GOLF ANATOMY

SECOND EDITION

Your illustrated guide to longer drives and lower scores

"These exercises helped prepare my body to compete and win against the best players in the world."

— **Kevin Chappell,** PGA Tour Winner and Member of 2017 U.S. Presidents Cup Team

DR. CRAIG DAVIES | DR. VINCE DISAIA

Golf

ANATOMY

SECOND EDITION

Dr. Craig Davies

Dr. Vince DiSaia

HUMAN KINETICS

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FOREWORD

One of the most important moments in my career occurred when I met Dr. Craig Davies in the early 2000s in Mississauga, Ontario. I had been teaching golf for four years and thought I knew it all when it came to the golf swing. At this chance meeting, at Momentum Golf in Toronto, I was made quickly aware that I hadn't even scratched the surface. (Golf instructors, it is safe to say, are not educated enough in the studies of anatomy, physiology, and biomechanics. The irony is that the golf swing *is* anatomy, physiology, and biomechanics!) My world changed for the better that day, because Craig has been my single greatest mentor in golf.

Now, 15 years later, Craig and I have worked together in junior golf, mini-tour golf, and more than 10 years of traveling on the PGA Tour. We have worked with many players who during our time together have been in the top 10 in the world. In this time, Craig has become one of the most successful and trusted fitness trainers, movement coaches, and chiropractors in the world of golf. *Doctor of chiropractic* is his official designation, but his curious nature and sharp mind have allowed him to become an expert on all things movement based. With a knowledge set that includes nutrition, training, therapy, human learning, and performance, Craig has forgotten more than most people know.

Dr. Vince DiSaia and Craig wrote a ground-breaking book with their first edition of *Golf Anatomy*. That was one of the first books that allowed golfers, golf teachers, and golf fitness coaches an opportunity to explore what was actually occurring in the body during the golf swing. This new edition of *Golf Anatomy* raises the bar yet again with dozens of new exercises, more insight into how the body functions in the golf swing, and a focus on improving the body's ability to move.

Craig and Dr. DiSaia have helped numerous players whose professional careers were at risk as a result of chronic overuse and the injuries that arise because of this difficult sport and its taxing nature on the human body. In this fine book, you will share the same information that the world's top players receive week in and week out on the PGA, European, and LPGA Tours. The chapters are in sequence, and I would advise you to take a thorough look at all of them, because the skills intermesh—from the first chapter to the last. One of the greatest errors golfers make is rushing through the fundamentals. Without owning the fundamentals you will not be able to own either your golf fitness or your golf swing.

One of the main reasons it is so difficult for players to improve their swing is that they are often unable to physically perform the technique that they and their golf teacher desire. This may be the most powerful benefit of utilizing *Golf Anatomy*. As you slowly make your way through the chapters in this book, you will unlock greater and greater movement potential. This enhanced movement

will allow you to use better geometry and physics in your swing. The better your geometry and physics, the more efficient your golf swing, and you will be able to make changes to your technique quicker and more safely than ever before.

In *Golf Anatomy, Second Edition,* you will benefit from the growth of Craig and Dr. DiSaia's understanding. I have been fortunate to benefit firsthand from their advice in my training, and I have witnessed the incredible transformations in their players' ability to move safely and more efficiently. Did I mention that the players were able to do this while generating more force, and thus increased ball speeds? During the past decade, over a dozen players who utilized the concepts found in *Golf Anatomy* have been ranked among the best ball strikers and drivers on the PGA Tour.

Whether you are a golf coach, physiotherapist, chiropractor, or trainer, this book can better your understanding, which in turn will make you a more competent professional. If you are a young golfer, college golfer, professional, or even high-handicap amateur, the information in this book, if applied properly, will no doubt enhance your game.

Whether you are looking to hit the ball farther and straighter or to play without hurting, this book is for you. As you make your way through *Golf Anatomy*, enjoy your progress as you become more successful at this amazing game.

Sean Foley
PGA Tour Coach

PREFACE

A tremendous influx of golf training aids, clubs, and balls have been brought to the market during the last decade. The one thing we have learned is that you can't fake your way to a new body. You can use all the training aids, golf clubs, and golf balls that you desire. If your body is unable to move the way the golf swing requires, it won't matter how new your clubs are or how many swing training aids you have used. You will not be able to make the consistent powerful swing you desire.

The golf swing is an extremely complex skill that requires most of the joints in the body to move through a large percentage of their maximal range of motion, and the muscles moving and supporting these joints must perform at a high percentage of their capacity. Few movements in any sport require the technical precision and power that the world's best golfers display as they accelerate their clubs into the golf ball at impact and then immediately decelerate the club head from incredible speeds back to zero by the time they reach their finish position.

Mark Broadie's appearance in the golf world influenced many golf commentators to change their perspectives about the dominant aspect of the game as it pertains to lower scores and a better world ranking. The assumption used to be that golfers "drive for show and putt for dough." This phrase was repeated on telecast after telecast but has now been shown to be inaccurate. Professor Broadie's analytics have proven that the world's best players strike the golf ball a greater distance and with better accuracy than the peers who finish below them in the world rankings. It is possible that, in decades past, the influence of putting on overall score may have been greater than it is in the modern game.

The best players (according to world ranking) use the same quality golf clubs and golf balls as the players who are hundreds of spots lower on the world-ranking list. It can't just be the equipment that allows these players to hit the ball harder and with greater accuracy. The world's best players often share coaches with the players who are far behind them in the world rankings. So it can't only be the coaching that is making the biggest difference. What is the factor that separates the top players in the world from their less successful peers?

Well, a quick look at the field of a recent World Golf Championships Match Play event that included 64 of the world's top 66 ranked players may provide some insight. Fifty-seven of the 64 players (or 89 percent) travelled with a trainer or therapist who was helping them move better. Of the other seven players who did not travel with a fitness or manual therapy professional, at least five of them utilized a trainer while at home. This means at least 62 of the 64 players in this very exclusive field utilized a professional to help their bodies move and function better. When we assessed the players competing in an opposite field event that same week, only 26 percent had utilized a professional to help them with

their bodies' potential to move and function. This is a significant difference and may be the greatest influence determining the success of golfer at the highest level of the sport.

The goal of this second version of *Golf Anatomy* is to connect various scientific fields' findings on how the body develops and what enables the body to adapt to training and create more effective and precise movement. We will provide insight into how to develop healthy, pain-free joints that can be controlled the way you want. We are going to give you examples for incorporating these healthy joints into an integrated multisegment chain of accurate movement. You will also learn how to train specific movement patterns, and we will help you understand how each of these movements will directly assist in improving your golf game. Never before has a book so clearly and easily linked the two worlds of movement acquisition and golf performance. Once you understand how to progressively, safely, and efficiently adapt your body to increase the potential it has for movement, your learning and training experience will become more fulfilling, and you will have more motivation because the time you spend on your body will be more effective and much more fun.

We redesigned and updated this book for multiple reasons. First, every golfer should understand how his or her own body moves and what it is capable of producing during a golf swing. For this reason, the first chapter is dedicated to improving your knowledge of the key elements of an effective golf swing. The true beauty and complexity of the golf swing could never be covered in any single chapter. However, understanding the main points mentioned in chapter 1 of *Golf Anatomy* will help you appreciate how forces are created in the golf swing and why it is so important to have a body that is not only fit, but also fit for golf.

Second, we wanted to provide a clear and detailed picture of the movements performed during the golf swing and within the various exercises found in this book. Since movement ability is the keystone to a better golf swing, understanding how the body moves is crucial to improving its movement. After all, the more you know, the better you can prepare.

Detailed anatomical illustrations for both the fitness and golf swing sections show you exactly what is actually occurring within the body during each of the described movements, both on and off the course. The anatomical illustrations are color coded to indicate the primary and secondary muscles and connective tissues featured in each exercise and movement.

This intimate look into the body allows you to understand not only which joint complexes and muscles are being worked in each exercise but also how those same muscles are utilized directly in the golf swing itself. This straightforward, illustrated connection is unique to *Golf Anatomy*, and it is the easiest way to learn about both the body and the golf swing and how they so closely influence one another.

Third, this book was written to give you many concise exercises to help improve the mobility, stability, balance, rotational skill, strength, and power of the joint complexes and muscles that directly affect the accuracy, distance, and consistency of your golf swing. These are presented with step-by-step instructions so that you can easily perform each exercise.

The instructions and detailed anatomical illustrations help you train with a purpose and understand how that training translates directly to your swing. Your own body is the most powerful and effective piece of equipment you can use on the golf course. The more knowledge and understanding you have about this tool, the more effectively you can use and improve it.

Fourth, this book provides information for developing healthy and functional joints. For the body to safely create the movement patterns with the desired precision and power, it needs joints that possess the necessary range of motion and the neurological ability to control them. The golf swing is one of the most dynamic, explosive, and complex movements in all of sport. The golfer's body produces and absorbs some of the highest forces seen in the athletic world. This is evident in the fact that up to 80 percent of all golfers will experience *at least* one significant injury during their golfing careers. More than 35 million people play golf in the United States alone, so that amounts to more than 28 million significant injuries and many more minor troubles.

One reason for the high injury rate is that the forces created when driving the golf ball produce upward of 8 to 10 times a golfer's body weight in compressive forces to the spine. To put that into perspective, running—which is considered a high-impact activity that causes stress to the body—produces only three to four times a runner's body weight in compressive forces to the spine. The spine is just one of the many body parts that require both strength and mobility to endure the repeated high-velocity forces of each golf swing. Having to absorb all these stresses with each swing is reason enough to keep your body as fit, strong, and active as possible. The inability to withstand such forces will lead to dangerous compensations, poor swing technique, and injury. Fitness helps prevent injury and promotes optimal performance on the golf course.

When attempting to train the body to withstand the forces during the golf swing, we must consider what aspect of golf performance to improve. For example, when we swing a golf club, we require immediate anaerobic energy. But walking a four- or five-hour round depends on our aerobic system for energy production. These systems are trained in completely different ways.

If that wasn't complicated enough, we must look at the demands placed on the body during practice sessions. These demands do not match those in an actual round of golf. During a practice session, a golfer may perform over a hundred golf swings in less than an hour. The explosiveness of the golf swing requires incredibly high levels of muscle activation, which requires large amounts of energy. Repeated golf swings with a depleted energy supply will result in decreased performance and an increased likelihood for injury. We must consider the demands of the practice session when designing the training program and not just the actual performance during a round of golf.

Although improving your physical fitness for better golf performance and reduced risk of injury is an important goal, it is not enough for us to just give you dozens of exercises and have you train at random. For this reason, *Golf Anatomy* helps you understand the anatomy involved in the golf swing and how it can be used most effectively. And since you are training to improve fitness for a sport, not just get bigger muscles, it only makes sense to arrange the chapters of *Golf Anatomy* in a *functionally* logical order. This unique approach to training was designed specifically with the golfer in mind and can be found only in this book.

Because of the dynamic nature of the golf swing, many parts of the body need to be stabilized while others are moving at high speeds. Golf definitely necessitates speed, strength, and power, but none of these can be effectively achieved without first having sufficient mobility, balance, and stability. These last three are the building blocks on which the first three depend. For this reason, the early chapters of this book focus on the mobility, stability, and balance of the golfer's body, and we have left strength and power for later chapters. There is no need to completely master each section before moving to the next, but do not train solely for power if your mobility and stability are greatly lacking. This progression of exercises and chapters is easy to follow, and it is just as easy to achieve results in both your fitness and golf performance.

Achieving a body fit for golf will definitely reduce your risk of injury, but it can never guarantee an injury-free golf career. Since the golf swing is so explosive, injuries are bound to occur. However, creating a golf fitness program that focuses on the proper movement of each body part gives you the best chance to not overload one area of the body. Many golf injuries are due to poor swing mechanics, often driven by either a lack of mobility or an inability to properly control movement. Creating your golf fitness program based on the order in which the exercises appear in *Golf Anatomy* and the exercise progression chart in chapter 8 will help you maximize time on the course and minimize time spent rehabbing injuries.

This is why we included a warm-up chapter to make sure you completely prepare your body for both the golf swing and a golf fitness routine. Players often neglect this part of their routine, and this sets them up for a greater risk of injury or for developing poor movement patterns. The week before we wrote this preface, one of the players on the PGA Tour decided to skip his warm-up because he was late getting to his practice round with his peers. He injured his lower back and was forced to miss the next tournament. We can't stress enough how important it is to prepare your body for the golf swing.

With all of this useful information, *Golf Anatomy* is appropriate for a few different audiences. First, it is for any golfer who wants to avoid injury; improve fitness; and hit the ball farther, more accurately, and with more consistency. *Golf Anatomy* will help you understand the anatomy behind the swing and the tools to train that anatomy effectively.

Teaching professionals are the second group who will benefit greatly from the information found in this book. They will gain a much greater understanding of

the body mechanics found within the swing. Instructors often are not aware of or are unable to identify inefficiencies or physical limitations in their students' bodies. This is not their fault; they are masters of the golf swing, not the body. However, having a better grasp of the physical anatomy of a golfer's body and the type of movement each of these body parts is able to create can help teaching professionals give lessons with greater effectiveness, better understand how to avoid injuries in their golfers, and provide sound advice to improve areas of dysfunction.

Golf teaching professionals will learn to identify specific areas for golfers who move exceptionally well (we refer to these areas of exceptional movement as physical gifts) and ensure teaching capitalizes on these physical gifts. This will help the golfer move in a way that maximizes his or her physical potential.

Moving the way that his body was designed for was exactly what Hunter Mahan did during his junior, collegiate, and professional career, right through his time spent working with golf coach, and our good friend, Sean Foley. Capturing these physical gifts and exploiting them is what allows the best ball strikers to display their unique "thumbprints." The best ball strikers—whether we talk about Rory McIlroy, Kevin Chappell, Justin Thomas, Gary Woodland, Graham DeLaet, Dustin Johnson, Hideki Matsuyama, Ben Hogan, or Norman (Moe or Greg)—all had unique swings. This uniqueness is the player's "thumbprint." When a player tries to move in a way that does not exploit his or her gifts and attempts to fit the golf swing into a method, the player often loses ball-striking prowess.

The third group who can use this book to further their knowledge is strength and conditioning specialists. Although they are experienced in designing fitness programs, they might not have enough understanding of the golf swing mechanics to apply the correct training protocols. *Golf Anatomy* provides this in-depth detail of the golf swing and will shed light on how training programs can be designed to effectively target the movements and other important aspects needed for an efficient and powerful swing.

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The creation of this book was made possible because I get to spend my life surrounded by the most amazing people. These quality individuals—whom I consider my tribe—have supported, motivated, and invigorated me over the years. They have made each day a special occurrence and fostered an environment full of love, learning, and mentorship. We are a reflection of the environment we surround ourselves. Thank you for being you, even if your name does not appear in this short acknowledgment.

My wife Andrea challenges and encourages me more than anyone else. There is no possible way my life, family, and career would be as amazing as they are without your intimate influence. My daughters, Brooklyn and Charlotte, teach me more than I could ever hope to teach them. My mom and sisters have always believed and encouraged me in all ventures.

To the greatest mentor in my professional career, Sean Foley, and my great friend, Dan McVicar, life would be incomplete without the two of you. A small group of peers have been by my side the past decade on tour and often do not get the recognition they deserve for helping build this profession: Ara Suppiah, Marc Wahl, Marnus Marais, Troy Van Biezen, Chris Noss, Joey Diovi salvi, Randy Myers, Jeff Banaszack, and Mark Blackburn. Tremendous professionals who are pushing forward the standard of athlete care now join us. This next generation of golfer is in good hands.

It has been a privilege to spend so much time with remarkable athletes who have trusted me to help develop and maintain their incredible performances: Hunter Mahan, Kevin Chappell, Graham DeLaet, Nick Taylor, Chez Reavie, Gary Woodland, Byeung-hun An, Henrik Stenson, Chris Barilla, Jon Mills, Andrew Parr, Stephen Ames, Si Woo Kim, Sean O'Hair, Lydia Ko, Justin Rose, and Y.E. Yang. Each an amazing athlete, but more importantly, each is a wonderful human.

—Craig Davies

To my wife Marci, thank you for never failing to support me, can't imagine achieving any goal without you by my side.

To Carson, Cole, and Crosby, thank you for just being you. Hopefully I can inspire you as much as you have inspired me.

To all of my many mentors along the way. Thank you for your input, which has shaped who I am and what I have become.

—Vince DiSaia

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THE GOLFER IN MOTION

Golf is a unique athletic endeavor because players of all skill levels can compete against each other by using a handicap. Players also compete against themselves as they develop an improved handicap. For all players, regardless of actual golf ability, being able to compete in a meaningful match is a fantastic opportunity that does not present itself in any other sport.

However, we would all rather be the player with the lower handicap—preferably with a constantly decreasing one at that! There are many ways to get better at the game of golf. We can improve the stroke with a putter or our ability to read putts correctly. We can improve our short game and iron play, and we can improve our game off the tee. The problem with these options is we need to be on a golf course to practice and improve. For most, it is difficult to find time to get on the course regularly enough to make substantial improvements in any of these areas, never mind all of them.

There is another option to improve your golf game. The world's best players have known for quite a while that the most effective way to improve a golf game is to improve the quality of the body playing the sport. As players earn better control of their bodies, it becomes easier to improve the technical part of their game because they now have more movement options available. Most players, whether they are high-handicap amateurs or those trying to keep their cards each year on the PGA Tour or European Tour, struggle with one common issue: They are wasting precious time, energy, and confidence making technique changes when their bodies simply can't perform the desired movement. They are attempting to move the way their golf instructors believe would be beneficial, but the player may not have the physical skill set to do it. They may lack the mobility, strength, or body awareness to move in the direction, range, or sequence desired. The player may be suffering from an injury that prevents the desired position or perhaps has even become injured trying to force the body into a position it simply can't make, a common situation.

Sometimes a player will think he or she can move the required way, so he or she will spend time on the range, using significant energy, focus, and repetition to perform the desired movement without much attention to other variables (wind, water, etc.). Then the swing the player has practiced doesn't work on the course. In our experience, a player struggles to transfer a range swing onto the

course because the player is attempting to use an unnatural or extremely difficult technique relative to the player's current physical skill set. When the physical skill sets improve, the technique becomes easier to perform, and the golfer is now able to take the range swing onto the course. If you have been practicing your swing technique but continue to struggle to find it on the course, you are most likely working on a movement inappropriate for your current physical state. The most efficient way to improve technique and scoring will not be to continue beating balls on the range but instead to improve the body.

At professional golf tournaments, players often make the game seem simple, and their swings look effortless. The reality is that the game is far from easy, and their swings are anything but effortless. Great ball strikers such as Justin Rose, Graham DeLaet, Henrik Stenson, Kevin Chappell, Rory McIlroy, and Lexi Thompson look like they are able to create tremendous club-head speeds and still finish their golf swing with impeccable balance because they have put many hours of work into the technical aspects of the golf swing and the movement capacity of their bodies. The average golf fan is not able to appreciate just how much time these top players spend making sure their bodies are moving and functioning at the high levels necessary to consistently turn in a world-class performance.

It is no different from an F1, NASCAR, or Indy Car being tuned up and modified to meet the demands that each track will place on it. The world's fastest car with the world's best driver won't be able to compete at a championship level if the car doesn't have the proper tires for the track conditions that day.

Each week on the PGA Tour, the manual and physical therapy section resembles a MASH unit, with many treatment tables set up and being used to fine-tune and patch the world's premier players. The fitness trailer doors are like turnstiles, given how many players pass through them as they strive to increase their on-course performances. Swing coaches meet with fitness trainers and manual therapists consistently to ensure they are teaching the most appropriate swing for their players based on each player's current physical state.

To teach or perform a golf swing, we are looking at improving the ability to perform movement. The golf swing requires more than 300 joints in the body to move through significant portions of their available motion and each one of the body's more than 640 muscles to perform at a high level to allow effective, repeated power and precision. The complexity of the golf swing is on par with that of some of the most difficult movements in sports, including Olympic lifts and gymnastics skills. The best movement coaches in the world must study diverse sciences, such as embryology, anatomy, cell biology, neurology, psychology, physiology, biomechanics, and nutrition, to help their players appropriately. This level of understanding takes years to accumulate, but our goal is to summarize these sciences in this second edition of *Golf Anatomy* to help you streamline your journey, understand your body, and appreciate how to maximize your body's potential to move.

Success in sports often comes down to the athlete who can move more effectively than his or her competitors. At its most fundamental level, prodigious movement

requires an athlete to have both the ability to move and control movement at each joint through the required action. Many athletes, trainers, and coaches try to create effective movement without first gaining capacity in individual joints. This is analogous to attempting university-level calculus before learning how to count. You will probably get a few questions right on a multiple-choice exam, but you aren't going to see consistent results, and you're surely not going to see success over the long haul!

Once we have optimized the movement of our individual joints, we can develop a level of neurological control that allows the player to move into the positions they desire in the swing. Only then can we focus on gaining the strength and speed required for this sport. In the golf swing, this can be *a lot* of speed! After the 2017 Open Championship, Kevin Chappell improved his driver's club head speed from 119 to 121 up to 127 to 129 by the time he arrived at the World Golf Championship event a couple weeks later. He achieved this improvement by focusing on better body control and by making small changes to his technique to expose the new physical skill.

One of the biggest mistakes many golfers—and athletes in general—make when attempting to increase speed is failing to learn how to dissipate it. Deceleration is more often the limiting factor in a golfer's quest for greater club-head speed than an actual lack of ability to accelerate or create speed. One of the nonnegotiable elements of any golf swing is that it must eventually end.

Many golf coaches working with young players now consider it paramount to teach their athletes to swing fast when they are young and then focus on technique later, once the potential to create speed has been developed. The reasoning is that technique can be taught anytime, but stimulating the nervous system to increase speed must be done during specific windows in an athlete's development. Although there is considerable evidence in the literature to back up this concept, this focus can be devastating to the long-term health of athletes if they do not take the steps necessary to ingrain adequate deceleration skills. Injury development will be more of a certainty than a possibility.

Our bodies are inherently intelligent and will attempt to minimize the likelihood of injury whenever possible. To appreciate what this means, let's consider our natural instincts if we were driving a high-end car and have 100 feet to stop before a hairpin-turn near the edge of a cliff. If we were driving with no brakes and really old, slick tires, we would absolutely approach that 100-foot mark with minimal speed. If we had brand-new brakes, new wheels, and an extra 50 feet of room to slow down, we would be much more likely to drive with considerably more speed because we would trust that the car and extra space would be sufficient to stop in time.

The new brakes and wheels are comparable to an optimized nervous system and healthy joints; the increased room to stop the car is equivalent to a body having an increased competence to move through greater motion with superior control. When we approach the end range of a joint's capacity, the soft tissues that support that joint must work at a much higher percentage of their maximum capacity to slow down the body segments. It is very easy to injure the joint and

associated soft tissues (muscles, tendons, ligaments, joint capsules) at the outer limits of a joint's motion. If we are able to earn even 10 percent greater mobility throughout our body's numerous joints, we would end up with a very large accumulated movement potential. More controllable movement equals greater space to slow down!

If you have more space to slow down and a greater ability to decelerate as a result of your training, you will, without question, have a much greater likelihood of increasing your club-head speed because your body will be more confident that it possesses the ability to stop the movement safely. Increased club-head speed equals greater distance, and greater distance with acceptable accuracy never hurts. Just ask Dustin Johnson, Rory McIlroy, Jason Day, Adam Scott, Justin Thomas, Rickie Fowler, and Jon Rahm. Oh yeah, they all happen to be among the top-ranked players in the world!

If you look at the top seven players from the PGA Tour's 2017 money list and compare their driving distance and their ranking for strokes gained on approach to the green and strokes gained putting (see table 1.1) when entering the Tour Championship, you can see how important it is to manage club-head speed and accuracy, both off the tee and when approaching the green.

TABLE 1.1 2017 PGA Tour Money List With Driving Distance and Player Rank for Strokes Gained Approaching the Green and Strokes Gained Putting

Player in order of money list rank	Money earned (in U.S. dollars)	Driving distance (yards)	Strokes gained approaching the green (rank)	Strokes gained putting (rank)
Justin Thomas	9,921,560	309.76	6	47
Jordan Spieth	9,433,033	295.6	1	42
Dustin Johnson	8,732,193	315.0	5	81
Hideki Matsuyama	8,380,570	303.3	7	173
Jon Rahm	6,123,248	305.8	17	49
Rickie Fowler	6,083,197	300.3	23	2
Mark Leishman	5,866,391	298.6	21	27

How do you hit the ball over the greatest distance and with the most accuracy? You learn to master your body's movement potential! If we look at the 100th-ranked person in driving distance on the PGA Tour in the 1985, 1995, and 2015 seasons (table 1.2), we can better appreciate the need for greater distance than if we looked at the top-ranked players' averages. The large increase seen with the 100th-ranked players shows just how much distance off the tee has increased and illustrates that if you can't produce speed, you simply can't compete on the course anymore.

TABLE 1.2 100th-Ranked PGA Player in Driving Distance: 1985, 1995, 2015

Year	Average distance off the tee (in yards)
1985	258.4
1995	262.0
2015	292.0

Most of the world's best players travel with a conditioning coach and a manual therapist to help keep their bodies in optimum condition. Although most of you won't have this luxury, it doesn't mean you can't understand and have exposure to the techniques that these players use. We have worked with many major championship winners, World Golf Championships winners, and champions from the PGA Tour, European Tour, Australian Tour, and Asian Tour. We have worked with players from the American, European, and World teams competing in the biannual Ryder Cup and Presidents Cup competitions, and players we have worked with competed at the Olympic Games in Rio, two of them capturing the gold and silver medals in the men's competition and another capturing the silver in the women's competition. This book will provide the principles and training methods we used with these great players, juniors, and high-handicap players alike.

