various joint complexes. The slightest change in variables (weight on bar, technique used, etc.) can significantly change the strength placed on your body. This allows us, as coaches, to make exercise recommendations for our athletes based on individual needs. For example, an athlete returning from a knee injury who still can't tolerate a more forward knee position while squatting the barbell will benefit from using a low bar back squat compared to a high bar change. This is partly because more torque is placed on the knee joint while the high bar is back squat. In addition, an athlete dealing with back pain may benefit from using anterior squats during a workout rather than the usual posterior squats. This is because the front squat seats have less torque on the lower back compared to both rear squat variations when more realistic weights are used. This recommendation is practical only if the injured athlete is able to perform a front squat with an acceptable technique. An athlete with poor core control or limited thoracic mobility can be difficult to take shape for. Exercise recommendations for healthy athletes should not be based solely on the forces sustained in one joint. Studies show that healthy athletes can easily tolerate strength for any of the three squats.7 You don't have to worry about injuring your knee using a high bar or low bar back squat. The ACL and other ligaments inside the knee joint should be completely safe. As long as a good method is used, the joint stress values never come close to exceeding harmful levels.7 Athletes should use a curriculum that uses multiple squat techniques to provide a more balanced approach and reduce the risk of excessive injury. Notes 1) D. Diggin, C. O'Regan, N. Whelan, S. Daly, et al., Biomechanical Analysis Front vs. Back Squats: Injury Effects, Portuguese Journal of Sports Sciences 11, Suppl. 2 (2011): 643-46. 2) M. Rippeto, Initial Strength: Basic Barbell Training, 3rd Ed. (Wichita Falls, Texas: Aasgaard, 2011). 3) A. C. Fry, J. C. Smith, and B. K. Schilling, The effect of knee position on the hip and torque of the knee during the squat of the barbell, Strength and Conditioning Study 17, No. 4 (2003): 629-33. 4). Wretenberg, J. Feng, and W. Arborelius, High and Low Bar squatting Techniques during Weight Training, Medicine and Science in Sports and Exercise 28, No 2 (February 1996): 218-24. 5). O'Shea, Parallel Squats, National Association of Air Conditioning Force Magazine magazine (1985): 4–6. 6) H. Hartmann, K. Wirth, and M. Klusemann, Analysis of the load on the knee joint and vertebral column with changes in squatting depth and weight load, Sports Medicine 43, No 10 (2013): 993-1008. 7) B. J. Schoenfeld, Squats of Kinematics and Kinetics and their application for performance performance, Journal of Strength and Conditioning Studies 24, No. 12 (2010): 3497-506. Confessions I heard the story once about a group of people who came across a turtle sitting on top of a post fence. Some of the group exclaimed: Look at what this turtle did! Only an experienced climber could make it this far! Although this achievement was by all means extraordinary, the little turtle could not have been herself on this feat. Someone had to help him get to his final destination. This book is the accumulation of more than three years of constant writing, editing and rewriting. However, in the end, I know that there is no way this book would have been possible without the help of so many people along the way. First of all, I have to thank my wife, Christina. She stood next to me and put up with my constant research and writing throughout these years. You're an angel, and I'm grateful every day that you're with me. My co-author, Dr. Kevin Sontan. This book would still be over five hundred pages and sound like a research article, if not for your input and vision. You challenged me to become a better writer; for that I am eternally grateful. My mentor, Travis Neff. It was a great privilege and honor to learn from such a hard-working and God-fearing man. The mantra to give an example is that you modeled for me from the first day I started at Boost. Thank you so much for your contribution to the writing and publication of this book. My current and past weightlifting coaches are Anna Martin, Dr. Tom Lafontaine and Dr. Alex Koch. 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My past professors at Truman State University and the University of Southern The education I received wasn't the second. Thank you. Several books and authors have inspired me in recent years. These people definitely changed my outlook on life: The Movement, Grey Cook; Becoming a supple leopard, By Dr. Kelly Starrett; Starting force, Mark Rippetoe; Start with Why, Simon Sinek; The Effect of the Icon, Darren Sugiyama; and Crush It, Harry Weinerchuk. And finally, for all those who are trying to live their lives to the fullest every day. For those who live and teaches the motto to move well and then raise heavy. If enough of us realize and spread this message, we can really change the world. Aaron Aaron