TECHNIQUE

The golf teaching industry is a multibillion-dollar industry. Unfortunately, even this enormous monetary investment has done almost nothing to change the average North American handicap in the past 30 years. Most teaching for the golf swing has focused on attempting to change the motion of the golfer without improving the golfer's capacity to move. In addition, most golf teachers have very little, if any, understanding of anatomy, kinematics, joint capacity, or the common limitations that athletes of all skill sets experience. Without this understanding, one can only guess at the technique a golfer can attain. However, as our good friends and successful PGA Tour coaches Sean Foley, Drew Steckel, George Gankas, Scott Hamilton, and Mark Blackburn can attest, understanding the body and how it moves can help golfers make enormous improvements to their swing techniques quickly and safely. The guessing is significantly reduced when you know what an athlete is actually physically capable of achieving. If you know the golfer's feet, ankles, hips, spine, shoulders, and neck possess adequate mobility and the ability to move in association with each other in a way that fits a movement you would like them to do during the golf swing, you can be much more confident that you are not wasting their time or increasing the likelihood of injury.

Our goal for this second version of *Golf Anatomy* is to help change the way golf is taught at both amateur and professional levels. We want golfers reading this book to improve their bodies and increase their success in the short term and, just as important, increase the number of years they can play this great game at the highest levels of their ability, healthy and pain free. We want to stop the insanity so rampant in this sport of attempting to change the aesthetic product (the movement) without developing the quality of the underlying instrument (the body). The quality of your body will either enhance or inhibit your ability to create and replicate movement. Respect the complex motion of the golf swing. When it is performed freely and without hesitation or compromise, it is one of the most graceful yet powerful movements in sports.

Some individuals will have more range of motion, and others will have relatively less. Kevin Chappell and Si Woo Kim are both world-class ball strikers. However, their swings look completely different because the potential for movement is different between these two great players. If Kevin Chappell tried to swing like Si Woo, he would have no success. Si Woo's and Kevin's golf coaches both understand the golfer's body and its potential to move. This knowledge allowed them to streamline the technique they employed to best match the player's body. Fitting the technique to the body makes sense intuitively, yet most of us do not possess the knowledge to make this possible.

On the PGA Tour, coaches with players having a difficult time learning new techniques are one of our main referral sources. These coaches send us athletes because of our unparalleled track record for helping golfers progress their technique, which is secondary to cultivating the athlete's individual movement potential.

How does improved body control lead to greater technique in less time and with less likelihood of injury? When it comes to identifying the perfect way to swing a golf club, the rapid advancement in technologies such as 3D video analysis, radar, high-definition slow-motion cameras, and force plates revealed that there wasn't a specific, perfect way to swing a club. This applies to everyone. You can swing a club an infinite number of ways. Many end with the same result: The club face hits the ball squarely at impact.

The difference is the efficiency of the swing. If you put Tiger Woods' swing in his prime against Graham DeLaet or Henrik Stenson, or if you stack Hunter Mahan's swing on top of Jim Furyk's (he of the magical round of 58) swing, you would notice an incredible difference for much of the swing, but at impact, many of those differences would become less apparent. Obviously, all these players are phenomenal strikers of the ball, although their swing styles look completely different. They all have an efficient downswing that transfers a very high percentage of the energy produced during the downswing into the golf ball at impact. Their swings look different because the potential for movement within their bodies is different.

If you walk down a range at any PGA Tour golf tournament, you will notice that each player has a swing so unique that it's like a fingerprint. Yet when amateurs, and even many professionals, visit their local coaches, they are placed into a one-size-fits-all swing model that often does not work for the golfer who is trying to improve.

Comparing your swing with your favorite player's and attempting to mimic his movement is not a sensible way to improve the technical side of your full swing. The key is to make your body capable of producing the most efficient swing that *you* can produce. The future of golf no longer relies solely on copying a standard swing. It is rather a meshing of proper mechanical technique and movement efficiency. Every player has a unique range of available motion in the joints, a unique level of strength, and inconsistencies with body awareness. Only by maximizing his or her own physical profile can a player truly achieve optimal competence.

Each sport has its own specific demands, and golf is no exception. The fitness industry has finally moved past the archaic views of "exercise by body part" that anchored it down for the early days of professional training. Understanding body development during embryology and the concept of tissue continuity has finally allowed us to move past the prescription-by-body-part exercises and toward the prescription of movement and joint health.

Golf Anatomy provides the framework necessary to enable you to understand how joint mobility and health, body awareness, and balance are all prerequisites to greater full-body movements, the development of power, and a resilient body that resists injury.

We focus on some of the major pieces of golf fitness, including mobility, balance and body awareness (proprioception), strength, and power. The order in which these specific components are trained is just as important as the components themselves. The correct progression of exercises provides the most efficient training and diminishes the risk of injury. Training for power before you have obtained an adequate amount of mobility increases the risk of injury and results in minimal golf-specific performance expansion. This book will provide the essential skill sets to build a bulletproof golf body.

GENERATING POWER AND SPEED

At the sport's highest levels, it is increasingly common for players to adapt their swings for improved efficiency in power generation. Our goals in *Golf Anatomy* are to introduce exercises that will help you achieve greater golf fitness and to introduce some of the important principles used by today's top teachers and players when developing a technically efficient golf swing. Three of these principles are ground reaction force, the kinetic chain or web, and potential energy.

Ground Reaction Force

Generating speed using the arms creates many of the swing faults found on driving ranges. For maximal power creation with minimal negative stress on the body, the ground must be the first link in the chain of energy transfer. Newton's third law of motion states that for every force applied by one object onto a second, an equal and opposite force is applied from the second object back onto the first. For example, using the legs to drive forcefully into the ground results in the ground pushing back up with an equal force. The force the ground transmits into the golfer is known as the ground reaction force (GRF). GRF is then transferred up through the legs and into the pelvis. From the pelvis, the force is transferred into the golfer's core, shoulder complex, arms, and, finally, the golf club and ball. Transmitting this energy from the ground to the ball with the most efficiency creates the most power your body will allow.

Kinetic Chain or Web

The energy that stems from the GRF moves through the body in what is known as the kinetic chain or web. The different parts of the body act as a system of chain links, whereby the energy or force generated by one part of the body (or link) can be transferred to the next link. The optimal coordination (timing) of these body segments and their movements makes this transfer of energy and power up through the body efficient. Each movement in the sequence builds on the previous segment's motion and energy. The result of this transfer and summation determines club-head speed.

This kinetic chain connects adjacent joints and muscles throughout the entire body via connective tissue. A weakness or injury in one area of the body impedes the transfer of energy. Weakness in this context can mean a deficiency in strength, range of motion, or body awareness. The body then compensates for this deficiency by overusing, or misusing, other body parts to try to make up for this lost energy. For an efficient golf swing in which the legs generate most of the power, large muscles contribute to force generation. When a weakness is present along the body's kinetic chain, the energy the legs produce cannot transfer effectively into the core and arms. As a result, the smaller muscles surrounding the area of weakness are placed under great stress. In time, this will lead to overuse injuries within the joints and soft tissues (the muscles, tendons, and ligaments) and make an efficient swing impossible.

Potential Energy

As with any sport, power can be improved by increasing the amount of potential energy available. In the golf swing, potential energy is the energy stored within the body that can be used to create force. This is a very important concept because it highlights that improving movement ability directly correlates to power. Previously in this chapter, we discussed the importance of obtaining optimal joint motion at every level. We also mentioned how increasing each joint's movement just 10 percent would result in a large accumulation of movement potential throughout the swing. This is because increased mobility equals increased potential energy. As the golfer moves to the top of the backswing, he or she is creating potential energy within the body that can eventually be directed into the club head as the downswing leads to impact. Therefore, if a golfer is unable to move with a full range of motion, he or she is unable to capture maximal potential energy.

Potential energy is a perfect term because this storage of energy in the swing is only potentially transferred to the club head. In order to maximize the use of the potential energy stored in the back swing, the golfer must then be able to efficiently transfer the energy through the kinetic chain. This is why increasing mobility is useless, and sometimes harmful, unless it can be controlled properly. A competent training program for golf must include both a way to increase mobility or potential energy and a way to control or direct it.

MAJOR MUSCLES AND JOINTS USED DURING THE GOLF SWING

The golf swing involves nearly every muscle and joint in the body, so it is very difficult to pick just a few to highlight as the most important. For simplicity, we have attempted to highlight a variety of the major muscles and joints utilized during the various subsections of the full golf swing. This list is not all-encompassing but does provide a solid basis.

Upswing or Backswing

The upswing phase (figure 1.1), also known as the backswing, is performed with much less tension and physical stress throughout the body than the remainder of the golf swing. In this phase, balance, proprioception, and joint and muscle mobility are often more important than actual muscle strength. Having sufficient external rotation and retraction of the trail-side shoulder complex (the right shoulder in a right-handed golfer) and abduction, internal rotation, and protraction on the target side (the left shoulder in a right-handed golfer) while possessing sufficient internal rotation of the trail hip, external rotation of the target hip, and spinal rotation is more important than how strong the big muscle groups are. The problem with many golf fitness programs is the lack of time spent on increasing mobility or flexibility. If a golfer can't move into a desirable position while remaining in balance during the upswing, the remainder of the golf swing is negatively affected, regardless of the muscle strength or explosiveness of that athlete.

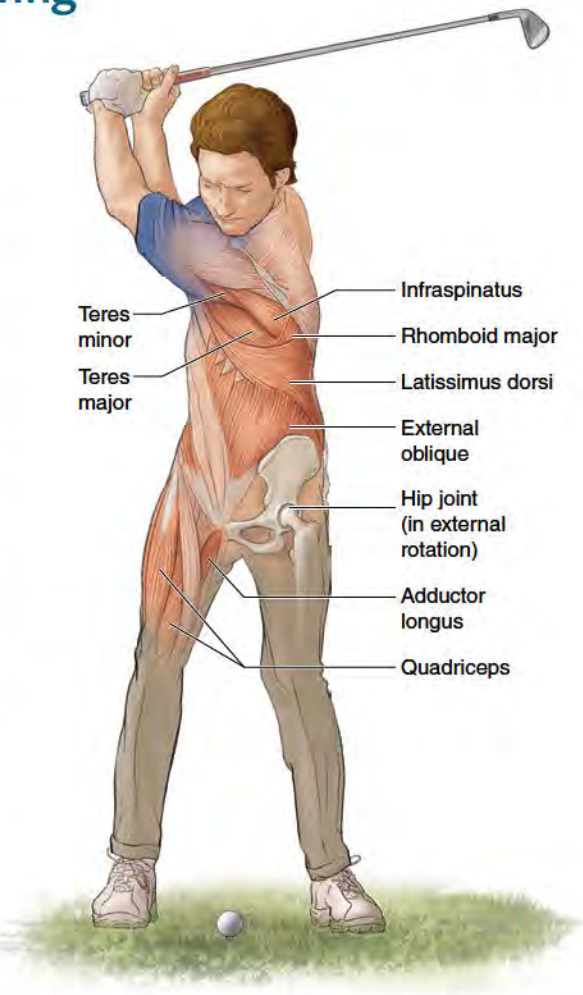


FIGURE 1.1 Muscles used during the upswing phase.

Although this phase of the swing uses mostly a golfer's mobility, some muscles provide a stable base so others can maximize their movements. During the upswing, the golfer must load the quadriceps, gluteus medius, and gluteus maximus in the trail leg and the obliques as the golfer coils toward the top of this phase of the golf swing. When these muscles work efficiently, the latissimus dorsi, infraspinatus, rhomboids, obliques, and multifidi can elongate properly to achieve the correct, full position of the upswing.

A great deal of time during golf lessons is spent on positions in the backswing. Average and even high-level golfers spend very little time on the downswing or follow-through. During fitness training, most golfers do not work on developing adequate motion throughout their bodies. However, many golfers may be unable to properly achieve the positions the golf teacher wants. When positive changes are not seen, the result is frustration for both players and teachers and may lead to injury and poor performance. When golfers increase their mobility to match the motion the instructor is trying to get them to create during the upswing, more time can be spent learning the downswing, impact, and follow-through phases of the swing.

Downswing

The transition from the upswing to the downswing (figure 1.2) requires great coordination and an ability to separate the lower body and pelvis from the upper body. The golfer initiates the transition between these two phases of the swing by moving the lower body into position to allow for the greatest muscle efficiency. One of the primary objectives is to position the target-side knee over the outside aspect of the target foot. This puts the golfer in the proper alignment for the quadriceps and hamstrings to contract and straighten the knee, the gluteus maximus and hamstrings to contract and create hip extension, and the muscles of the hip rotator cuff (piriformis, gluteus medius and minimus, and obturators) to contract to create the initial external rotation of the hip required to position the knee

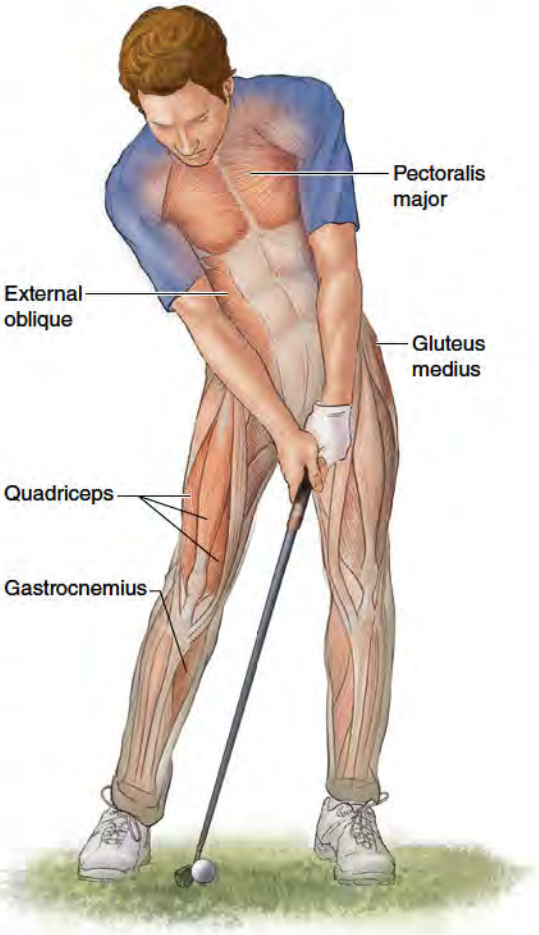


FIGURE 1.2 Muscles used during the downswing.

appropriately, provide lateral hip stability, and allow relative internal rotation of the hip joint, all on the target-side leg.

The trail-side leg uses the quadriceps, adductor magnus, hamstrings, gluteus maximus, and gastrocnemius muscles to create knee extension, hip extension, and ankle plantar flexion to help drive the golfer's weight onto the left side. The activation of the leg muscles helps drive the golfer into the ground and position the player so that the arms are able to move into position and create the desired angles of attack.

In the core, the obliques and psoas major are highly activated, creating a crunchlike position as the golfer's hips move through extension and the pelvis tilts in a relatively posterior fashion (the belt buckle starts to point up) while the chest remains over the ball. The target-side latissimus dorsi helps pull the golfer onto the target side while countering the force generated by the pectoralis muscles on both sides of the golfer's body.

Follow-Through

The follow-through movement in the golf swing (figure 1.3) allows the body—specifically the arms—to decelerate postimpact. This phase of the golf swing is very taxing because the muscles must work predominantly through eccentric contractions to slow down the body. The golfer's entire core—glutes, obliques, quadratus lumborum, psoas major, and transversus and rectus abdominis—works at maximum power to produce force and decelerate the body. The latissimus dorsi and the muscles that stabilize the shoulder blade to the spine and rib cage (serratus anterior, rhomboids, levator scapulae) as well as the muscles of the rotator cuff (supraspinatus, infraspinatus, teres minor, subscapularis) help protect the shoulder joint from approaching its end range of motion under high velocity.

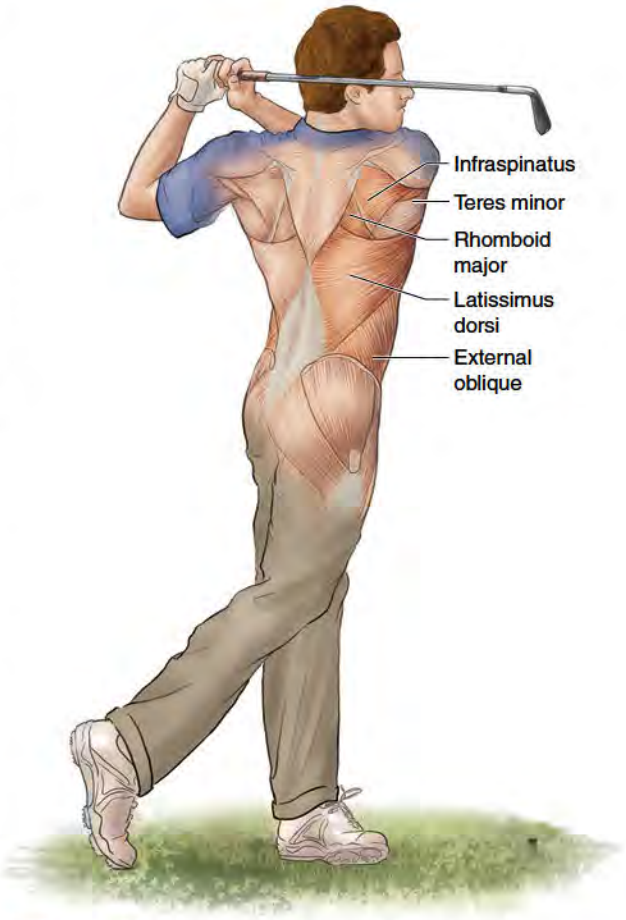


FIGURE 1.3 Muscles used during the follow-through.

UNDERSTANDING BODY AWARENESS

Often, body awareness, or proprioception, is the most overlooked sense. It is as important as the other senses for optimal athletic functioning, if not more important. The body uses proprioception to react with an immediate response to its surroundings. Your body must be able to respond rapidly to changing positions and different forces throughout the swing. Imagine how many body parts are moving in different directions during the golf swing, all in less than two seconds from the initiation of the upswing to the end of the follow-through.

How can your body keep up with all that information? The body is able to do this through tiny sensory receptors in the muscles and joints that keep track of every joint position and stress throughout the body. The better these receptors work with their respective muscles, the more body awareness you will have throughout the entire golf swing. This will help you more frequently produce the correct movements and angles necessary for a good swing.

Kinesthesia is the ability to sense joint motion and acceleration. Proprioception and kinesthesia are the sensory feedback mechanisms for motor control and posture. The brain uses these feedback mechanisms to help orient the body and maintain balance as it evaluates a constant influx of sensory information, sending immediate adjustments to the muscles and joints to achieve specific movement and balance.

Your ability to maintain balance under different circumstances depends on how well your body senses changes to body position and the forces applied against and within it. Walking, riding an escalator, and treading on uneven ground are some examples in which the body requires proprioceptive input to maintain balance during motion.

Training can lead to increases in muscular strength and increase the accuracy and speed with which the body is able to perceive and respond to various positions and forces. Because improvements in balance and proprioception come through neural adaptation and often do not require an actual increase in muscle mass, these are often the first skill sets to improve once they are incorporated into a fitness program.

TRANSFERRING POWER

When a right-handed golfer initiates the downswing, the body weight often shifts to the target side (left side) when the golfer positions the left knee over the left foot. This places the golfer's lower body into an ideal force-generating position. With the knee over the foot, the quadriceps can straighten the knee, and the gluteus maximus and hamstring muscles can contract to create extension of the hip and pelvis. This combined extension movement drives the target foot into the ground. The ground sends a resultant force back into the golfer that can be passed effortlessly through the legs and into the golfer's pelvis and core. If the pelvis and core are functionally strong and are able to move through the desired range of motion, the force will pass into the shoulder complex.

The shoulder complex consists of the muscles connecting the spine and ribs to the shoulder blade and the muscles connecting the shoulder blade to the arm. If the shoulder complex is functioning optimally, this force can be transferred into the arms and, finally, into compression of the golf ball. This comprehensive connection of joints and tissues highlights why fitness training for golf is so unique and cannot be done by isolating muscle groups.

In addition, using the legs to position the golfer and create power helps minimize an over-the-top, slice-generating swing. We commonly see errors in understanding how the body moves toward the target in the downswing. For a right-handed golfer, it is common for coaches to refer to the pelvis moving left. For a player who has developed adequate physical skills, the focus should be on the left knee moving left so that it is positioned over the left foot. Then the athlete will automatically rotate the pelvis toward the target as the left knee and hip move into extension because the joints are aligned. When the player moves the pelvis to the left instead of the knee (often the left knee will be bent medially, or in a valgus position, compared to the pelvis and foot), the player will be pushed away from the target as the knee begins to straighten, and pelvis rotation will be restricted. The lateral shift of the lower body onto the target side makes it much easier to bring the plane of the downswing forward toward the target. As such, the arc of the club will automatically have a more inside swing path.

When a golfer initiates the golf swing with her upper body, the angular momentum of the golf club forces the club head out away from the body on the downswing. Once initiated, this angular momentum provides resistance through inertia against the golfer's body, preventing the body from moving forward toward the target. Visually, you see a golfer who appears to have fast hips. The hips appear to rotate too quickly, which forces the club out and away from the body as the trail shoulder moves forward toward the ball, creating an over-the-top, slice-generating swing plane. Often a player like this is told to slow the hips down. Actually, the problem is not that the hips are turning too fast but that the player is using the arms to generate the power and not using the legs to shift forward toward the target. When this player learns to use the legs to push into the ground, the apparently fast-rotating hips will appear to slow automatically, and the club head will begin to attack the ball from the inside more easily.

Players who appear to have fast hips and have trouble attacking the ball from the inside are rotating predominantly through the joints in the lower back with minimal rotation actually occurring at the hip joint. This lower-back-centered movement is especially stressful on the spine and supporting muscles. The wear and tear eventually will lead to pain.

TRAINING FOR SUCCESS

How can so many of today's top players, such as Dustin Johnson, Justin Thomas, and Jordan Spieth, combine power and finesse in their golf swings? Part of the answer is obvious—their technique is world-class. The other part of the answer is not as obvious. They are able to move each part of their bodies through the

required range of motion while maintaining kinetic balance, stability, and power. When one of these skill sets is limited, a golfer's efficiency in transferring energy is diminished, the golf swing suffers, and injuries occur. For this reason, each of these players puts a lot of time and effort into ensuring his body is in functionally optimal form. This includes daily sessions in the PGA fitness trailers during tournament weeks, regular treatment sessions for injury prevention and injury maintenance, and aggressive off-week fitness regimens.

Each week, these players include various forms of fitness in their routines: mobility exercises like those found in yoga, stability movements for the core and shoulder regions, balance and proprioception exercises, and strength and power movements. They use exercise equipment such as tubing and cables, medicine balls, stability balls, traditional weights, cardio equipment, and kettlebells. Many exercises require only body weight. It is important to use more than one type of training methodology in your golf fitness program to ensure a constant and progressive challenge to your body.

In many aspects of life, people tend to practice what they are good at and ignore what they find challenging or difficult. Decent ball strikers often spend most of their practice time beating balls on the range and almost completely ignore their short-game practice. The same occurs in the gym: People work on their strengths and ignore their weaknesses. For example, athletes who have poor flexibility often ignore or invest minimal time in a mobility program and spend most of their time executing traditional strength training exercises. The gains attained in the gym carry over only minimally onto the golf course. The result is frustration and a lot of wasted time.

Whether you are one of the golf world's up-and-coming stars, an established veteran, or an amateur player looking to improve your game for future club rounds, using your time efficiently is important. We all wish we had more time to do the things we love. Unfortunately, our time is limited, and we need to maximize the time we have. We chose the exercises in this book to maximize efficiency so that you quickly see results both on the course and in your daily life.

Understand that fitness training for golf may be unlike any other training program that you have done. How much you sweat or how many calories you burn may not be the sole indicators of on-course improvement initially. The key concept is that you must improve your body for the demands of the golf swing, and that begins with proper mobility, balance, and proprioception. Be ready to train with a purpose, and eliminate any preconceived notions of what training should be. We developed *Golf Anatomy* to help you avoid the common pitfalls of fitness training.

Remember, different skills are involved in developing fitness. Often, athletes want to move directly from minimal or no specific fitness training to the most difficult or complicated movements, which leads to poor long-term performance gains and an increased likelihood of injury and mechanical restrictions. It is important to develop good balance, mobility, stability, and strength before attempting the power movements found in this book, in magazines, and on the Web. If you listen to your body and gradually progress through your exer-

cise routine, you should see great improvements while staying safe and free of injury. In time, you will be able to expand your training routine and incorporate the multijoint, complex movements found in the later sections of *Golf Anatomy*.

Many of the legends of golf had problems with injuries toward the ends of their careers. Jack Nicklaus, Arnold Palmer, and Tom Watson all required hip reconstruction. Fred Couples and Tommy Armour III have had significant problems with their backs. Tiger Woods has had significant injuries that challenge his ability to win not only a record number of majors but also potentially another tournament. Injuries plague the golf world at a staggering level. It is common to see the members of a golf foursome, regardless of age or skill level, use a pain modulator, either before or after a round of golf. Many injuries that require pain medication occurred off the course but limit the player's ability to play pain-free on the course.

Understand that injuries can also take place when you are involved in fitness training. Limiting the potential for injury both on and off the course should always be a priority. The warm-up chapter has been included in this updated version so that you can improve your fitness level for golf without creating more opportunities for injury. It is always best to make sure your body is prepared for both workout and sport.

FITNESS PROGRAM DESIGN

The goal of *Golf Anatomy* is to give you the basics for developing a golf fitness program specific to your needs. We decided not to include a detailed workout program in the first edition simply because each golfer's body is different. The exercises a golfer needs depend on what aspects of golf fitness need the most work.

Assuming a deficiency in all areas, it is best to focus workouts on mobility and proprioception, rather than on strength exercises. A standard workout template is not only impossible to create but also probably proves to be inefficient and detrimental for certain golfers. We encourage you to seek the help of a golf fitness professional in incorporating these movements into your current program. Having a proper comprehensive assessment from a golf fitness professional can help you understand how to efficiently create a program to maximize your gains. However, we understand that sometimes finding a qualified professional can be difficult. In chapter 8, we provide a few sample programs based on our work with professional golfers.

The exercises in *Golf Anatomy* appear in a specific order, one that provides the best opportunity to safely and efficiently build your body's movement potential. Many of the reader questions we received from the first edition of *Golf Anatomy* were about program design. How can *Golf Anatomy* be used to build an individual program? The reality is, we can't truthfully, or ethically, design a program or a style of program that would be adequate for all (or any) readers. When we design a program, it is typically centered around three premises:

1. Results of a comprehensive assessment
2. Specific training goals
3. Specific timing of the training program

When we create a program for a golfer, the first, and most important, step is always a comprehensive movement assessment. This allows us to understand how the player moves so that we can create a program specific to his or her strengths and weaknesses. This gives the player the most efficient workout program possible. It also prevents the athlete from training beyond his or her ability. Far too often, we see athletes who want to perform an intense workout but lack the skills required for basic movements. When strength is built on a poor foundation, it can only lead to poor swing habits, the inability to swing consistently, and eventually injury. Some athletes spend weeks focusing solely on mobility exercises, while others start their programming using more advanced exercises. Since we obviously do not have the luxury of a personal assessment within this book, we've written it in a specific order to provide some guidelines and make it a little easier for you to choose the exercises that are most appropriate for you.

The second and third premises used in program design are a little easier to outline. Athletes often overlook or misunderstand the second premise, having a specific training goal. In this case, the training goal is to move efficiently and effectively throughout the entire golf swing. While it is more common to hear people say the goal is to hit the ball farther or more consistently, these are just side effects of creating a body that moves well in the golf swing. Although the goal of hitting the ball farther is a good one, it usually makes the athlete want to train with exercises geared solely around strength and power. Understand that hitting the golf ball well depends mostly on how well your body moves, not how strong you are. If you begin with getting your body to move efficiently and effectively throughout the golf swing, you will be able to see why we wrote this book in this order and included these exercises.

The third parameter in program design deals with the timing of specific workouts. We will explain this later in the book, but it means that different fitness programs are appropriate depending on when they are used. Some programs are best for off-season training and others for competition weeks, preround, or a rehab, postinjury program. This becomes more important for the golfer who is competing professionally or consistently participating in tournaments. However, everyone should learn how to alter workouts from week-to-week if necessary. The workout you do the day before a big tournament is not the same workout you do a month away from competition.

Specific examples of programs are included later in this book. These programs were used to help professional golfers who already possess an incredible amount of skill. Each program was designed differently because each player has a unique set of strengths and deficiencies in his or her movement, and the timing and goals of the fitness program had to be evaluated. You will notice that even top-level golfers sometimes, and oftentimes, need to focus mainly on skills involving mobility, balance, and proprioception to improve their golf game.

The first step in creating a fitness program is a proper warm-up. Chapter 2 provides some relatively simple exercises to prepare your body safely and effectively for either a round of golf or the more intensive aspects of training. We recommend including a complete warm-up before any vigorous activity. The warm-up will increase your heart rate and respiration, which prepares your body to deliver oxygen and nutrients to the working tissues and eliminate cellular waste. Your body temperature will increase slightly to encourage a more fluid environment within your connective tissue, in addition to many other physiological benefits.

These physical improvements are important parts of a complete warm-up, but one of the most underappreciated aspects of a warm-up is the psychological benefit of preparing for the challenge ahead. Life is so busy these days. Most of us carry mental baggage to the gym and the golf course. We may have school, work, or family issues stealing our attention. The warm-up is a great opportunity to gather your thoughts and focus on the upcoming task. When golfers come to the PGA Tour trailer for their preround warm-ups, it is common for them to talk about everything besides their training session or golf. By the time they finish their warm-up and leave the trailer, they have been able to decompress and gain the focus required to compete at the highest level. We often see amateur golfers skip their preround warm-ups and gym rats jump right to intensive training before they are physically and mentally prepared. The first part of the round can be wasted as the golfer's body and mind adjust to meet the on-course demands, and it increases the likelihood of injury both on the course and in the gym.

The next step is to figure out which exercises in this book you can initially include in your program. The reason that mobility is the topic of the first main exercise chapter (chapter 3) is because it is by far the most important physical skill for golfers to have. Trainers, therapists, and golfers often talk about athletes needing more stability or flexibility, but athletes generally need more mobility. Mobility is the range of motion available that an athlete can control. In essence, mobility is the ability to stabilize your flexibility. Having the prerequisite mobility is fundamental to performing any exercise or sport technique effectively and efficiently. Devoting the most time to mobility (chapter 3), balance and proprioception (chapter 4), and rotational resistance and deceleration (chapter 5) will lead to the greatest results in the long term for most athletes. Avoid the common error of rushing through the first chapters to get to the strength and power exercise chapters. While many people think these later chapters will yield the biggest rewards, the opposite often happens. Focus your initial time and effort on developing great body control, and you will find the remaining power and strength exercises will not only be much easier to perform but also much safer!

We suggest using the warm-up (chapter 2) and mobility (chapter 3) chapters as a mock assessment. If you have difficulty with many or most of these exercises, your initial program needs to focus entirely on these exercises. Alternately, if you are proficient with most of these exercises, you probably can incorporate more complex and difficult exercises from chapters 4 and 5 into your program. Typically, you will find that some movements are very difficult to perform while others are easier. Understand that when you uncover weaknesses in your mobility

and movement capabilities, these are precisely the things that you need to work on! Once you begin to gain proficiency with these exercises, you can progress to the later chapters of the book.

In addition to ordering the chapters in *Golf Anatomy* to create an athletic development program, we have placed the exercises in each chapter so that they build on the skill and experiences of the preceding exercises. This will help you create a program that fits your specific needs.

Golf is a wonderful activity that can contribute to a healthy lifestyle by encouraging both increased physical activity and social interaction. We truly hope that *Golf Anatomy* will help increase your enjoyment on the course through improved functional capabilities and a decreased likelihood of on-course injury and discomfort. But more important, we hope that it leads to better scores on the course!

2

PREWORKOUT WARM-UP

Whether you are preparing for a round of golf, a pickup game of soccer, or a difficult training session in the gym, you need to include a proper warm-up. While a warm-up may vary depending on the activity, the goal is the same: to move all the necessary joints, associated muscles, and connective tissue through a full range of motion in multiple planes of movement. A proper warm-up primes the mechanoreceptors in the joints, muscles, and connective tissues throughout the body. These mechanoreceptors provide the brain with information detailing the positions and forces the body is experiencing. The brain translates this information to make informed decisions about the speed, force, and direction of movement needed to best allow the intended action to occur. Cold tissue isn't as responsive as warm tissue due to the colloid quality of connective tissue. Therefore the warm-up is key to preparing the body for action, encouraging the mechanoreceptors to begin signaling the brain so the brain can create and respond to movement accurately and quickly. Moving the joints through a full range of motion and multiple planes of movement increases the number of receptors activated. The more active receptors, the more information the brain receives, leading to a greater likelihood of success and reduced risk of injury. The athlete's ability to use this functional range of motion effectively will be addressed in chapter 3, which is about mobility, but before then, the warm-up should prepare each joint complex for its full range of motion.

The true goal of any athlete should be to increase the range of motion of the joint complexes while maintaining complete control. While lack of mobility is a problem for any athlete, excessive uncontrolled mobility is equally detrimental. We often tell our athletes that our job is to help them increase range of motion, but once we do that, we must immediately follow with exercises and movement patterns that help control this newfound movement. Once you develop your body's awareness of these important joint complexes and activate the kinetic

web by working the joint at both its shortened and lengthened positions, you can begin to incorporate each segment into multijoint and full-body movements that progressively increase the demands placed on your motor control.

WARM-UP PROGRESSION

The way we approach the warm-up is just as important as the order in which we train for golf. We will begin with the feet because this area must function well for us to have any chance of successfully performing movements that involve our feet on the ground. Our feet anchor our bodies to the ground and provide feedback about the surface on which we move. The muscles and connective tissue (joint capsules, ligaments, tendons, and fascia) in the feet and ankles are loaded with mechanoreceptors. Mechanoreceptors are the sensory receptors that the body uses for balance and body awareness. The rest of the body's joints position themselves largely as a result of the information the mechanoreceptors of the feet and ankles obtain.

If you perform an exercise such as a squat but do not have the necessary mobility in your feet and ankles, you will require much greater movement from other joints, such as the hips and spine, to compensate for the deficiency in the feet and ankles. This greatly increases the opportunity for injury and the likelihood that you will be unable to complete the movement. Ensuring that each joint complex is functioning at the greatest capacity before attempting more difficult and demanding tasks that require the integration of the body's kinetic web is important.

Once we have developed the muscles and joints in the feet and ankles, we will move up the kinetic chain and focus on increasing the range and control in the hips. Having an appropriate range of hip mobility can allow the lower back to perform the role it is best suited for. One of the most common reasons golfers develop lower back pain or injury is a loss of hip mobility, specifically internal rotation and adduction of the lead hip, external rotation and abduction of the trail-side hip, and extension of both hips.

When the hips are not able to move through the transverse plane into internal and external rotation appropriately, the lower back will be forced to pick up the slack and rotate. The facet joints of the lower back are anatomically positioned to encourage flexion (bending forward) and extension (bending back) and not rotation. When excessive rotation occurs, the greatly increased shear forces on the intervertebral discs lead to wear and tear of the annular fibers of the discs and joints. Lower back extension and rotation has been shown to increase the stress on the facet joints, specifically on the trail side, in golfers. Maintaining the correct level of mobility in the feet, ankles, and hips keeps you less dependent on the back to produce rotation, and you will be able to repeat your golf swing more dependably and play for more years injury free.

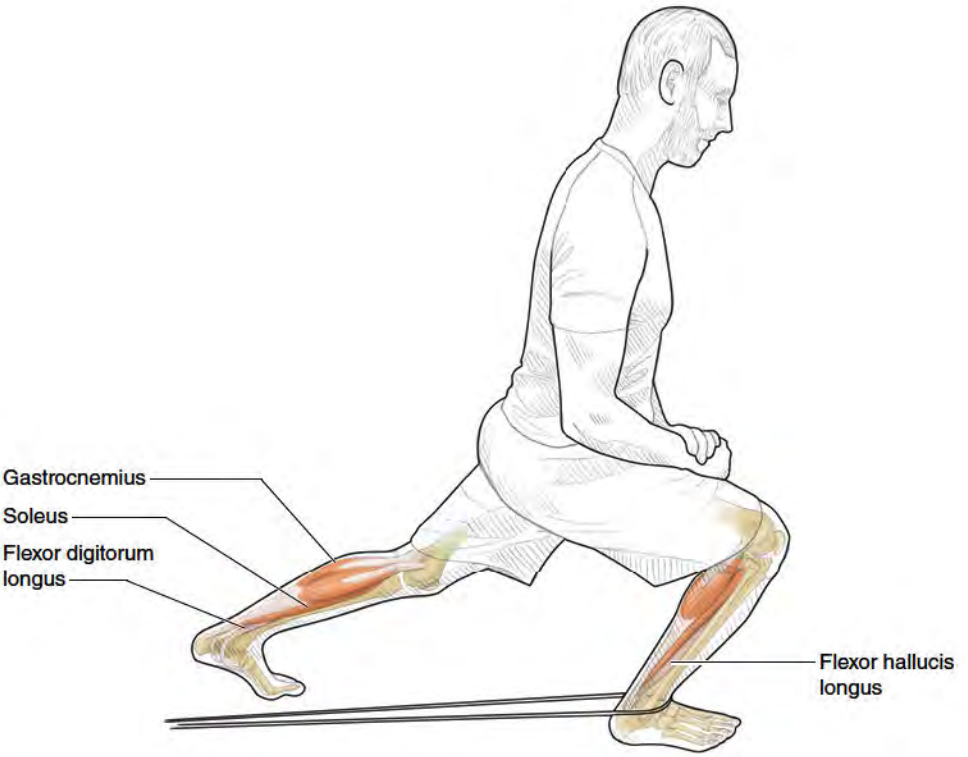
Many of us cannot properly segment the spine, which is the ability to move each of the spine's 24 presacral vertebrae (lumbar, thoracic, and cervical) through a full range, both in isolation and in conjunction with the other joints in the

spine. When an athlete cannot purposefully move the individual segments in his or her spine, the player moves a block or group of segments together. A hinge involves excessive motion at one segment to compensate for the lack of motion occurring at its neighboring segment. This results in increased strain and less efficient movement in that part of the spine.

Most commonly, we see the middle and upper thoracic spine and the lower lumbar spine not moving segmentally and instead moving as a block. In addition, the main contributors to degeneration or arthritic changes in the body are a lack of movement or excessive movement. When a joint does not move (an area of the spine unable to segment), we begin to see arthritic changes develop because the body no longer deems these segments necessary for normal daily function.

After working on the individual joint complex's movement, you can begin to incorporate them into integrated movements with the confidence that your joints will perform to the greatest of their abilities. We initially begin this integration of joint complexes through controlled movements and then progress to more dynamic movements that involve moving through multiple planes, ranges, and speeds. Upon completion of this warm-up and joint health section, you will be prepared to move into the more intensive mobility section in chapter 3.

ANKLE DORSIFLEXION USING SUPERFLEX BANDS



Execution

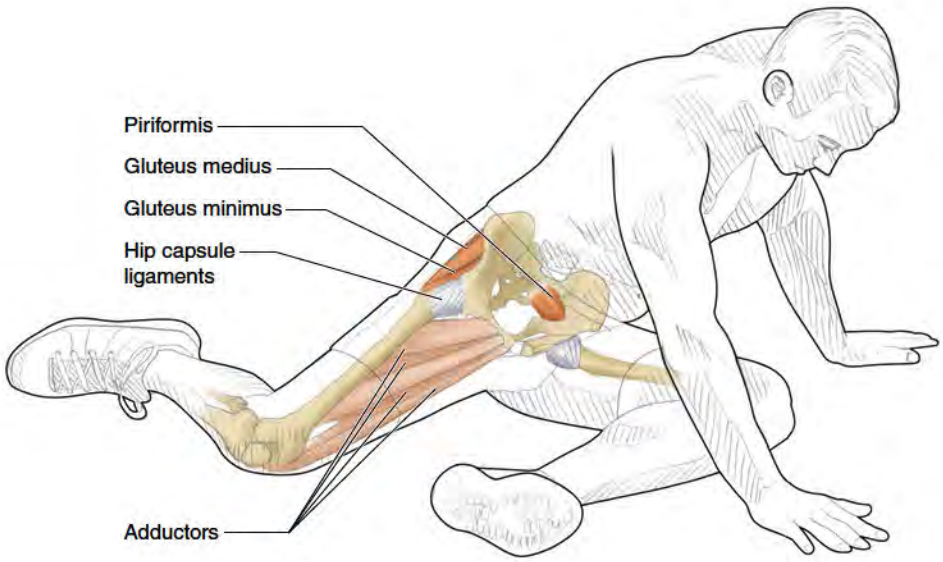
Loop or tie one end of a band around an immovable object. Place the other end around your right foot at the lowest part at the front of your ankle. Turn your back to the object holding the band so the band is behind you. Assume a split stance, with your right foot slightly forward. Stand far enough away from the anchor point to allow medium to heavy pressure to build in the band. Push your right knee forward as far over your toes as you can without lifting your heel at 30 percent maximal force and hold for 60 seconds. Release the knee to return to the start position and then perform a second repetition. Repeat on the left side.

Muscles Involved

Primary: Gastrocnemius, soleus, Achilles tendon

Secondary: Flexor hallucis longus, flexor digitorum longus

HIP 90/90



Execution

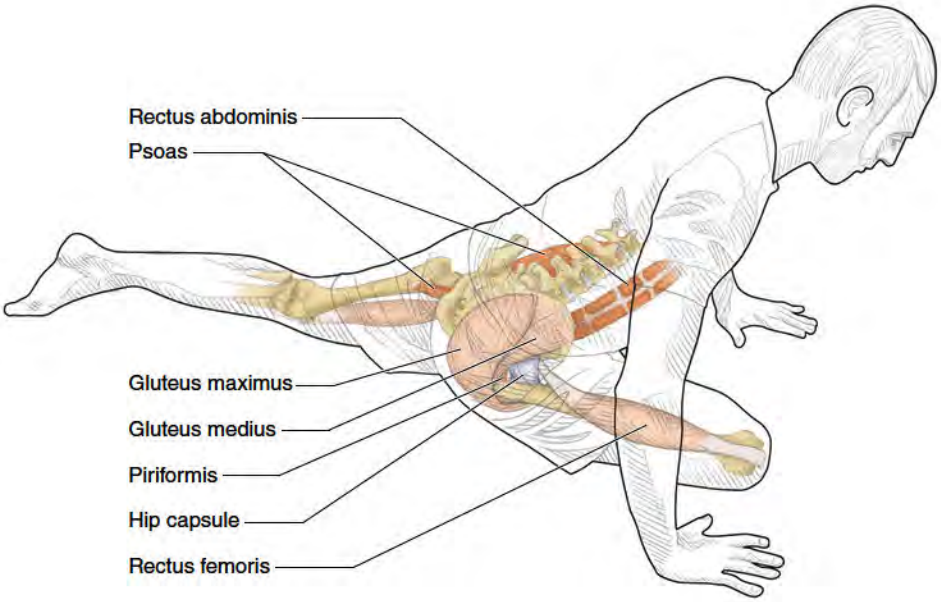
Sit on the ground. Put your left thigh out in front of you with the knee bent 90 degrees and the outside of your left thigh and leg flat on the ground. Bend the right knee 90 degrees and point the right thigh and knee directly to your right. Place your left hand on the ground to your side for support and stability. Align your spine and torso with your pelvis. Position the spine upright so you feel tension in your right hip joint, but not your lower back. For most people, this means the spine will be somewhat tilted to the left. Squeeze your right glutes to push the right hip forward until you feel pressure in your right hip. Push your right knee, shin, and ankle (equally for all three) into the ground with 30 percent of your maximal effort. Hold this pressure for 60 to 90 seconds. Without shifting your body, attempt to reduce the pressure under your right shin by pulling the leg away from the floor. Hold for 15 to 20 seconds. Switch legs and repeat on the other side.

Muscles Involved

Primary: Piriformis, gluteus medius, gluteus minimus, hip capsule ligaments

Secondary: Adductors (right side)

PIGEON POSE



Execution

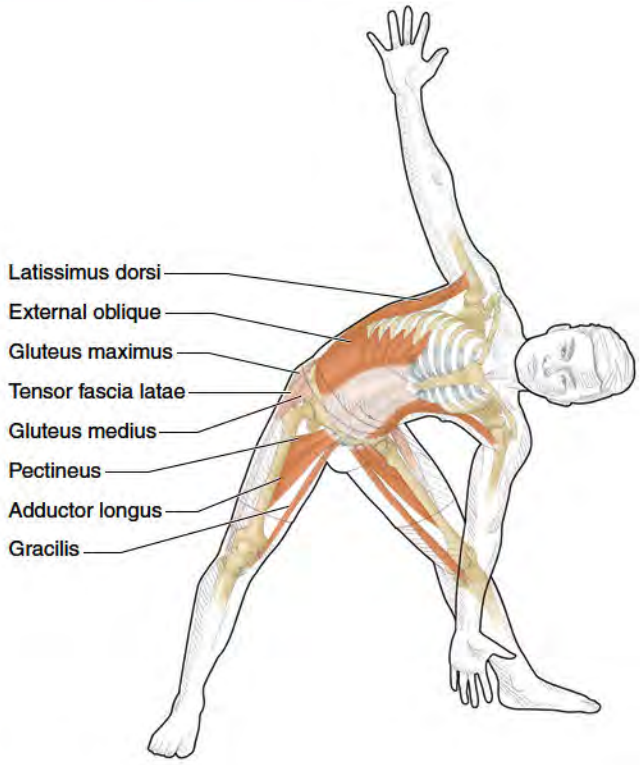
Begin on all-fours. Slide your right knee forward so that your thigh and knee are directly in front of your hip socket and the outside of your right thigh is touching the ground. Place your right foot comfortably near your left thigh. Attempt to straighten your left leg. Keep your pelvis level and pointing directly forward. Place your hands on the ground and keep the torso long from your tailbone to the top of your head. Hinge at the hip until you feel a moderate stretch in the back of your right hip. Don't move your torso as you press your right thigh into the ground with 30 percent maximal pressure. Hold for 60 seconds. Do not move your torso as you try to pull your right shin off the ground. You won't be able to lift the shin, but try to feel the tension build between your abdominals and inner thigh. Hold this tension for 15 to 30 seconds. Repeat on the opposite side.

Muscles Involved

Primary: Psoas major (left side), hip capsule (right side), piriformis (right side), quadratus femoris

Secondary: Rectus femoris, rectus abdominis, gluteus maximus (right side), gluteus medius (right side)

TRIANGLE POSE



Execution

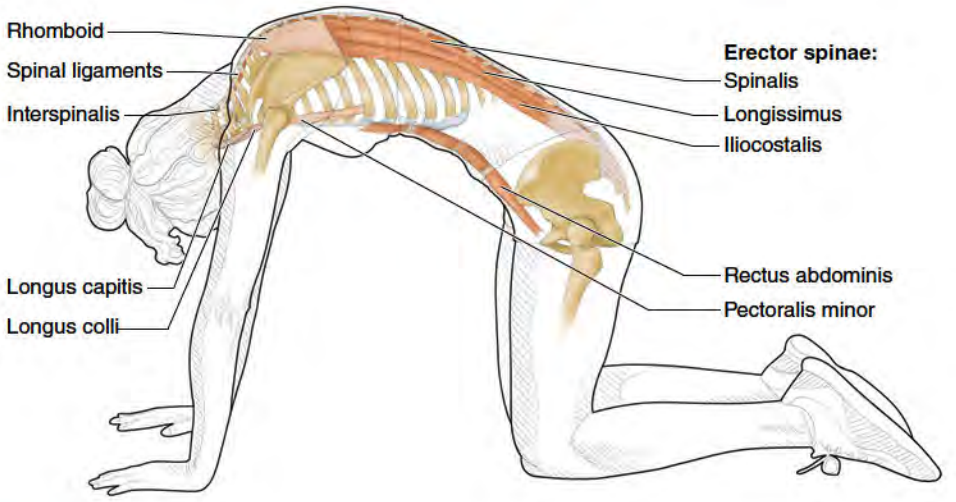
Stand in a staggered stance with your feet 3 to 4 feet apart, left foot in front and pointing forward. Lift your arms straight out to your sides so they are parallel to the ground. Push your left knee forward so that it is in line with your left foot. To rotate your torso, reach up with your right hand while reaching down with your left hand. Keep your right hand, right shoulder, left shoulder, and left hand in line with each other at all times. Maintain your rotation as you slowly straighten your left knee. Straighten the knee only as far as you can maintain the torso rotation. Hold this position for up to 60 seconds while trying to maintain pressure from the left foot into the ground and keeping your spine straight and long. Slowly return to the start position by reversing rotation. Repeat on the other side.

Muscles Involved

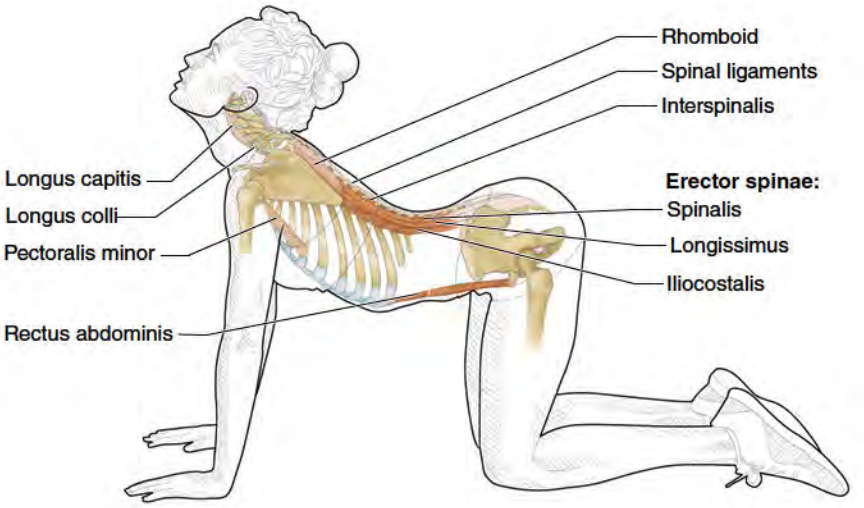
Primary: Adductor longus, gracilis, pectineus, latissimus dorsi, external oblique

Secondary: Gluteus medius, gluteus maximus, tensor fasciae latae

SEGMENTAL CAT CAMEL



Cat.



Camel.

Execution

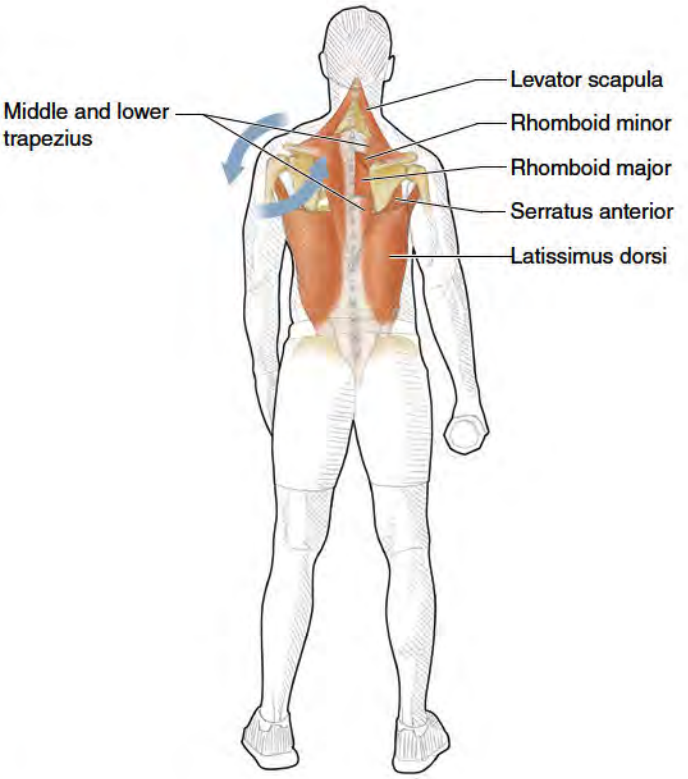
Kneel with your hands and knees on the floor. Round your spine as much as possible, so your back forms a smooth curve and both your head and pelvis are tucked under into maximal spinal flexion. You should feel engagement throughout your core to keep your pelvis tucked under your body. Try to tilt just your pelvis as you keep the rest of your spine rounded. Slowly work your way up your spine, trying to move only one segment at a time into extension. Do this by pulling one vertebrae down toward the floor until it feels like it locks out and then move up to the next segment. Keep the remainder of your spine flexed as much as possible. Once you have reached the top of your back, lift the head while keeping your chin tucked. Untuck your chin and look up to the ceiling to move the very top segments of your spine. Slowly reverse the steps to return to the start position. Each pass up and down the spine should take 30 seconds per direction. Perform 3 repetitions.

Muscles Involved

Primary: Erector spinae (iliocostalis, longissimus, spinalis), interspinalis, spinal ligaments, rectus abdominis

Secondary: Rhomboids, pectoralis minor, longus colli, longus capitis

SCAPULAR CIRCLES



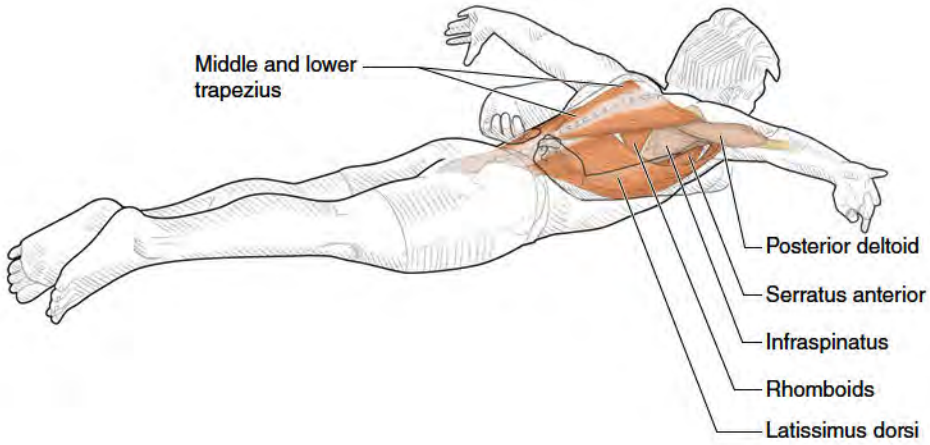
Execution

Stand with a small weight in your **right** hand. Try to crush the weight by squeezing your hand as hard as possible while building tension in your legs and core. Maintain this tension throughout the exercise. The only part of your body allowed to move during this exercise is your **left** shoulder blade. Slowly pull your left shoulder blade down toward your butt as much as possible. Next, pull the left shoulder blade toward your spine and then keep the blade pulled as tight toward the spine as possible as you slide it up as high toward your ear as possible. Keep your left shoulder blade as high as possible while moving the blade out to your side, away from your spine. Once your shoulder blade moves away from the spine, lower it back down toward your butt. Each circle should take at least 20 seconds. Perform 5 repetitions and then switch sides.

Muscles Involved

Primary: Rhomboid major, rhomboid minor, serratus anterior, subscapularis, levator scapulae, latissimus dorsi, middle and lower trapezius

PRONE SWIMMERS FOR SHOULDERS



Execution

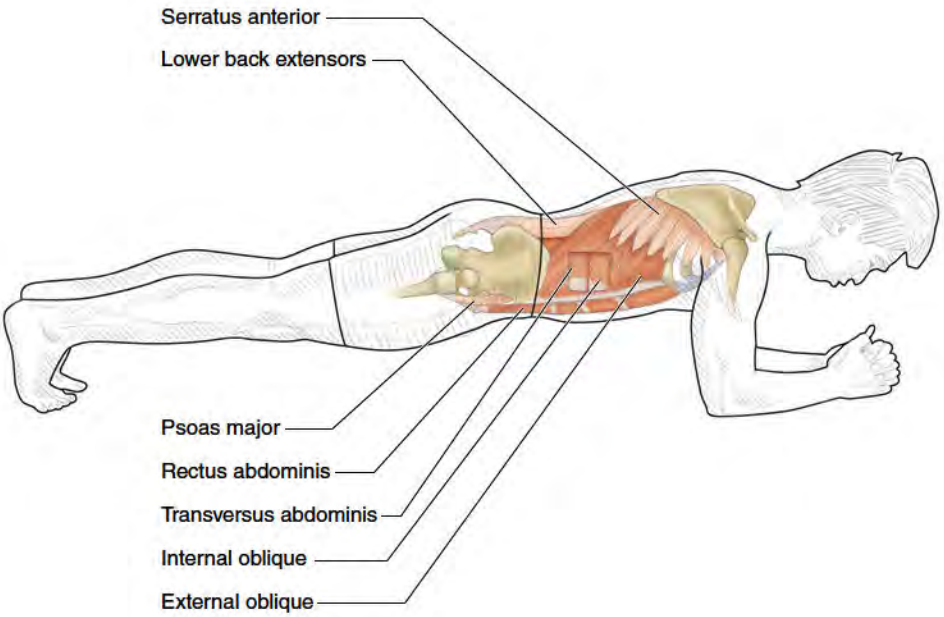
Lie on your abdomen with both hands palms up and resting on your lower back. A pillow or pad under your chest may make it easier for you to keep your neck in line with the rest of your spine. Squeeze your shoulder blades together. Lift your elbows as high as possible. Lift your palms toward the ceiling and straighten your elbows. Keep your hands and elbows as high as possible throughout the exercise. Slowly begin to move your arms out to your sides. When you get to around shoulder level, pull your shoulder blades back and down toward your butt as you rotate your arms so that your knuckles are now facing up toward the ceiling. Hold this position for 10 seconds and then reverse the steps until you return to the start position. Repeat 2 more times.

Muscles Involved

Primary: Rhomboids, lower and middle trapezius, serratus anterior, latissimus dorsi

Secondary: Infraspinatus, posterior deltoid

ABDOMINAL PLANK



Execution

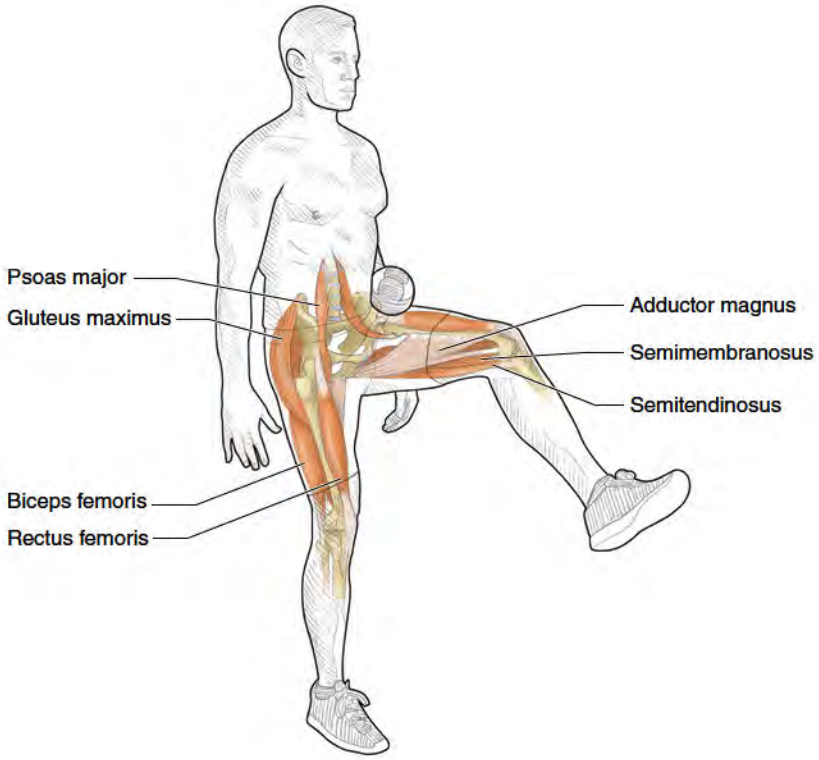
Lie facedown with your arms bent close by your sides. Lift your body off the ground, using your forearms and toes to support yourself. Tighten your abdominals and keep your spine straight without allowing your lower back to sag toward the ground. Your elbows should be under your shoulders and your palms flat on the ground. Continue looking down at the floor during the exercise so that your entire spine is straight. Don't forget to breathe while holding the position. Hold for 15 to 30 seconds. Repeat 2 or 3 times.

Muscles Involved

Primary: Transversus abdominis, rectus abdominis, internal oblique, external oblique

Secondary: Lower back extensors, serratus anterior, psoas major

SINGLE-LEG STANCE HIP FLEXION AND KNEE EXTENSION



Execution

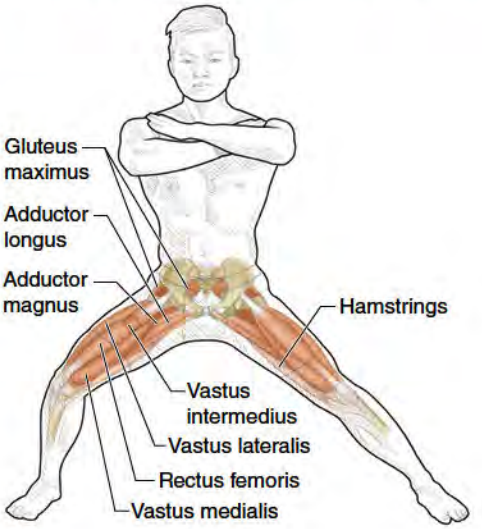
Stand on your right foot. Keep your right knee as straight as possible and your spine as tall as possible. This is good posture for this exercise. Place a small, light ball between the top of your left thigh and your lower left abdominals. Try to pop the ball as you pull your knee as close to your chest as possible while maintaining good posture. Maintain the compression on the ball as you slowly straighten your left knee. Straighten the knee only until you begin to lose the height of the knee or compression of the ball. You will not be able to straighten your knee all the way if you are pulling your knee up as high as possible. Perform 10 to 15 slow knee extensions in good posture and then switch legs.

Muscles Involved

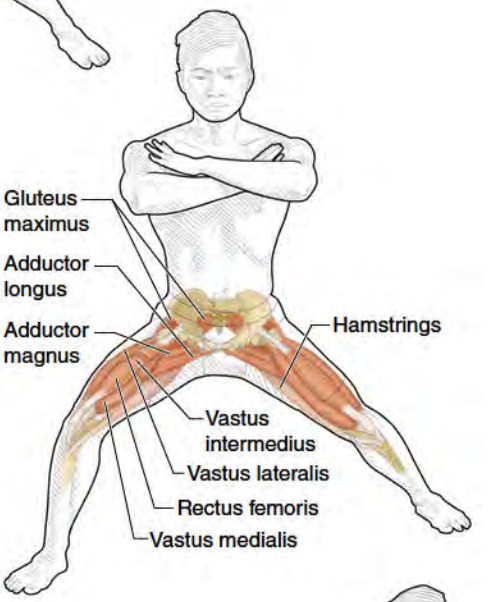
Primary: Hamstrings (semitendinosus, semimembranosus, biceps femoris), psoas major, rectus femoris, gluteus maximus

Secondary: Adductor magnus

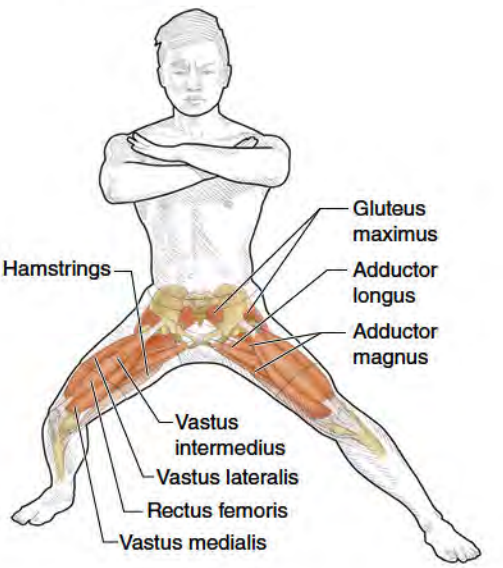
THREE-POSITION SIDE LUNGE



Side.



30 degrees forward.



30 degrees backward.

Execution

Stand on your left leg with your right foot just off the ground. Step directly to your right with your right foot approximately double shoulder-width. As your right foot hits the ground, push your right knee out to the side over your right foot (don't let the knee collapse in) and press your hips back and down. Your left knee should be straight. Push your right foot into the ground to drive yourself up and return to the start position. Repeat, but this time step approximately 30 degrees forward with your right foot instead of directly to your side. Repeat again, but this time step approximately 30 degrees behind the original step. Repeat each of these positions 5 times and then switch sides.

Muscles Involved

Primary: Adductor longus, adductor magnus, gluteus maximus, quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius)

Secondary: Hamstrings (semitendinosus, semimembranosus, biceps femoris)

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3

MOBILITY FOR OPTIMAL SWING ANGLES

As we discussed, the golf swing is a complicated full-body movement that requires control of all body segments through near full range of motion under incredible accelerations and decelerations. A common misconception is that great ball strikers are able to achieve astonishing swing speeds and distances with brute strength alone. Although having adequate strength is obviously an advantage, and the best ball strikers on tour mostly have adequate to above-average strength, it is not the sole determinant of power generation within the swing.

Many players on both the PGA Tour and the lower-level tours with equal or greater strength are not able to generate the swing speeds or the driving distances that the world's best players can. The best ball strikers have one more thing: They move their bodies with a high level of control through the necessary ranges of motion. This is the result of a neurological system that enables incredible mobility.

Mobility is the range of motion through which an individual can move one or a group of joint complexes with the desired speed, precision, and resistance to both internal and external forces.

Simply having the ability to move through large ranges of motion is not enough. Mobility is an essential component because it involves control. What if, for example, you have a large range of motion at either an individual joint complex or multiple joint complexes but not the ability to control it? What happens in this "sloppy" range of motion? Well, the range of motion that you cannot control is the range of motion that you don't own! Your body is not able to get accurate information on location, speed, or direction of movement and is not able to resist or create the force required to move in the desired manner.

The range of motion that a single joint complex, or group of joints working together, is not able to control is known as the zone of flexibility. This zone of flexibility is where a significant loss in athletic potential lies. We often see large

discrepancies between the controllable motion (mobility) and the end range passive or uncontrollable range of motion (flexibility).

Many factors can hinder mobility. When an individual joint complex or multiple joint complexes cannot move through the required range of motion, the result is often frustration, wasted time, and a lack of improvement as the athlete struggles to produce the desired technique. This lack of movement potential, or stiffness, is exceedingly common as we age but is also seen in juniors following rapid periods of growth and in almost anyone who does not regularly move the body through a full range in multiple planes of motion. A lack of motion may be due to an anatomic limitation such as joint degeneration or overworked muscles or movement patterns that overload the nervous system and decrease the range of motion available at a joint.

Whether the athlete has a large zone of flexibility or excessive muscle tone that permits less-than-desirable motion, two main factors predispose an athlete to this lack of movement.

First, the athlete is receiving poor information from the sensory organs in the peripheral nervous system (mechanoreceptors in the muscles and their connective tissue joint capsules, ligaments, tendons, fascia) from the joint complex. As a result, the peripheral nervous system is not able to supply the central nervous system (brain and spinal cord) with an accurate picture of this specific joint complex and its relative position with respect to other segments of the body or the environment (ground, the golf club) that the body must interact with.

Second, the athlete may not have enough experience in a specific environment to effectively interpret the information sent by the peripheral nervous system to the central nervous system. The peripheral nervous system sent adequate information, but the central nervous system wasn't able to correctly interpret the information to create the desired movement.

The mechanoreceptors used in movement are analogous to the receptors in the eyes for the visual system. They receive the information about the body's physical environment and then send this information to the brain to be interpreted. This creates awareness, just as the receptors in the eyes receive information about what is in the visual field and provide this information to the brain for interpretation.

Whether the athlete's body is sending inaccurate information about the body's position to the central nervous system or is creating a muddled movement program due to a lack of experience, the result is the same. The golfer is unlikely to create the desired movement, and the resulting ball flight will be the cause of frustration and higher scores!

The exercises in chapter 3 help increase the peripheral nervous system's ability to provide more accurate information about a joint's position relative to the rest of the body and its environment. In addition, we include exercises that focus on the central nervous system's ability to use the data the peripheral nervous system provides to create accurate motor programs that integrate multiple joint complexes into seamless flows of movement.

This ability will have a dramatic effect on the golf game. A golfer who is able to move the body with the necessary control through the desired range

of motion can use geometry and physics to their greatest effects, ensuring that maximum possible club head speed can be produced and repeated consistently with the ultimate control. This unique ability is something that the world's best ball strikers—including Dustin Johnson, Rory McIlroy, Henrik Stenson, Graham DeLaet, Francesco Molinari, Lexi Thompson, and Suzann Pettersen—all enjoy.

Mobility plays a central role in golf, in not only achieving longer distance but also improving accuracy and consistency and avoiding injury. Creating specific angles and motions throughout the golf swing has more influence on producing high club-head speed than an athlete's ability to lift heavy weights. Tiger Woods, regardless of his body size as his career progressed, always had a tremendous level of mobility at his disposal. It was not his strength that allowed him to create the tremendous, game-transcending power he first unleashed on the professional circuit as a young, lean 22-year-old. This mobility, especially in his hips and spine, stayed with him throughout his career until his legs and finally his back began to fail him due to injuries.

Mobility is also a key component in allowing the golfer to decelerate the golf club after impact. The more range of motion a golfer is able to control at each joint, the more time and distance the joints and soft tissues have to slow down high club-head speeds. This equals less stress to the body and a reduced likelihood of injury.

Additionally, any golfer who has taken a golf lesson has experienced the frustration of not being able to move his or her body and club on command into the positions the teacher asks for. This inability to follow instruction is usually not from lack of desire but is often a result of mobility issues within the player's body. A golfer with limited ability to move joints and muscles through full ranges of motion will not be able to position himself or herself to create proper angles. This, of course, is to the dissatisfaction of the golf instructor and the irritation of the student.

When any area of the body is compromised in its ability to function through the desired range of motion with satisfactory strength, the body will compensate by attempting to make up this lost movement in another area of the body. An example of this is the lower back rotating excessively to compensate for a loss of (internal) rotation at the hips. This compensatory motion within the lower back usually results in both decreased performance (an over-the-top swing path is often seen) and increased likelihood of injury to the lower back.

The two main goals of all avid golfers should be (1) to play this wonderful game in a manner that allows pain-free play for as long as they want, regardless of age, and (2) to reach their full potential in terms of level of play. To achieve these goals, a player's golf swing cannot be allowed to cause injury. Appropriate mobility is the fundamental variable that must be addressed when attempting to play golf at any level (figure 3.1).

When golfers attend our testing facilities, regardless of whether they are PGA Tour or amateur-level players, we are often able to identify mobility issues. The areas within the players' bodies that have limited ranges of functional motion often result in compensatory movements that lead to reactive stress in adjacent

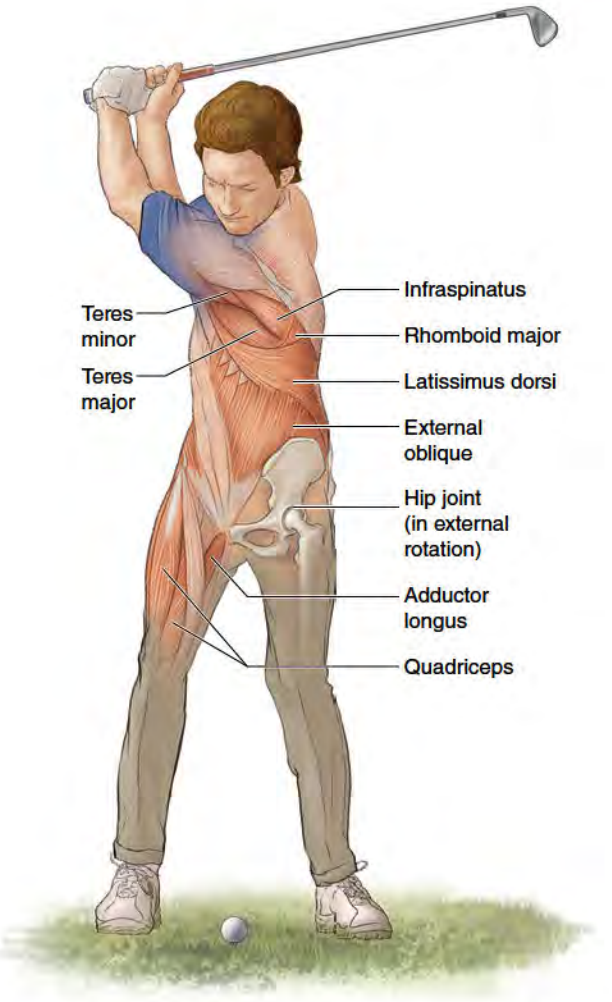


FIGURE 3.1 Excellent mobility enables the golfer to create the proper angles during the swing.

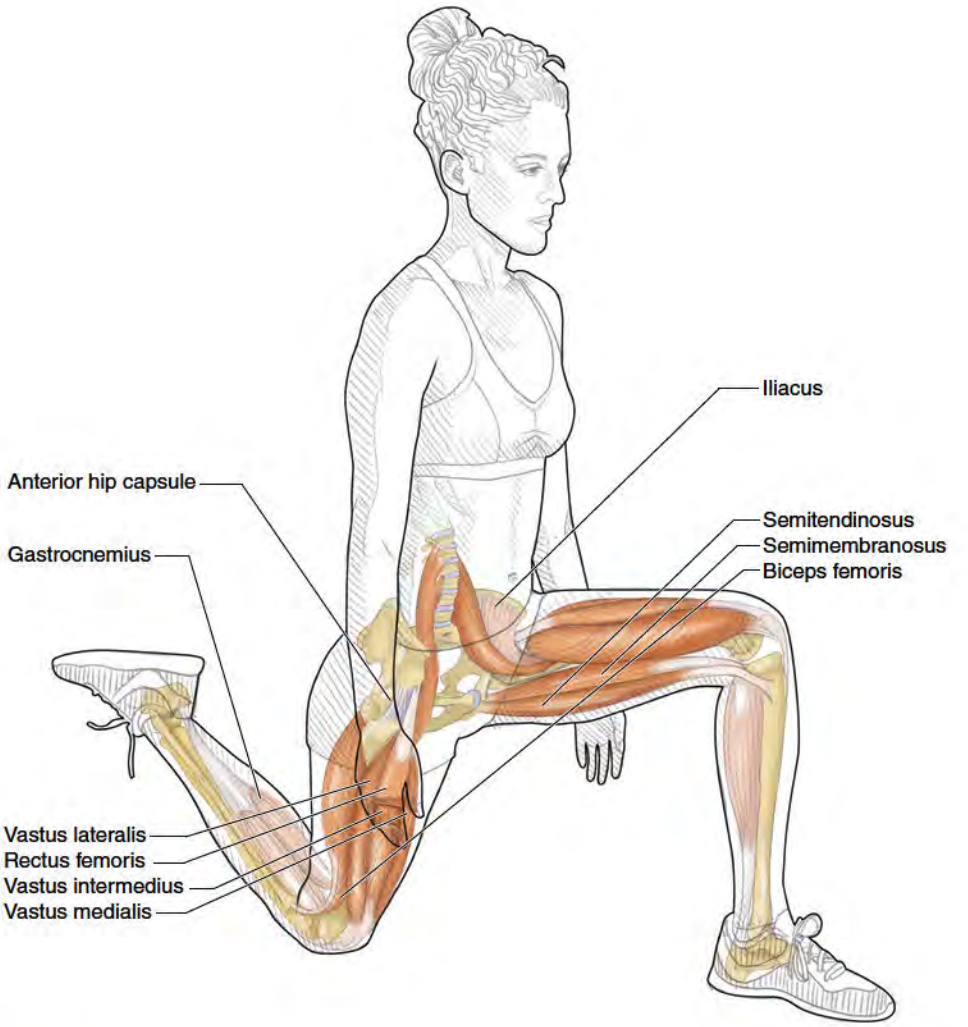
muscles and joints because the body is attempting to make up for the motion lost within the area of restriction. For players at the highest level of professional golf, a restriction in body function can lead to both huge financial losses and injury.

It is common for professional golfers to visit our facilities as a last resort because they have been unable to resolve inefficiencies in their swings with their golf instructors. If a player has put a significant amount of time and effort into making a technical change to the golf swing but has had limited success, the most common contributor is a physical limitation in mobility. Often we will find a limitation in a golfer's movements during testing that has a direct corre-

lation to the inability to make a specific swing change. Once the golfer corrects the movement deficiency, the swing changes are made easily and successfully.

This chapter will educate the average player about movements that will not only improve the ranges of motion desired for the golf swing but also increase the functional strength within the entire range of motion. As you read the exercises in this chapter, you will notice that they are not the traditional stretches most of us have learned from books, videos, or gym classes. Traditional stretching exercises neither increase the accuracy of the mechanoreceptors in the peripheral nervous system (and as a result, there is no improvement of the body's awareness of itself) nor the central nervous system's ability to produce more accurate motor programs, both essential components to improving a golf game.

ISOMETRIC HIP FLEXOR STRETCH HOLD (HAMSTRING ACTIVATION)



Execution

1. Get into a kneeling lunge position with your right knee down.
2. Actively pull your right heel toward your butt with your hamstrings while pushing your right hip down and forward.
3. Hold the end range for 60 seconds, attempting to fight through potential cramping.
4. Initially, it is often necessary to use minimal force to lift the right foot off the ground to prevent cramping in the hamstring. Cramping is a normal

part of this exercise, but you want to deal with a minor cramp that you can fight through. As you build strength and improve the nervous system, you will be able to use more force.

5. Switch sides and repeat one more time per side.

Muscles Involved

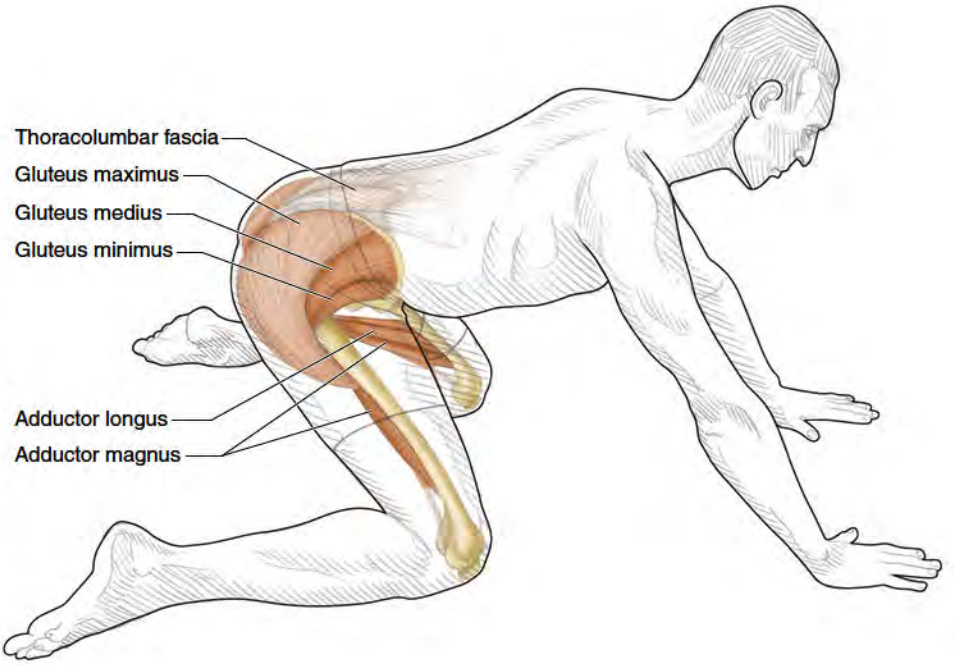
Primary: Hamstrings (semitendinosus, semimembranosus, biceps femoris), quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), psoas

Secondary: Anterior hip capsule, iliacus, gastrocnemius

GOLF FOCUS

Strengthening your hamstrings at the end range of their active motion is important for everyone, not just golfers. Too often, the quadriceps and psoas are overused as a compensation for weak glute muscles. In this case, hip flexion is often used in place of hip extension, and this limits the hip extension range of motion. When the range of hip extension is limited and the glute and hamstring muscles are weak, it becomes difficult to push the hips forward as you approach the finish of your golf swing. This exercise will help open the tissue at the front of the hip while strengthening the hamstrings and glute muscles, thus more effectively utilizing the powerful muscles in the back of your legs and hips.

COMBAT FROG ISOMETRICS FOR ADDUCTION AND ABDUCTION



Execution

1. Kneel on your hands and knees with your knees at least 1.5 times hip width. Your feet should be slightly wider than your knees.
2. Slowly push your pelvis back between your heels until you can't push it any further. Keep your spine long from your tailbone to the top of your head throughout the exercise.
3. Create an isometric contraction in your adductors by pushing your knees down into the ground and attempting to pull your knees together. Your knees should not actually move because of the ground, but the intent is to attempt to move them. Continue to push the pelvis back throughout the hold. Hold for 60 seconds.
4. Next, attempt to push your knees further apart by using the glutes while keeping the pelvis pushed back and the spine long. Hold the isometric contraction for 60 seconds.

Muscles Involved

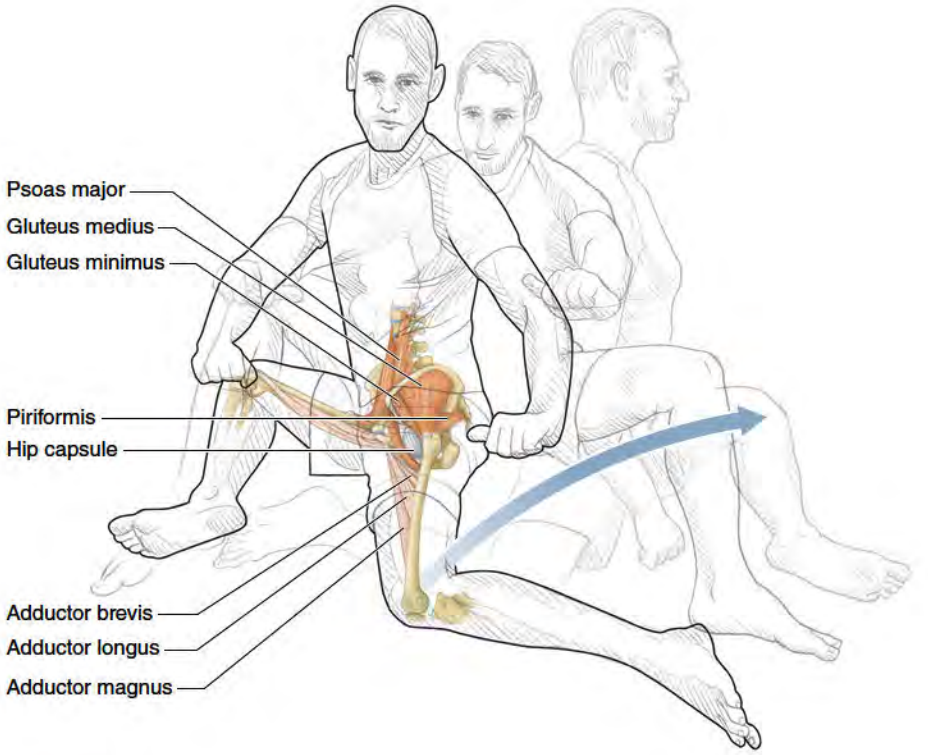
Primary: Adductor longus, adductor magnus, gluteus medius, gluteus minimus, hip capsule

Secondary: Thoracolumbar fascia, gluteus maximus, obturator externus, obturator internus, piriformis

GOLF FOCUS

The longest golf ball hitters do a tremendous job of pulling from their front leg while pushing from their back leg on the downswing. On the front (target) leg, this pull is created in large part by the adductors that run along the inside of the thigh. The gluteus medius, gluteus minimus, and gluteus maximus muscles predominantly perform the push from the back leg. Unfortunately, the adductors on the trail leg are often overused, and this tightness prevents full hip abduction and causes power generation to leak from the glute muscles. The combat frog isometrics exercise lengthens and strengthens the adductors while also allowing the gluteus muscles to be strengthened at the end range of hip abduction.

90/90 TRANSITION



Execution

1. Sit on the ground. Bend both knees to 90 degrees, left thigh facing to the left of your torso, right thigh facing straight forward.
2. Rotate the left knee up toward the ceiling, moving through the ball of your foot and toes (not the heel). Keep the right knee pushed down into the ground until the left knee can't move up any further.
3. When the left knee can't move any further, let the right knee come off the ground. Rotate the left knee to the left as the right knee follows until the left knee touches the ground. Let the right knee finish the arc and touch the ground.
4. You should be in the opposite 90/90 position from where you started (right thigh faces to the right of your torso). Repeat, going the other way, leading with right hip rotation.
5. Perform 5 to 10 repetitions per side.

Muscles Involved

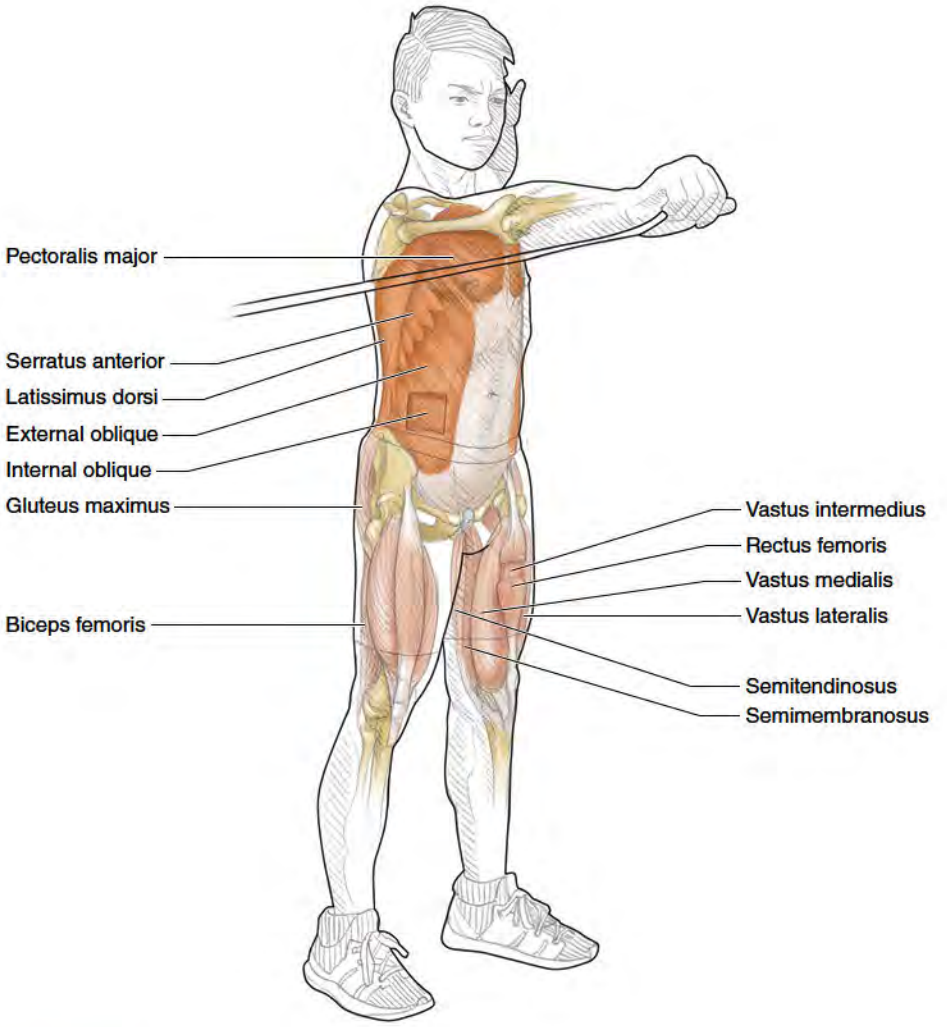
Primary: Piriformis, gluteus medius, gluteus minimus, psoas major, hip capsule ligaments

Secondary: Adductor magnus, adductor longus, adductor brevis

GOLF FOCUS

Many players are limited in either hip internal rotation or external rotation. Although much of the focus for hip range of motion limitations is placed on the impact and follow-through portions of the swing, a limitation in trail-side hip internal rotation or lead hip external rotation can significantly alter the backswing position a player is able to achieve. A limitation in trail-side hip internal rotation will prevent a golfer from rotating the hips and pelvis away from the target in the backswing. This can lead to a number of compensations, including excessively straightening the trail leg, swaying or sliding laterally instead of rotating the pelvis, depending on the lower back for rotation, or lifting the arms away from the body toward the top of the backswing. The 90/90 transition exercise will help the golfer learn to control the range of motion through which the hips are able to move. This will lead to easier, more reproducible loading in the backswing and more freedom in the hips during the impact to follow-through period of the swing.

SINGLE-ARM PUNCH WITH OPPOSITE ARM PULL



Execution

1. Attach tubing or a cable at chest height. Hold the handle of the tubing in your right hand and stand facing away from the attachment. Bring your right hand next to your right shoulder with forearm parallel to the ground. Put your left hand behind your head. This is your start position.
2. Build stability in your hips and pelvis by screwing your feet into the ground. To do this, push your feet into the ground then try to turn them out into external rotation. The downward pressure into the ground will

make it impossible for the feet to actually rotate (the feet will continue to point straight ahead), but an obvious arch should build under the feet. Your pelvis should always face forward during this exercise.

3. Pull the left elbow back while you punch the right hand forward and straighten the right elbow. The left elbow will try to rotate behind you as far as possible while the right hand will push as far forward as possible. The pelvis should not move. The left elbow and right hand should be as far as possible from each other.
4. Slowly return to the start position and perform 8 to 15 repetitions. Switch sides.

Muscles Involved

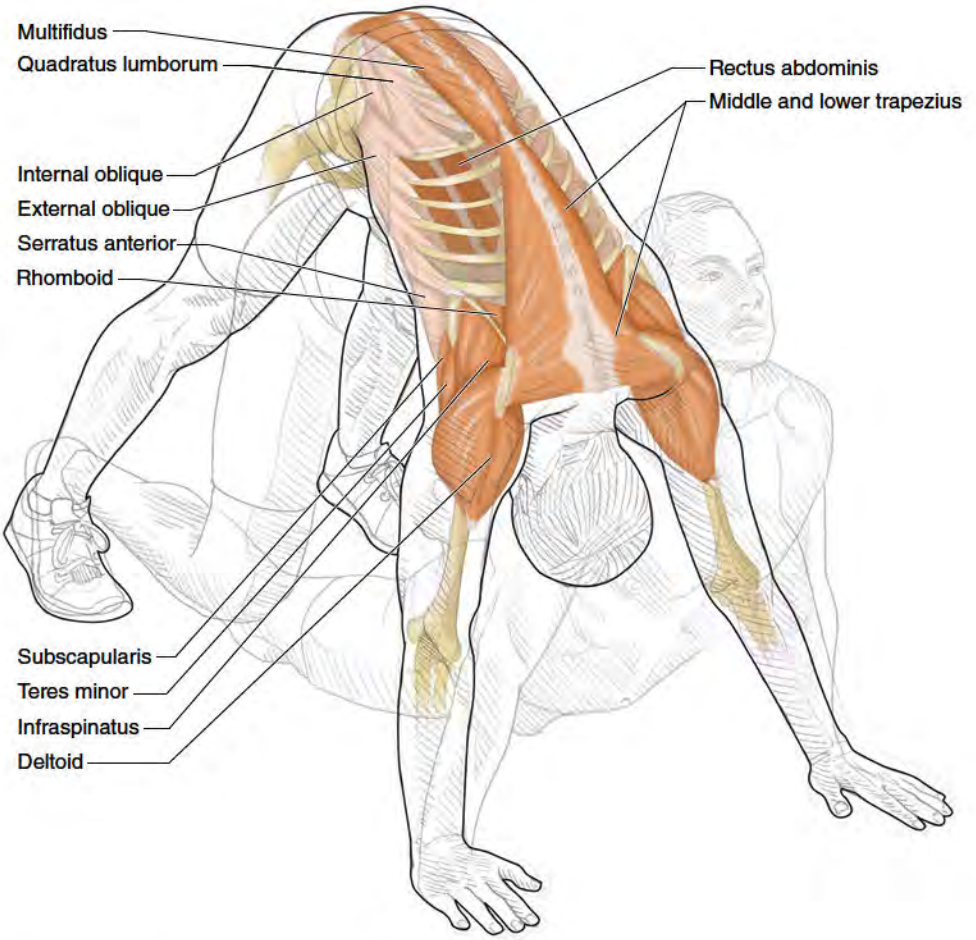
Primary: Latissimus dorsi, lower and middle trapezius, pectoralis major, serratus anterior, internal oblique, external oblique

Secondary: Gluteus maximus, quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), hamstrings (semitendinosus, semimembranosus, biceps femoris)

GOLF FOCUS

Coordinating the pull of the target side with the push from the trail side is difficult for many athletes. When this harmonization is achieved, a much more effective power generation occurs. The pull from the lead arm helps create torso rotation and drives the body onto the target foot through impact. When a golfer depends on the push from the trail side without the accompanying pull from the target side, the pivot stalls, and more of the golfer's weight remains on the trail side through impact. You will often see more of a lateral slide versus a rotation in golfers who rely solely on a trail-side upper body push.

SPINE WAVE FROM LOADED BEAST



Execution

1. Start on your hands and knees with your toes on the ground. Push your hips back toward your heels and keep your arms straight.
2. Lift your knees 1 to 2 inches off ground; this is the loaded beast position.
3. Lift the hips high in the air while coming up on your toes. Keep your arms straight, with your head between your arms, looking toward your feet.
4. Slowly flex each segment of your spine, from the lower to upper spine, similar to the movement in the segmental cat camel exercise. You will be in a push-up position with your spine rounded.

5. Slowly extend each segment of your spine from the lower to upper spine. Once at the top of the spine, tilt your head back and look up. You will be in an upward facing dog position.
6. Flex your neck again and look down, then flex each segment of the spine, moving from the upper to lower spine.
7. Return to the position with your hips high in the air, then to the loaded beast position.
8. Perform 2 to 5 repetitions, taking 20 to 30 seconds for each repetition.

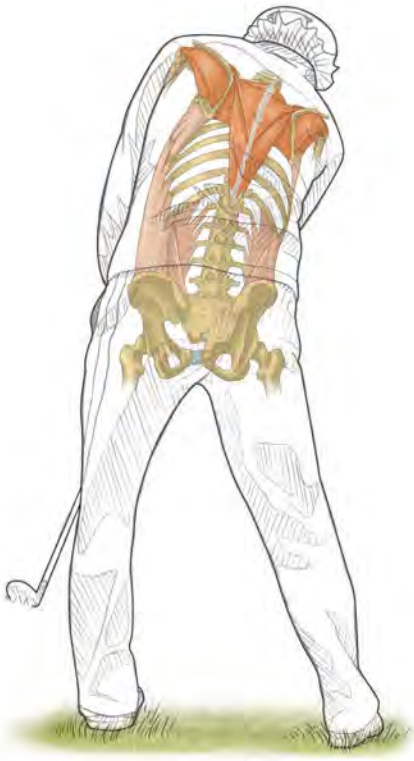
Muscles Involved

Primary: Multifidus, vertebral joint capsule, deltoids, rhomboids, rotator cuff (infraspinatus, supraspinatus, subscapularis, teres minor), rectus abdominis, middle and lower trapezius

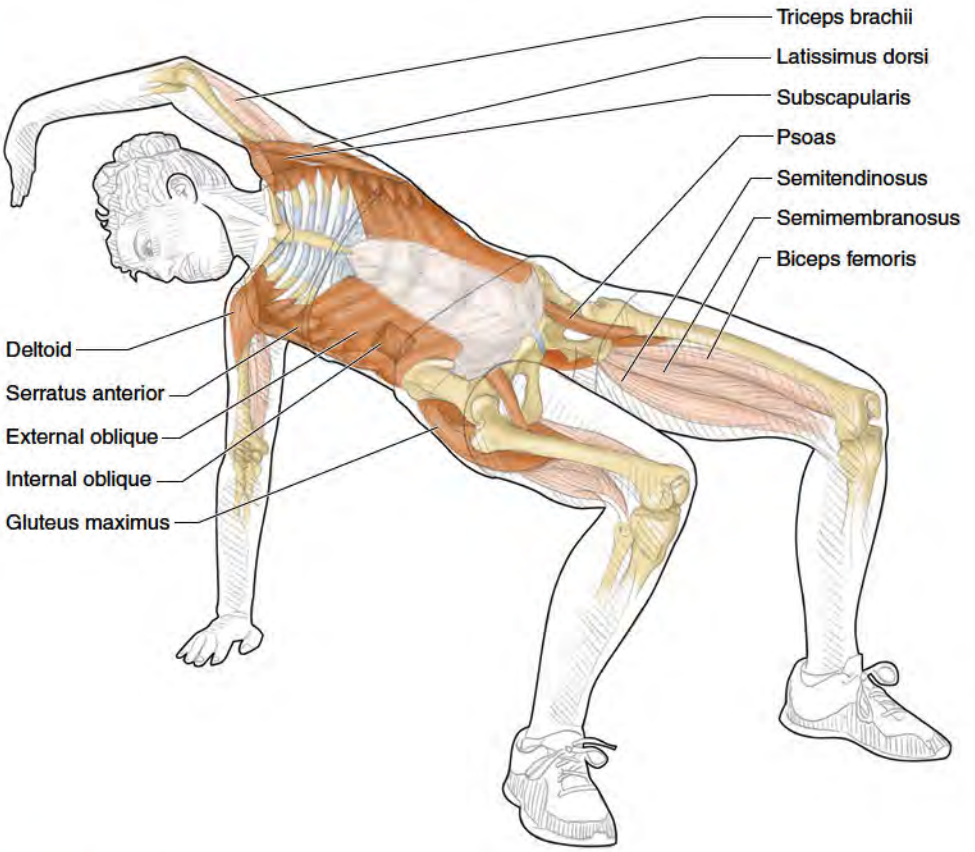
Secondary: Internal oblique, external oblique, serratus anterior, quadratus lumborum

GOLF FOCUS

Having the ability to segment the spine through flexion and extension allows you to more effectively distribute force and uniformly produce motion. This minimizes the stress accumulation in any one section of the spine and reduces the opportunity for wear-and-tear injuries. In addition, the ability to move the shoulder through full ranges of external rotation—very important in the top of the back swing (on the trail arm) and in the deceleration phase of the follow-through (lead arm)—depends on the thoracic spine being able to move into extension and the scapula being able to move on the ribs appropriately. When the thoracic spine remains in a flexed position, the shoulder blade will sit in a more anteriorly tilted position. This will tilt the joint surface of the shoulder blade forward and downward, which will result in less available glenohumeral (shoulder) external rotation. Increased thoracic extension will improve shoulder external rotation as a result of the positional improvement of the shoulder blade and its joint surface angle.



ARM REACH FROM CRAB



Execution

1. Sit on the ground with your knees bent about 90 degrees and your feet on the ground. Place your hands behind you, with your elbows straight and your fingers pointing away from you. Keep your chest out and drop your shoulder blades down and back.
2. Lift your hips off the ground about an inch. Then bring your left arm out in front of you, your elbow bent.
3. Drive your hips up as high as you can while rotating through your right shoulder and reaching your left hand overhead to the right.
4. Look down at your right hand and hold for 2 or 3 breaths.
5. Return the bent elbow to the front of the body and reverse the motion to the starting point.
6. Repeat on other side. Perform 3 or 4 repetitions each side.

Muscles Involved

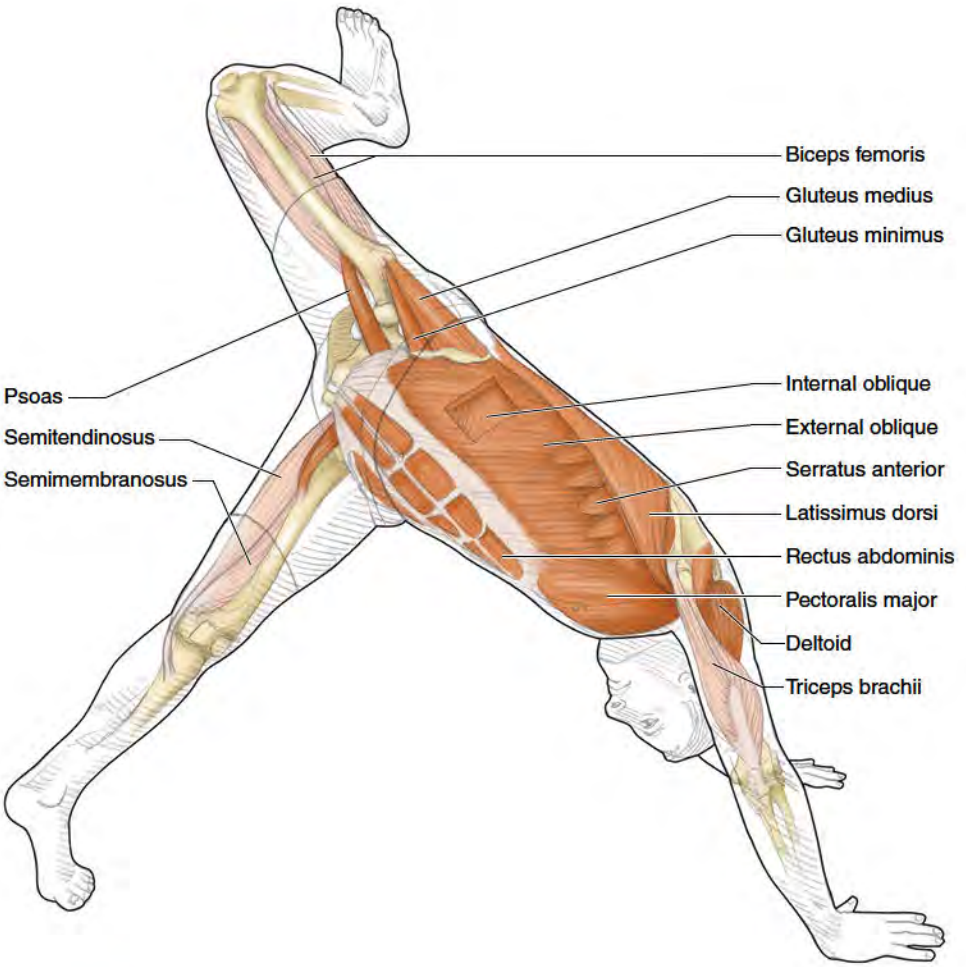
Primary: Gluteus maximus, internal oblique, external oblique, serratus anterior, psoas, deltoids, rotator cuff (infraspinatus, supraspinatus, subscapularis, teres minor), latissimus dorsi

Secondary: Hamstrings (semitendinosus, semimembranosus, biceps femoris), triceps brachii

GOLF FOCUS

Having adequate mobility in the hip flexors, obliques, and latissimus muscles allows the golfer to achieve a position at the top of the backswing with the lead arm positioned straight and across the chest. It also allows the golfer to extend the hips and pelvis freely in the follow-through while permitting deceleration through a full range of motion with minimal stress on the spine, specifically the lower back. Amazingly, an increased ability to decelerate both the club and the body often encourages increased club-head speeds. The greater breaking zone afforded by the increased range of controllable motion enables this increased speed.

SCORPION REACH FROM LOADED BEAST



Execution

1. Start on your hands and knees with your toes on the ground. Push your hips back toward your heels and keep your arms straight.
2. Lift your knees 1 to 2 inches off the ground. This is loaded beast position.
3. Lift your right foot off the ground. Shift your body forward from the loaded beast position to a push-up position and pull your bent right knee toward your left elbow. Keeping your right knee bent, rotate your right hip open to the right as much as you can.
4. Continue to open the right hip and move the right knee toward the ceiling by pushing through your left toes and both hands.

5. Hold for 3 breaths and slowly reverse the motion to return to start.
6. Repeat on the opposite side, and perform 3 to 8 repetitions each side.

Muscles Involved

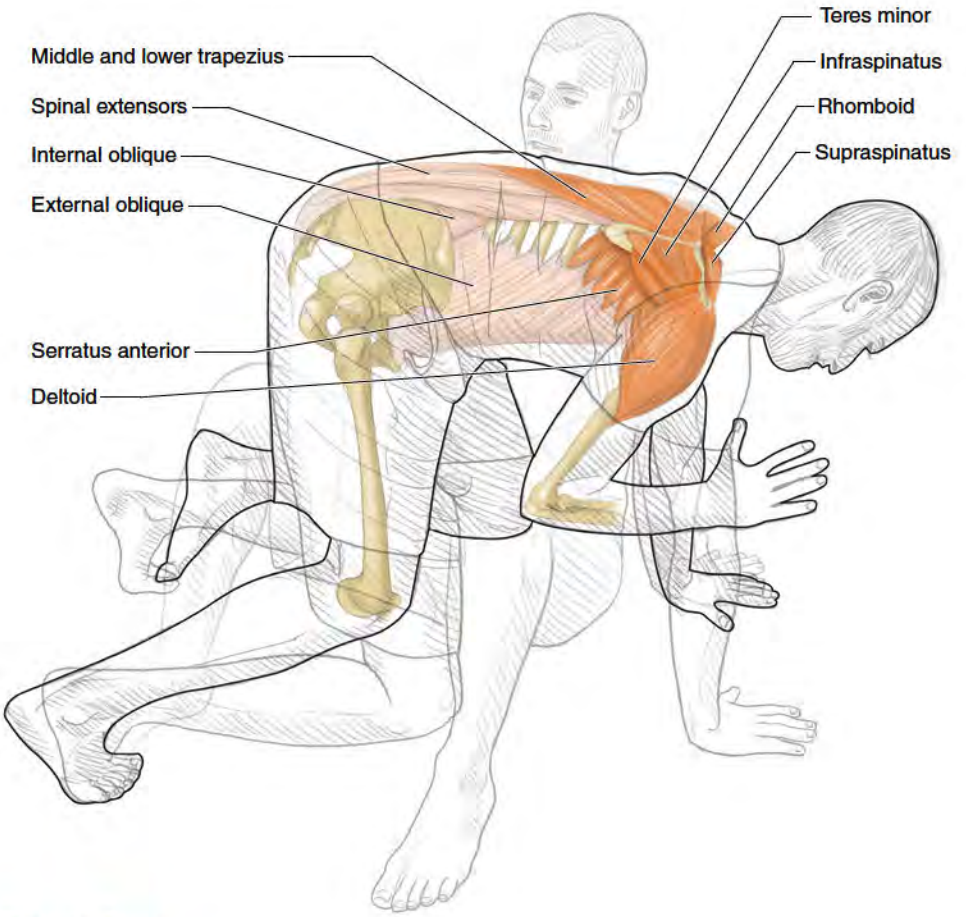
Primary: Psoas, rectus abdominis, serratus anterior, pectoralis major, deltoids, internal oblique, external oblique, gluteus medius, gluteus minimus, multifidus, erector spinae (iliocostalis, longissimus, spinalis), latissimus dorsi

Secondary: Hamstrings (semitendinosus, semimembranosus, biceps femoris), piriformis, triceps brachii, middle and lower trapezius

GOLF FOCUS

Many golfers struggle to move the pelvis and the upper body separately at the start of the downswing. This may be a result of poor mobility or motor control. The beautiful thing about the scorpion reach is that it teaches the golfer to disassociate the pelvis from the trunk and enables increased mobility of the obliques, psoas, rectus femoris, and latissimus muscles, among others. In addition, this movement helps build strength in the scapular and hip stabilizers and improves upper thoracic extension and rotation of the thoracic spine and costovertebral joints, all of which are extremely important for an efficient and powerful golf swing!

BEAST TO CRAB TO BEAST FLOW



Execution

1. Start on all-fours with your knees under your belly button. Lift up on your toes, with your knees 1 to 2 inches off the ground.
2. Keeping your chest upright, lift your right arm and left leg and bring the knee and elbow together while balancing on your right toes and left hand. Rotate your entire body all the way to the right by pivoting on your right toes until your chest is facing up, both feet and hands on the ground and your glutes 1 to 2 inches off the ground.
3. Lift your left arm and right leg and bring the elbow and knee together while pivoting on your left toes. Rotate your body again to your right until you reach the start position.
4. Repeat but moving in the opposite direction.
5. Perform 2 or 3 sets of 6 to 8 repetitions.

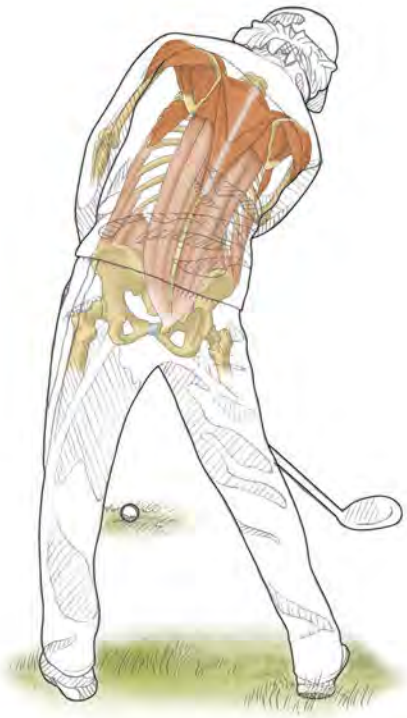
Muscles Involved

Primary: Rotator cuff (infraspinatus, supraspinatus, subscapularis, teres minor), rhomboids, middle and lower trapezius, serratus anterior, deltoids

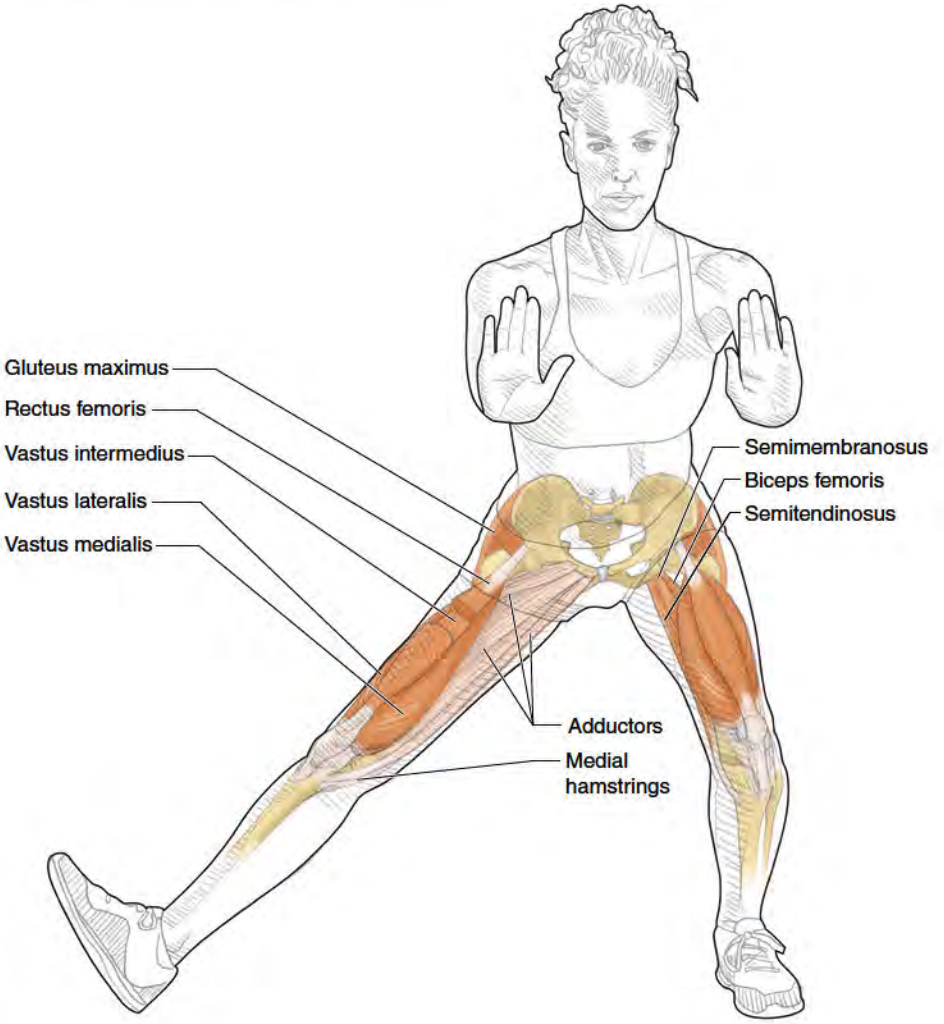
Secondary: Spinal extensors, internal oblique, external oblique

GOLF FOCUS

The shoulder (glenohumeral joint), shoulder blade, ribs, and spine need to move through near-maximal ranges of motion during the golf swing. For example, a right-handed golfer would ideally have the right costovertebral joints rotate posteriorly while the right intervertebral joints move into extension and posterior rotation. The right scapula would depress and retract while the glenohumeral joint externally rotates, flexes, and abducts. On the downswing and follow-through, this motion is reversed—the intervertebral joints flex and anteriorly rotate, the costovertebral joints allow anterior rotation of the ribs, the scapula protracts and elevates, and the glenohumeral joint adducts and internally rotates. The left side would see almost the exact opposite in both the back swing and follow-through sequences. The beast to crab transition helps develop these coupled motions and enables more precise movement of the torso and upper extremity in all aspects of the swing.



COSSACK SQUAT



Execution

1. Stand with your feet double shoulder-width apart and turned slightly out.
2. Point the right foot to the ceiling so you're balanced on your right heel. Put your hands straight out in front of you for balance.
3. Squat back and drive your left knee toward the left while keeping your right leg straight. Get as low as possible but keep your spine as long and straight as possible.
4. Hold the lower position for 2 or 3 breaths. Then return to the start position.
5. Do 5 to 8 repetitions; perform on the opposite side.

Muscles Involved

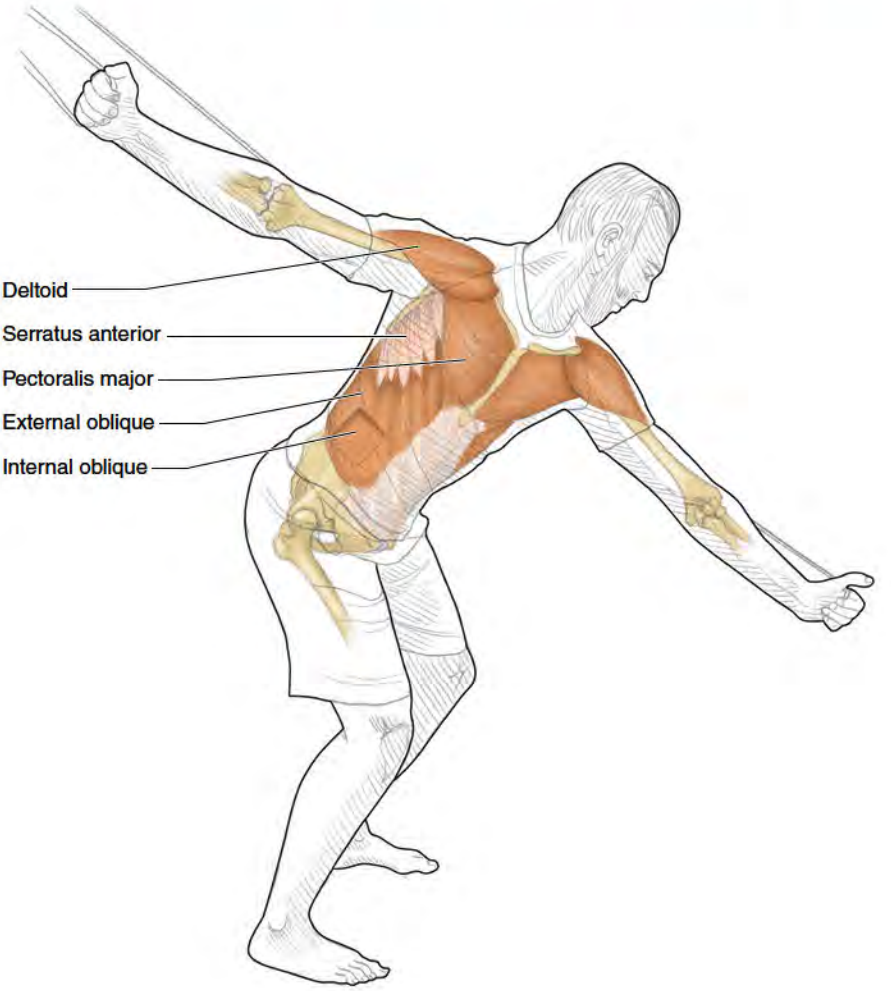
Primary: Gluteus maximus, quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), hamstrings (semitendinosus, semimembranosus, biceps femoris)

Secondary: Adductors (straight leg), medial hamstrings (straight leg)

GOLF FOCUS

Being able to load the trail hip in the back swing and then use the ground pressure under the trail foot to efficiently create energy to power the downswing is the key to all long golf ball drives. The Cossack squat requires effective loading of the hip and glute muscles and helps you appreciate how the foot interacts with the ground to position the rest of the leg and support an efficient transfer of energy from the ground up. The Cossack squat requires significantly greater ankle dorsiflexion, hip flexion, balance, and body control than a normal back swing. It helps build the neurological control necessary for a powerful transition at the top of the backswing into the downswing. The Cossack squat also allows for an eccentric demand of the adductor muscle group on the straight leg during the lowering portion of the movement. This is the same requirement, although to a lesser degree, that the adductor musculature sustains during the final stages of the backswing as the body prepares to transition into the downswing. When the adductors are able to lengthen under eccentric load, the target-side knee (left knee in a right-handed golfer) does not need to collapse in during the backswing, and more space can be maintained between the left and right knees.

REVERSE OPENER FOR MOBILITY



Execution

1. Attach tubing to an immovable object behind you and above your head. Holding tubing in each hand, face away from the anchor and get into a golf address position, palms facing each other. Step forward to create tension in the band. This is the start position.
2. Keeping your right elbow straight, rotate to the top of your backswing position (for a right-handed golfer) while pushing the straight left arm forward.
3. Maintain spine angle while rotating to your end range.
4. Return to the start position and repeat with the opposite arm.
5. Perform 8 to 10 repetitions.

Muscles Involved

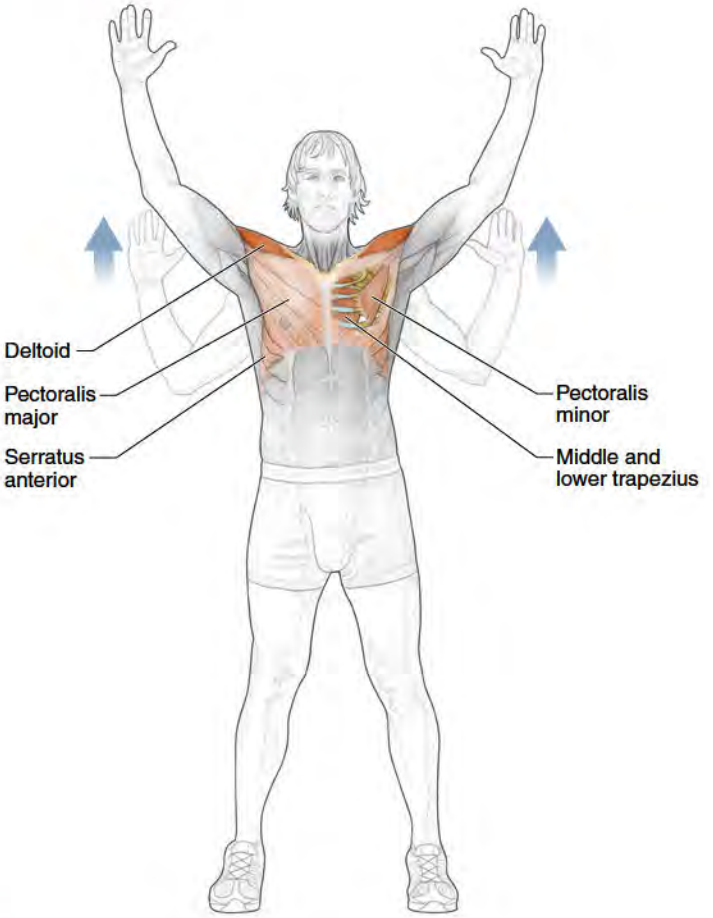
Primary: Pectoralis major, rotator cuff (infraspinatus, supraspinatus, subscapularis, teres minor), deltoids, internal oblique, external oblique, middle and lower trapezius

Secondary: Serratus anterior, rhomboids

GOLF FOCUS

During the downswing, the legs generate power that's transmitted through the core and into the arms. When this energy reaches the shoulder complex, it is important that the muscles stabilizing the shoulder blade be strong and work in concert with the muscles of the core. The reverse opener for mobility helps strengthen the core and shoulder stabilizers simultaneously. Using a piece of tubing is a great way to improve your shoulder and core stability to help transfer the power from the ground through your torso and into the arms just before impact. In the illustration, you can see that the target-side shoulder blade is maintaining its descended position at the onset of the downswing. This position allows for proper stabilization and mobilization of the shoulder throughout the swing so maximal energy transfer will occur.

WALL ANGEL



Execution

1. Stand with your back and head flat against a wall, knees bent, and feet 12 inches (30 cm) from the wall.
2. Bend your elbows, and place the elbows and wrists flat against the wall.
3. While keeping your back and head against the wall, slowly raise your arms up the wall without letting your elbows or wrists come off the wall. Do not let your rib cage elevate, or lift, throughout the entire exercise.
4. Return your arms to the start position, and perform 10 to 20 repetitions.

Muscles Involved

Primary: Deltoids, middle trapezius, lower trapezius

Secondary: Pectoralis major, pectoralis minor, serratus anterior

GOLF FOCUS

The movements of the golf swing require certain parts of the body to stabilize while others are moving. Your arms need to move through a large range of motion with every swing and have relative torso stability. If your upper back tends to round excessively forward, then shoulder movement will be restricted and swing faults will develop. Wall angels help train the mobility and strength of the shoulders while the spine stays stable and in an upright position. This mimics the requirements of the golf swing, where proper upper body posture allows for not only optimal shoulder movement but also improved rotation throughout the spine during the entire swing. Once this exercise can be done without excessive strain, you will find that obtaining appropriate angles in the golf swing becomes much easier. Ultimately, this leads to better and more consistent ball striking as well as decreased injury risk.

VARIATION

Supine Wall Angel

If wall angels prove to be too difficult for you, then do the same exercise on your back with your knees slightly bent and feet against the floor. This takes gravity out of the equation, making the exercise slightly easier.

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4

BALANCE AND PROPRIOCEPTION TRAINING FOR EFFICIENT ENERGY TRANSFER

Every great ball striker has the ability to control each body segment but must also consider the ground from which he or she is hitting. This last component is perhaps the least appreciated aspect of balance and proprioception. One of the differences of golf when compared to most other athletic activities is the unpredictability of the slope, firmness, or type of surface on which you play. In soccer, American football, rugby, cricket, baseball, squash, tennis, and hockey, the athlete expects to play on the same type and firmness of surface with the same slope (flat) throughout the match.

The only time a golfer can be confident the lie will be flat during a round of golf is when the ball is placed on a tee to start each hole. After the ball leaves the tee, the golfer is at the mercy of how the ball bounces and interacts with the environment to determine what body position and set up will be required for the next shot. The golfer may find the ball on an upslope or downslope in a bunker or on the side of a hill. When playing a course such as Augusta, there won't be a flat lie anywhere on the golf course, including the putting surfaces. Mountain biking and trail running may be two sports that are comparable in this regard.

Players who succeed in major championships, where the courses often have significant changes in elevation and slopes throughout the 18 holes, usually place a significant emphasis on fitness and movement training, specifically on the function of their feet. While this may not be as important when playing on a course such as St Andrews or Hilton Head, where the course is unusually flat, it is extremely important on almost every other course. When the course slopes, the golfer must set up with varying degrees of dorsiflexion and plantar flexion

at the ankle. Sometimes you will need a level of dorsiflexion in one ankle and plantar flexion in the other. This is significant because a change in the angle at the ankle will change the alignment and joint positions all the way up the body's kinetic web.

To appreciate these differences, place a two-by-four under your heels and address the ball. Then place that same two-by-four under your toes and do the same. You will notice the angle of your knees, hips, lower back, and thoracic spine all change. Now place the toes of one foot on the two-by-four and the heel of the other foot on a two-by-four and address the ball. Each of these stances challenges the body and its ability to move.

The athlete's feet and ankles must be able to move into position easily and with control while providing accurate information to the rest of the body so that

FIGURE 4.1 Key muscles for balancing in the core and feet. Balance is the process by which the golfer maintains the center of gravity over the base of support.

the appropriate posture can be attained and maintained throughout the swing. This requires a high level of motor control, and motor control does not develop by accident. It is a deliberate part of a training program that should be considered in any program design. We need components in the training program that permit deliberate activation and movement at the ankles and feet, plus program modules that require our feet and ankles to function while our focus is on other areas of the body or external influences (such as a moving ball, another athlete, or another component of the environment).

We must prepare the connective tissue, muscles, and joints of the feet and ankles to perform as needed, and the other areas of the body must be able to adjust to what the feet are doing (figure 4.1). When the feet and ankles communicate with other body parts and function optimally, it results in a level of grace and efficiency of movement that makes the activity appear much easier than it is. Gymnasts, dancers, and figure skaters all exhibit a fluidity and control that is easy to identify.

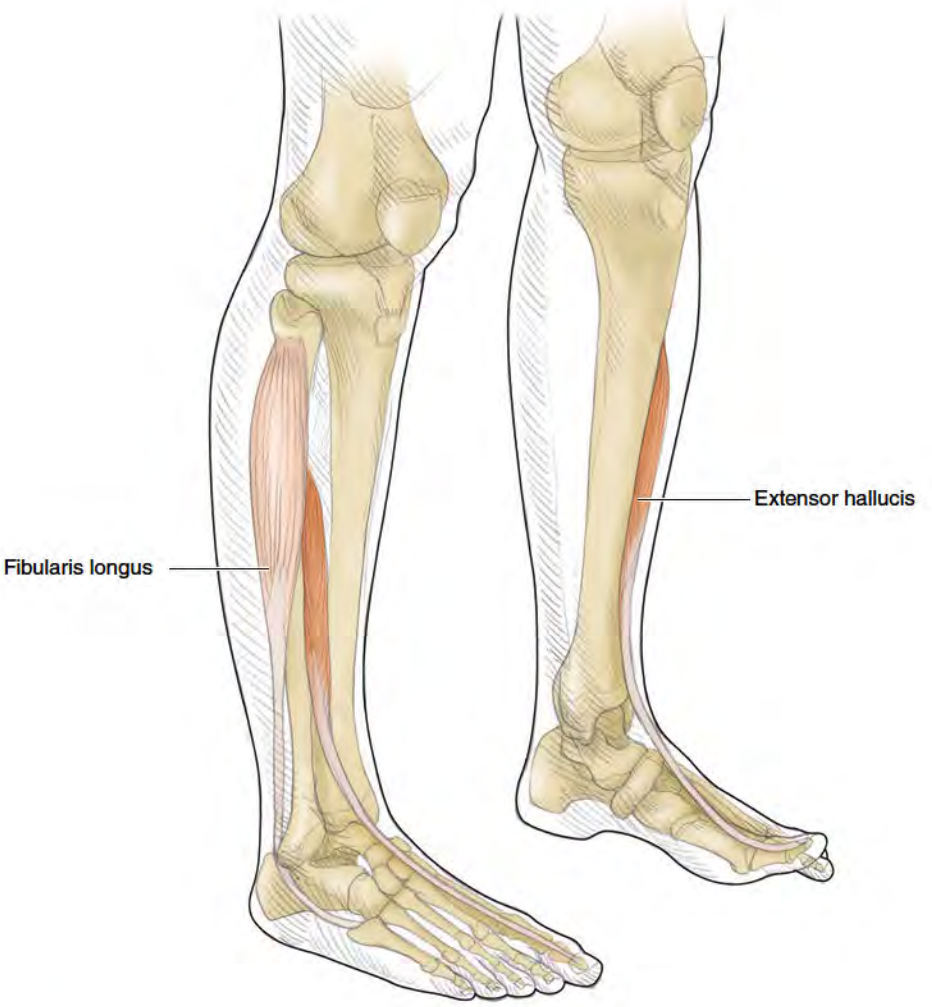
Incredible balance and proprioceptive abilities throughout the body are needed to smash a ball 350 yards and finish the swing with balance and control like Rory McIlroy, to cut at incredible angles and immediately put the body over the base of support so to run upfield like American football running backs Barry Sanders and Adrian Peterson, or to play with the soccer ball like Pelé, Maradona, Messi, or Ronaldo.

Exercises that improve the ability to move the feet with greater control are one of our training program fundamentals for all athletes, regardless of gender, sport, age, or experience. The feet are incredibly dense with mechanoreceptors, the sensory organs found throughout the body that provide feedback on how the body is positioned in relation to the rest of the body and the environment. Mechanoreceptors also communicate the amount and direction of force that the body is experiencing at all times. When we don't use the body in a manner that challenges these mechanoreceptors consistently, we minimize their function, and as a result, we have less accurate sensory information entering the body, which in turn creates less desirable motion, and performance suffers.

Shoes and socks are placed on our feet almost as soon as we are born. This is equivalent to placing mittens on your hands or a patch over one of your eyes. If you wore a mitten on your dominant hand for even a week, the ability to accurately move and control that hand would be considerably hindered. Likewise, if you wore a patch over your eye for an extended time, the muscles controlling the eye would be greatly affected, and your vision in that eye would be compromised.

Deliberately challenging these receptors in fitness training combats the negative effects shoes and socks have on feet and ankle receptors. This chapter is designed to help you improve foot and ankle control and then progressively incorporate more of the body until you are able to control the entire body through various angles and force requirements. Improving foot and ankle control will become something you don't have to think about as we move into more complex multijoint and full-body exercises. With this control, you can expect better performance in both your training program and sporting activities.

BIG TOE RAISE



Execution

1. Take off your shoes and socks and stand with most of the weight on your right foot.
2. Lift your left big toe off the ground without lifting your other toes. If you have trouble lifting only your big toe, don't get frustrated. Initially this will be very difficult for many people, but after a couple weeks, even the most stubborn big toes will begin to lift.
3. Return to the start position and repeat.
4. Perform 20 repetitions per foot.

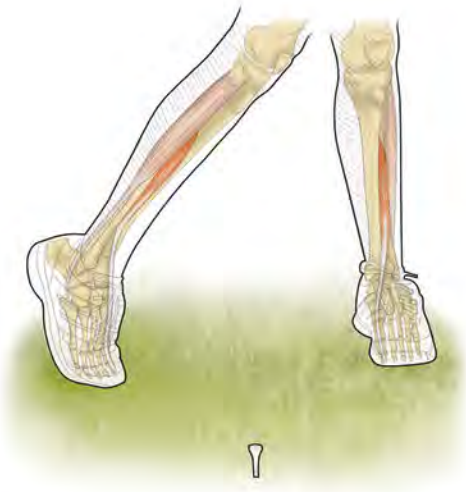
Muscles Involved

Primary: Extensor hallucis longus

Secondary: Fibularis longus

GOLF FOCUS

Regardless of the sport or activity you are performing, having adequate big toe extension is paramount. Walking requires up to 40 degrees of big toe extension to achieve full ankle plantar flexion and hip extension. Many people struggle to push off the big toe either because they don't have sufficient range of motion in the big toe or the neurological control to utilize the available motion. A lack of big toe extension forces the athlete to use the oblique axis instead of the transverse axis of the foot, and the result can be significantly more rotation through the lower back. Rotation of the lower back is one of the factors leading to injury of the discs in this region of the spine.

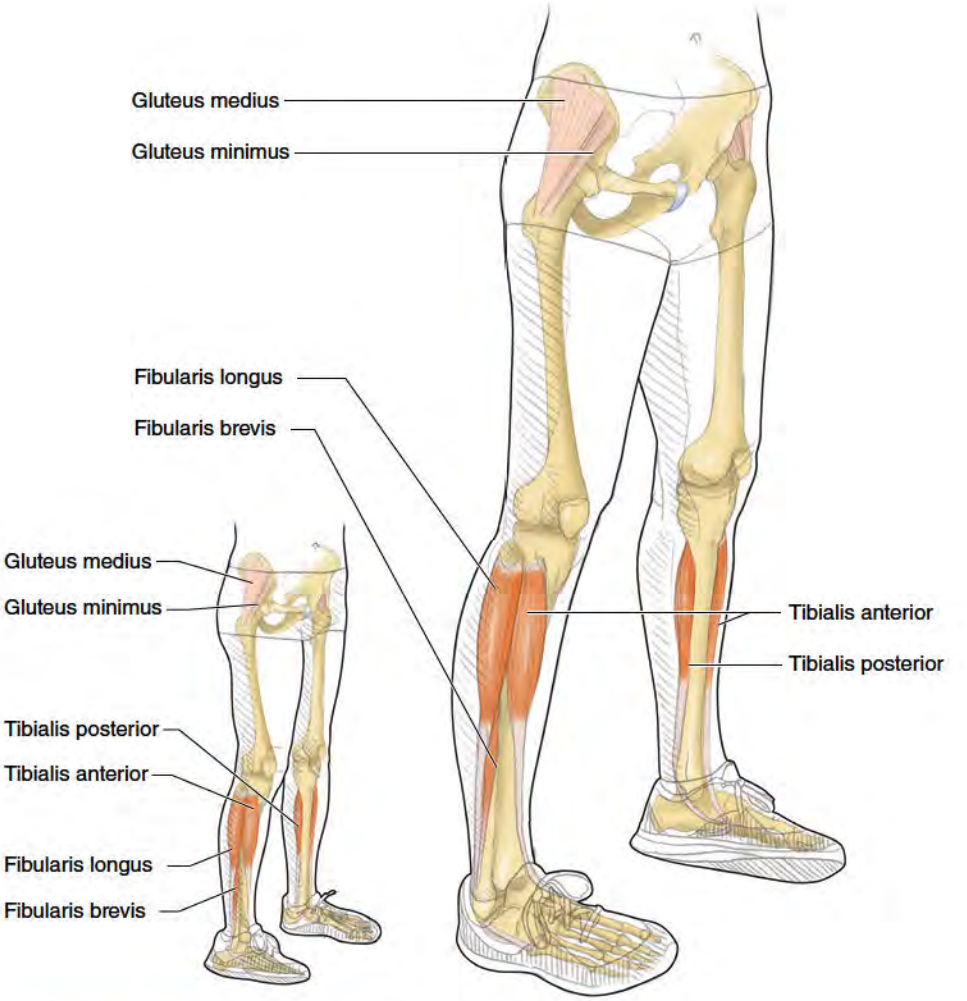


VARIATION

Assisted Big Toe Raise

If you have difficulty performing this exercise, start in a kneeling lunge position with your right foot forward. Use your hand to hold all the toes on your right foot to the ground except the big toe. Perform the big toe raise exercise while holding the other toes down until you get better at this movement.

PRONATION SUPINATION



Roll to the inside. Roll to the outside.

Execution

1. Stand with feet shoulder-width apart.
2. Roll to the outside of both feet while creating a larger arch in the feet. Roll to the inside of both feet by collapsing the arches inward. This is 1 repetition.
3. Perform 20 repetitions.

Muscles Involved

Primary: Tibialis posterior, tibialis anterior, fibularis longus, fibularis brevis

Secondary: Gluteus medius, gluteus minimus

GOLF FOCUS

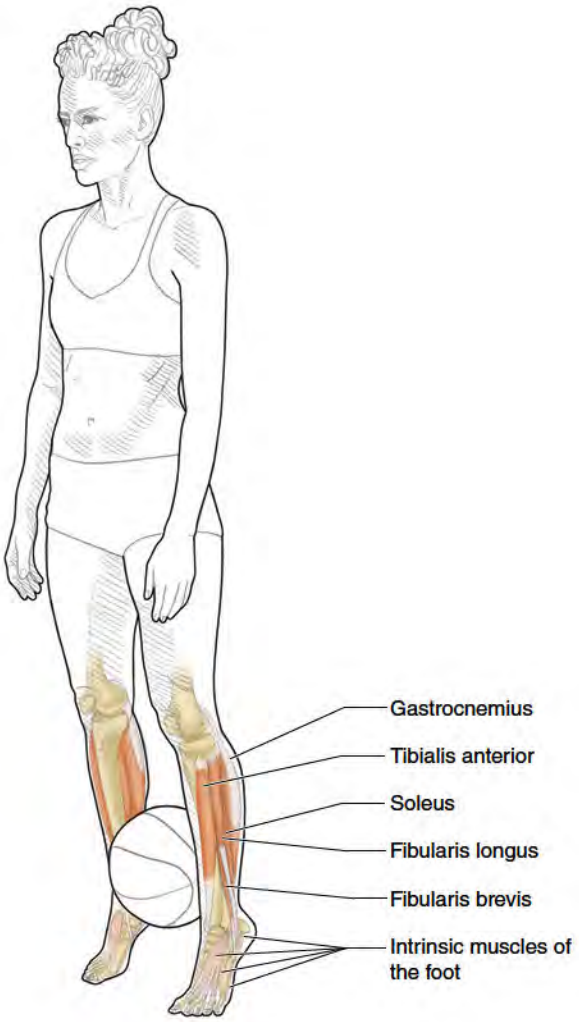
To maximize the amount of hip rotation used in the golf swing, we need the appropriate range and control of the foot's arch. Increasing the arch in the back foot in the backswing will increase the amount of internal hip rotation available to the golfer, and collapsing (pronating) the arch on the downswing will increase the amount of external rotation the hip can express. Building an appropriate arch in the lead foot on the downswing and follow-through will allow the lead hip to express significantly more internal rotation. Regardless of whether a golfer has a restricted or appropriate amount of hip motion available, the foot needs to move suitably to permit maximum expression of the hip's rotation.

VARIATION

Opposing Pronation Supination

Perform the same exercise, except this time, have one foot roll outward while the other one rolls inward. Do not let your hips move at all during this exercise; concentrate the movement in the feet.

ISOMETRIC HEEL RAISE



Execution

1. Stand with a volleyball (or similar ball) between your ankles.
2. Press against the ball with your ankles while lifting your heels off the ground as high as possible so that you are balancing on your toes.
3. Hold for 5 seconds.
4. Return to the start position and perform 8 to 10 repetitions.

Muscles Involved

Primary: Gastrocnemius, soleus, tibialis posterior, fibularis longus, fibularis brevis, tibialis anterior

Secondary: Intrinsic muscles of the foot

GOLF FOCUS

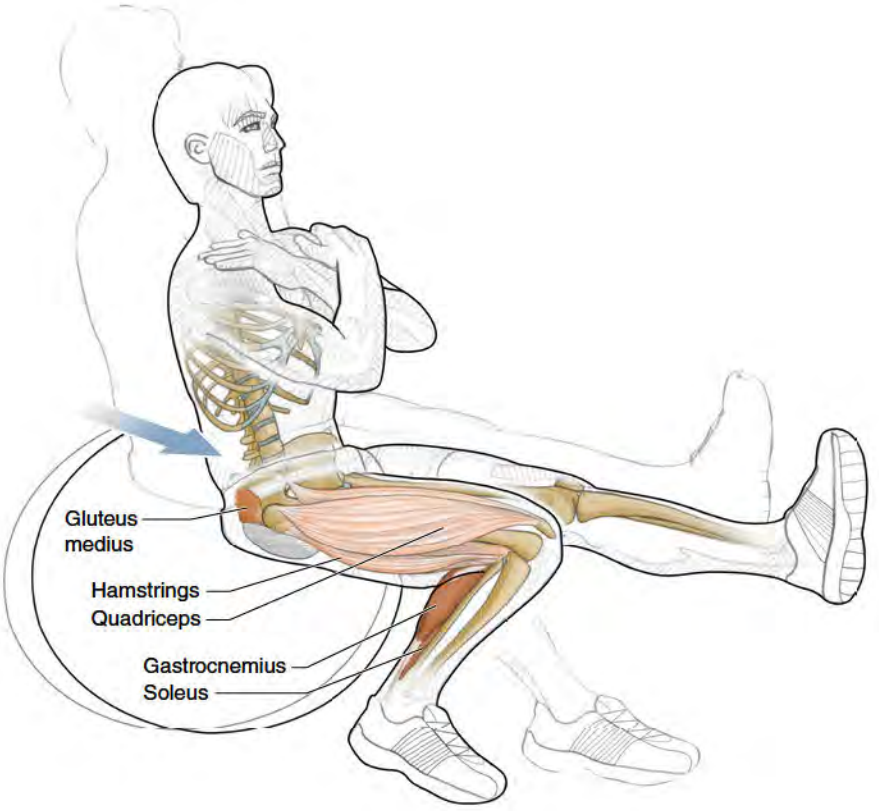
Once the big toe can move through full extension, you need to increase the resiliency in the connective tissue and muscles to withstand the repeated loading required while walking the uneven terrain of the golf course and during the dynamic, high-force push off involved in the golf swing (specifically on the trail side). The more range and resiliency you can attain in big toe extension, the more likely you will be able to utilize this motion in both situations. When there is adequate range available in big toe extension on the trail side, it is much easier to move into the finish position with the trail side of the pelvis facing the target, requiring less reliance on the lower back.

VARIATION

Isometric Heel Raise Into Partial Sissy Squat

Perform the same exercise, except once you lift your heels off the ground, stay in that position while performing a squat. While keeping your heels elevated, return to a standing position, then lower the heels. Repeat the entire movement.

SINGLE-LEG ROLL-OUT



Execution

1. Sit on a stability ball with the heel of your right foot on the ground out in front of you and the right knee as straight as possible. Lift a straight left leg up as close to parallel with the ground as possible. Your torso should be upright, and this posture should be maintained throughout the exercise.
2. Keeping your right foot, knee, and hip in line with each other, pull yourself and the ball toward your right foot by pressing the right heel into the ground and bending your right knee.
3. As the ball rolls forward, more of your right foot will contact the ground. When the ball is as close to the right foot as possible, the entire right foot will be on the ground.
4. Push off the right foot and roll the ball back to the start position. Complete the desired number of repetitions and repeat with the opposite leg.

Muscles Involved

Primary: Soleus, gastrocnemius, gluteus medius, hamstrings (semitendinosus, semimembranosus, biceps femoris)

Secondary: Hip adductors, quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius)

GOLF FOCUS

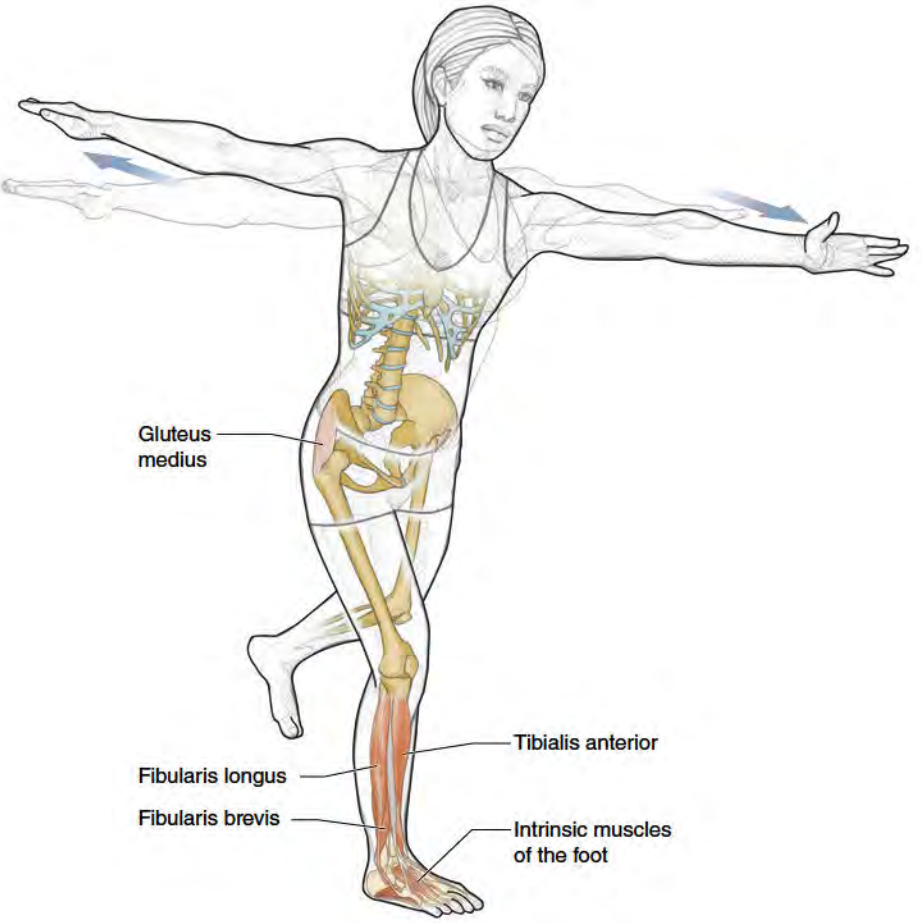
It is very difficult for many golfers to match real and feel. This means that what they feel with their swing as far as body and club positions should match what is happening in the swing. Single-leg roll-outs are a great starting point to achieve this awareness in your lower body. The challenge of this exercise is not just in training the leg muscles, but also in getting your body to better understand exactly where it is while moving. Improving this second factor will help your muscles control fine movements and have a much quicker reaction time. Both are needed to get your body to the point where you can maintain proper body position during a high-speed golf swing.

VARIATION

Single-Leg Roll-Out With Eyes Closed

Performing this same exercise with your eyes closed will present an even greater challenge. Your eyes are typically your body's most powerful source of balance information. Without the use of sight, your feet and muscles are required to work much harder to maintain balance.

SINGLE-LEG AIRPLANE



Execution

1. Stand and hinge at the hips so that your torso bends forward.
2. Lift your left leg off the ground, keeping it straight and behind you. Your torso and back (left) leg should form a straight line.
3. Lift your arms out to your sides so that they form a *T* with your torso.
4. Keeping your right foot, knee, and hip in line with each other, rotate your torso first to the left and then to the right.
5. Make sure to keep your arms in a *T* and turn with your torso.
6. Perform the desired number of repetitions and repeat on the opposite leg.

Muscles Involved

Primary: Intrinsic muscles of the foot, tibialis anterior, fibularis longus, fibularis brevis

Secondary: Tibialis posterior, gluteus medius

GOLF FOCUS

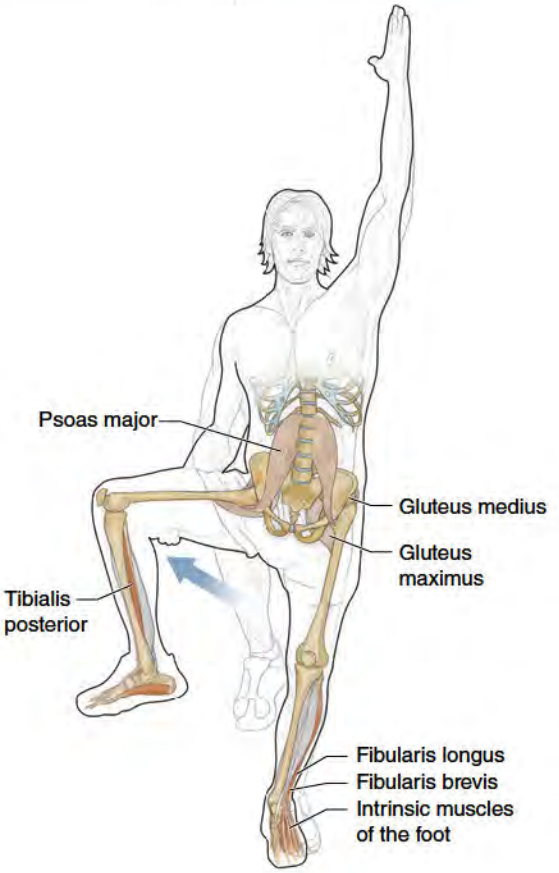
Two of the major reasons that many golfers cannot make consistent, flush contact with the ball are hip sway and slide. If you are unable to rotate your hips, then the tendency is to sway (move away from the target during the backswing) or slide (move toward the target during the downswing). Poor balance can impede proper hip rotation during the swing. This makes it very difficult to keep the club on path during your swing and therefore return the club face to the proper impact position. It also robs you of potential power that can be transferred to the club before impact. The single-leg airplane is another great exercise to train mobility and balance simultaneously. This will get you used to rotating only around your hips while keeping your foot firmly planted on the ground.

VARIATION

Single-Leg Golf Swing

Incorporate this exercise directly into your golf game by performing single-leg swings. The same muscles will be worked, but trying to swing a club will be much more of a challenge. Swing at a very slow speed, and concentrate on maintaining good posture and balance throughout.

MODIFIED HAND-TO-TOE POSE



Execution

1. Stand with your legs together and your left hand reaching skyward.
2. Raise your right knee, and place your right hand underneath the outside of your thigh.
3. Stand tall, and pull your knee to hip height for 3 to 5 breaths.
4. Move your right leg to the side, and hold it there for 3 to 5 breaths.
5. Perform 3 to 5 repetitions. Repeat on the other side.

Muscles Involved

Primary: Intrinsic muscles of the foot, fibularis longus, fibularis brevis, tibialis posterior

Secondary: Gluteus medius, gluteus maximus, psoas major

GOLF FOCUS

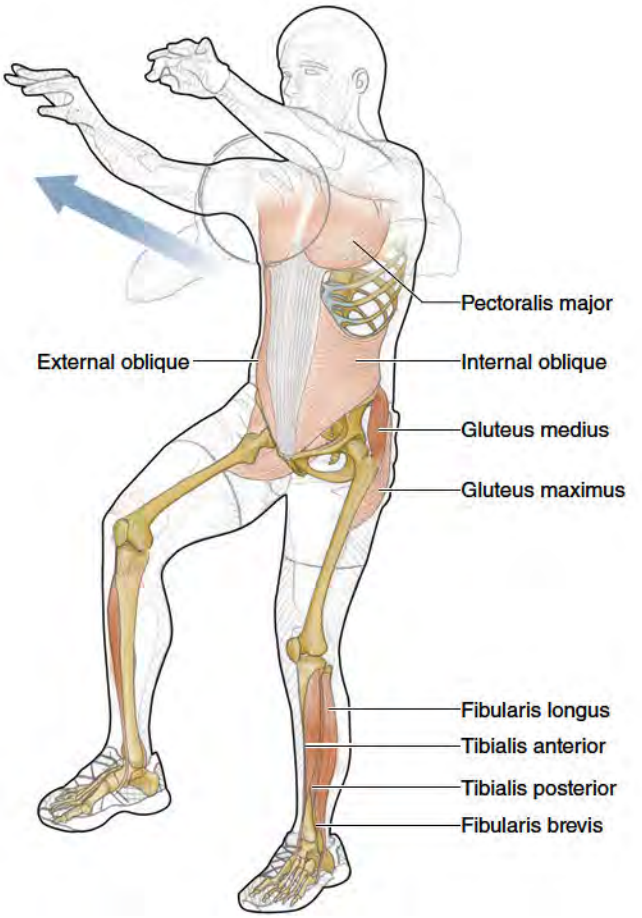
Golfers at all levels can appreciate the grace and efficiency of a well-balanced swing that ends as easily and comfortably as when the golfer was in the setup. This is an easier version of the hand-to-toe yoga pose (hand holding the toes with the raised leg extended straight). The modified hand-to-toe pose develops balance, strengthens the muscles of the supporting leg, and stretches the buttocks and inner thigh of the raised leg. It is a great beginner exercise to help all golfers understand their ability to maintain equilibrium in a static form. When this exercise becomes easy, you can try the modification and move on to the more difficult exercises found throughout this chapter.

VARIATION

Hand-to-Toe Pose

The unmodified hand-to-toe pose is a more difficult exercise for two reasons. First, it requires more flexibility through the calf, hamstrings, hip, and pelvis of the unsupported leg. Second, it requires better stabilization of the supporting leg because you have moved a greater percentage of your body's mass away from your base. In this exercise, you grab the toes of the unsupported leg and attempt to straighten the knee as you move the leg to your side. When this becomes easy, you can attempt either version with your eyes closed.

SINGLE-LEG CATCH



Execution

1. Stand on your left leg, the toes of your left foot pointing forward. Your right knee should be bent, with your right foot off the ground.
2. Hold a medicine ball with two hands in front of your chest.
3. While keeping your posture upright, throw a chest pass to a partner.
4. Catch the return pass with two hands.
5. Perform the desired number of repetitions and repeat with the opposite leg.

Muscles Involved

Primary: Tibialis anterior, tibialis posterior, fibularis longus, fibularis brevis, gluteus medius

Secondary: External oblique, internal oblique, gluteus maximus, pectoralis major

GOLF FOCUS

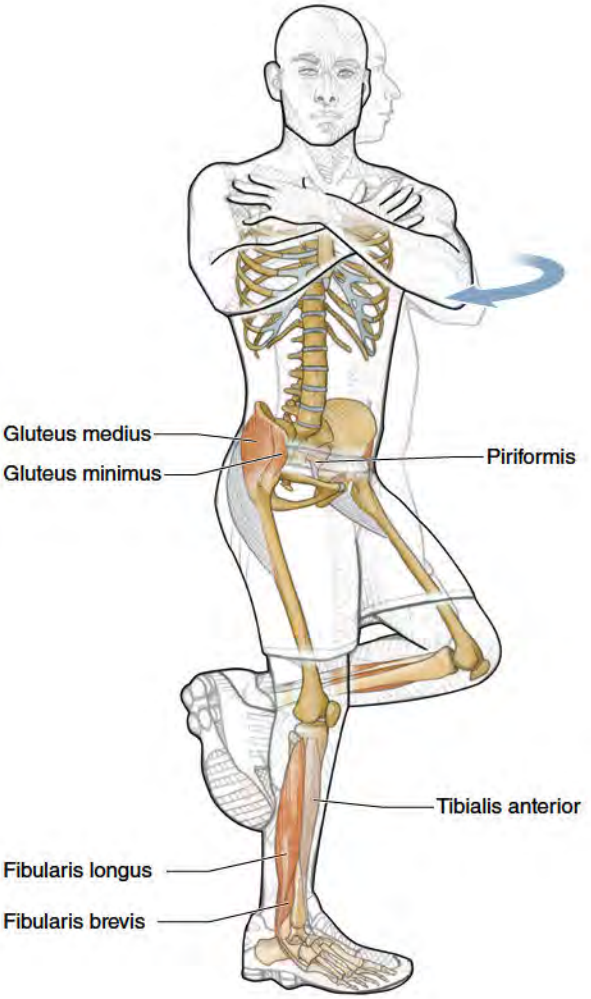
Maintaining balance during easy, partial swings can be fairly simple. However, when you need to take full swings and apply a lot of speed to achieve your shot, it becomes much more difficult. This exercise will help your legs learn how to balance efficiently while a force is being generated in your upper body. As this exercise gets easier, you can challenge this combination in a couple of ways. If you are using a partner, have the person stand farther away from you and throw the medicine ball with a much higher speed. Your partner can also throw the ball to you at different places each time instead of always throwing it to your chest (e.g., above you or to the sides so that you have to reach to make each catch). This will really teach your body how to balance effectively. As you increase the difficulty of the exercise, you will be better able to make golf shots that require both power and balance.

VARIATION

Single-Leg Catch Against Wall

If you are working out alone, get a medicine ball that bounces and throw it against a wall. The farther you are away from the wall, the harder you will have to throw the ball to make it return.

STORK TURN



Execution

1. Stand on your right leg and bend your knee slightly. Lift your left foot off the ground and place it behind your right knee.
2. Hinge at the hips to attain your golf address position at the torso, and cross your arms over your chest.
3. Trying to keep your upper body in line with your pelvis, rotate your pelvis from side-to-side.
4. Repeat on the left leg.

Muscles Involved

Primary: Fibularis longus, fibularis brevis, gluteus medius, gluteus minimus

Secondary: Tibialis anterior, tibialis posterior, piriformis

GOLF FOCUS

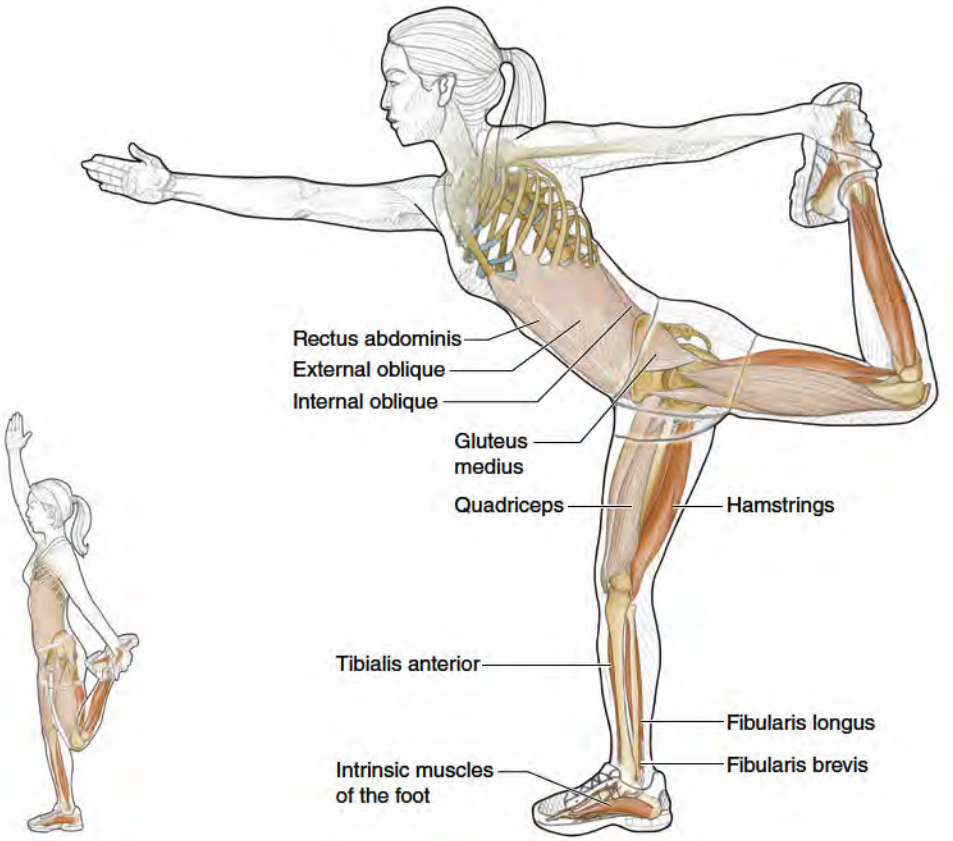
Being able to control the lower body and upper body separately is very important in golf. However, when you begin to move your pelvis more freely and with more control, you will need greater balance. Stork turns will continue to develop pelvis movement and pelvis and torso separation and will challenge your balance at the same time. You will be able to create a full backswing with proper separation while still keeping a solid base beneath you. This is essential for a downswing that is on path and full of potential power.

VARIATION

Stork Turn With Medicine Ball

Holding a medicine ball in front of you while doing this exercise will make the same muscles work harder and will also challenge your deltoids, external obliques, and internal obliques. This version forces you to simultaneously strengthen the muscles that stabilize the legs and torso and the muscles that rotate the pelvis and hips.

STORK TO BOW



Stork position. Bow position.

Execution

1. Stand with your legs together.
2. Bend your left knee and hold your left ankle with your left hand.
3. Raise your right arm toward the ceiling. This is the stork position.
4. Try to maintain a neutral pelvis while bending forward at the pelvis until your right arm and torso are nearly parallel to the floor. This is the bow position.
5. Hold for 3 to 5 breaths in each position.
6. Repeat 3 to 5 times. Then change legs.

Muscles Involved

Primary: Fibularis longus, fibularis brevis, intrinsic muscles of the foot, tibialis anterior, hamstrings (semitendinosus, semimembranosus, biceps femoris)

Secondary: Quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), gluteus medius, rectus abdominis, external oblique, internal oblique

GOLF FOCUS

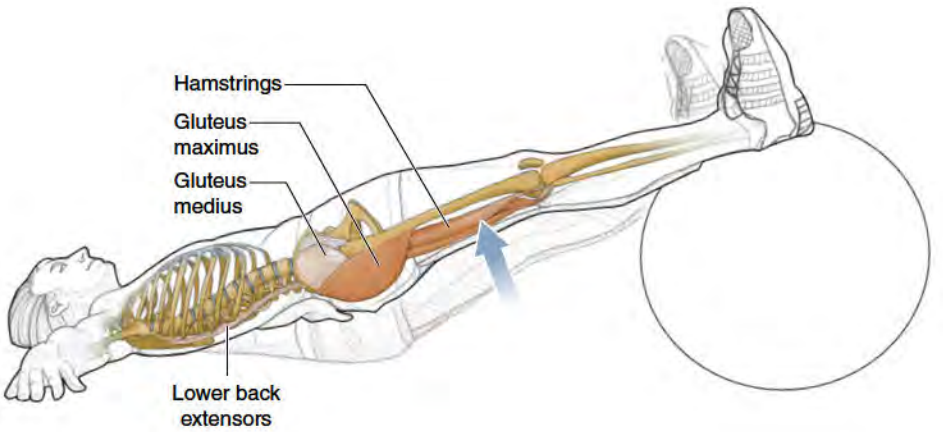
Golf is a sport that frustrates us with its challenges, yet it rewards us when we make an amazing recovery to save par. Discovering that the ball you were sure had stayed in the fairway has actually rolled into the fairway bunker, leaving you with a difficult shot, is a frustrating moment for any golfer. The ball lies 1.5 feet (.5 m) below your feet, requiring you to have great balance and stability. The stork to bow exercise creates better balance, flexibility, and stability and can make these difficult golf shots a little bit easier.

VARIATION

Stork to Bow With Eyes Closed

To make this exercise even more challenging, close your eyes while moving between the stork and bow positions. (Just make sure there aren't any sharp objects lying around for you to bump into!) By closing your eyes, you require the muscles and ligaments in your feet to provide the information your body needs for even better balance and stability.

STRAIGHT-LEG RAISE ON STABILITY BALL



Execution

1. Lie down with your legs straight and your heels on top of a stability ball.
2. Press down on the ball with your heels as you squeeze your gluteus muscles and lift your hips.
3. Slowly lower to the start position.
4. Do the desired number of repetitions.

Muscles Involved

Primary: Hamstrings (semitendinosus, semimembranosus, biceps femoris), gluteus maximus

Secondary: Gluteus medius, lower back extensors

GOLF FOCUS

The golf world is beginning to appreciate the importance of getting one's body weight onto the target-side leg at impact, which allows the golfer to drive hard into the ground and explode the pelvis upward, creating a tremendous amount of power and transfer through the body and into the golf ball. The ability to utilize the large muscles in the hamstrings and buttocks to extend the pelvis is an important aspect of this maneuver. Having proper balance and coordination in the legs, pelvis, and spine is just as important as having the ability to extend the pelvis. The straight-leg extension variation is a great beginner exercise to develop better pelvis extension as well as coordination and control within the legs, spine, and pelvis.

VARIATIONS

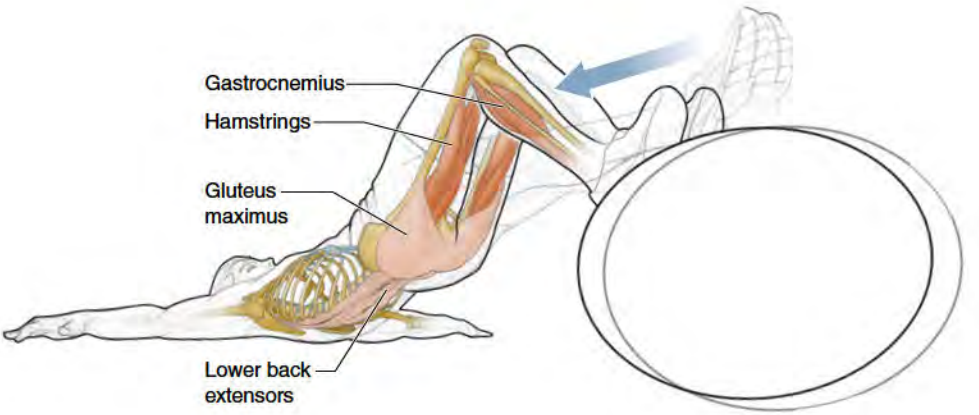
Straight-Leg Extension on Stair, Step, or Chair

If you do not have a stability ball or are new to exercising and find it difficult to perform the exercise on the stability ball because it keeps rolling away from you, try the same movement but put your heels on a stair, step, or chair. This allows you to strengthen the main muscles in this exercise while making it a little easier to balance yourself.

Unstable Leg Extension on Stability Ball

To make this exercise more challenging, try raising your arms over your chest so that they are reaching up to the ceiling. This will decrease your base of support and force your body to activate the stabilizing muscles in the pelvis and spine. This is a great way to increase the functional aspect of this exercise.

HAMSTRING CURL ON STABILITY BALL



Execution

1. Lie down with your legs straight and your heels on top of a stability ball.
2. Press down on the ball with your heels and lift your hips.
3. Stay in the lifted position as you bend your knees and roll the ball toward your buttocks.
4. Return your legs to the straight position and repeat.

Muscles Involved

Primary: Hamstrings (semitendinosus, semimembranosus, biceps femoris), gastrocnemius

Secondary: Gluteus maximus, lower back extensors

GOLF FOCUS

One of the significant differences between top professional golfers and the average amateur is the coordination and movement of the legs throughout the golf swing. Many amateurs let the lead leg collapse inward at the knee during the backswing, making it difficult to drive onto the target-side leg during the downswing. When this happens, the golfer will hang back at impact. This leads

to an inefficient transfer of energy into the golf ball and poor directional control of the ball. In other words, poor leg movement leads to decreased power and less accuracy. The hamstring curl on the stability ball is a great exercise to learn how to use the legs in a coordinated manner and develop strength along the posterior chain (calves, hamstrings, glutes, and lower back extensors). When this exercise becomes easy, you can try the modified versions to create more difficulty and increase the strength in these muscles. These are great exercises to both develop proper leg movement and increase strength within the hip extensors.

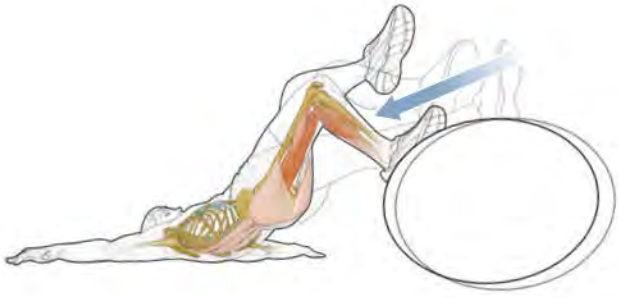
VARIATIONS

Unstable Hamstring Curl on Stability Ball

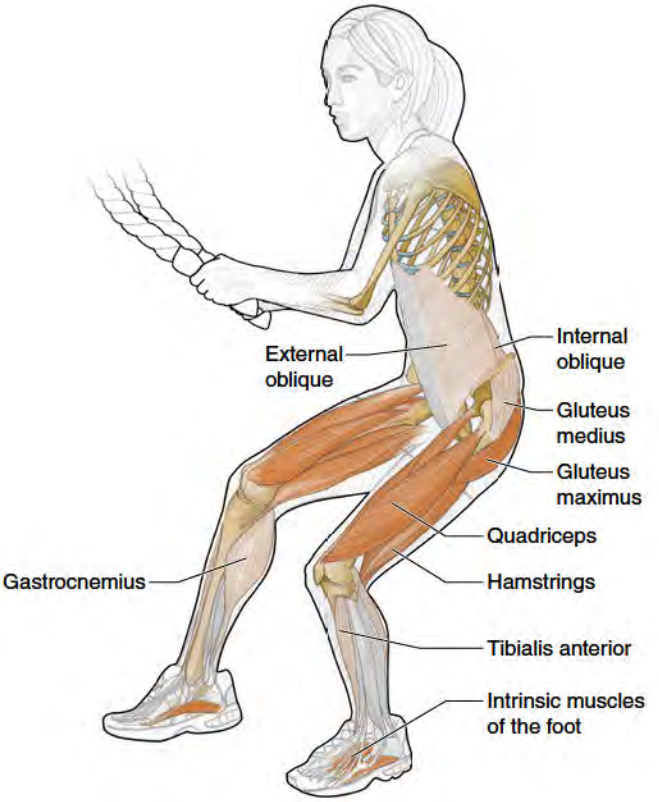
To make this exercise more challenging, try raising your arms over your chest so that they are reaching up to the ceiling. This will decrease your base of support and force your body to activate the stabilizing muscles in the pelvis and spine. This is a great way to increase the functional aspect of this exercise and make it much more challenging.

Single-Leg Hamstring Curl on Stability Ball

When this exercise becomes too easy for you, try the same movement with one leg on the stability ball and the other leg hovering slightly above the ball. This position will greatly increase the load on the leg on the ball and will force the pelvis and spinal stabilizers to work much harder to keep the pelvis flat and not let it tilt toward the unsupported side.



SINGLE-LEG TUG-OF-WAR WITH BATTLE ROPE



Execution

1. Stand on one leg and hold on to one end of a battle rope with both hands.
2. Have a partner hold on to the other end of the rope and attempt to pull you off your one leg. Your partner can be standing on one leg or on both legs.
3. Make sure your partner pulls hard enough to challenge you but not so hard that you cannot perform the exercise appropriately. The occasional hop is acceptable and expected to maintain balance.
4. Perform the exercise for the desired amount of time and repeat with the opposite leg.

Muscles Involved

Primary: Intrinsic muscles of the foot, quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), hamstrings (semitendinosus, semimembranosus, biceps femoris), gluteus maximus

Secondary: Internal oblique, external oblique, tibialis anterior, gluteus medius, gastrocnemius

GOLF FOCUS

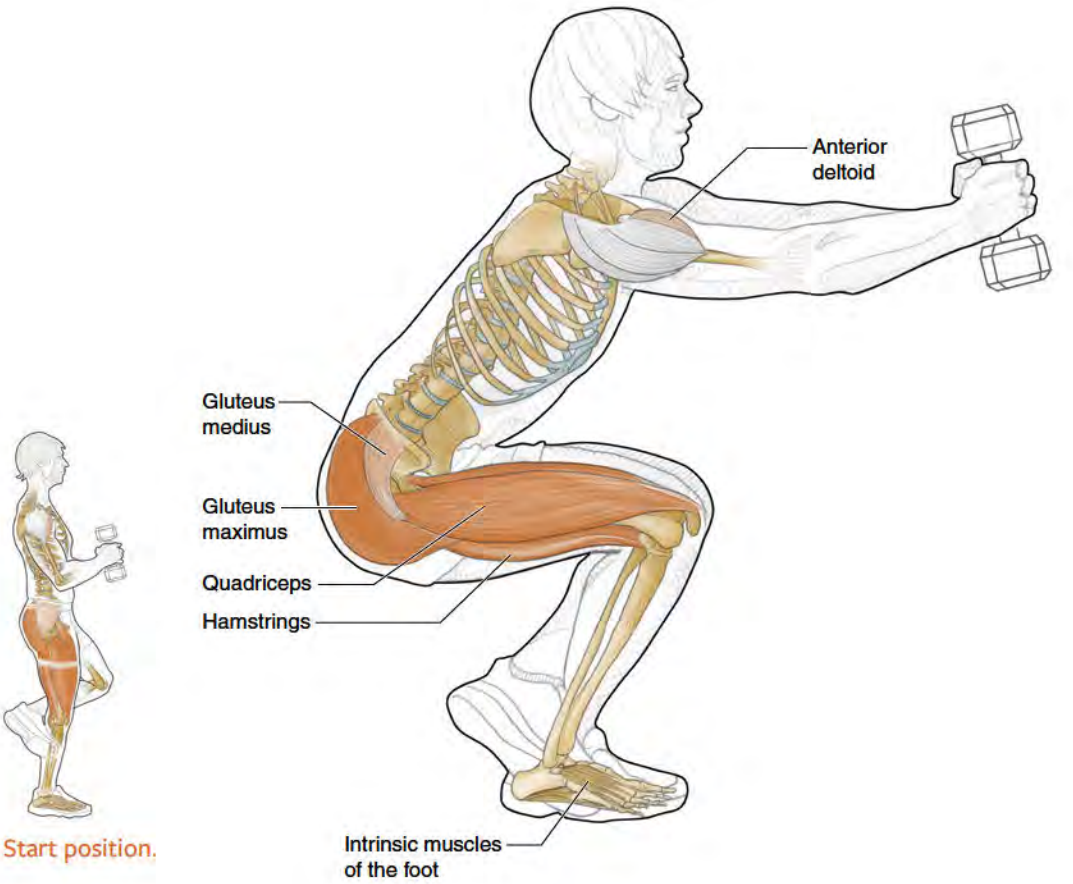
There is something majestic about watching a golfer who develops a great deal of power from the legs and has the stability and balance to transfer that power through the body and into the ball at impact while remaining in perfect balance into the follow-through. Rory McIlroy exhibits such a skill. Having great balance and strength in your legs allows you to drive through the ball onto your target side at impact and into a well-balanced follow-through. The tug-of-war exercise is a fun way to simultaneously improve your balance and increase your leg strength.

VARIATION

Tug-of-War With Eyes Closed

To make the balance aspect much more difficult and really work the small muscles and ligaments in your foot and ankle, try this exercise with your eyes closed. Make sure your partner doesn't pull too hard, though! Closing your eyes and having to stabilize in random multiple directions places a lot of stress on the receptors of your foot. This makes them develop quicker for better results on the course.

SINGLE-LEG REACHING SQUAT



Execution

1. Stand with your left ankle crossed behind the right calf.
2. Bend both knees as you squat by pushing your buttocks behind you.
3. As you bend your knees, lift both arms up to shoulder height and reach out in front of your body to help maintain balance. Your weight should be distributed through the entire right foot, but there should be slightly more weight in your heel. The base of your big toe should remain on the ground throughout the exercise.
4. Slowly stand up out of the squat by pushing the hips forward.
5. Do the necessary repetitions and switch legs.

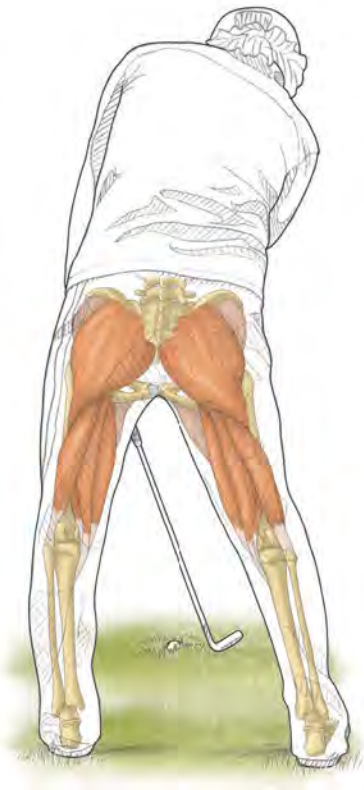
Muscles Involved

Primary: Gluteus maximus, quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), hamstrings (semitendinosus, semimembranosus, biceps femoris)

Secondary: Intrinsic muscles of the foot, gluteus medius, hip adductors, anterior deltoid

GOLF FOCUS

Many situations on the golf course require strength and balance to make a quality golf shot. In this image, you will notice the golfer attempting to hit a ball from the rough with the ball lying below his feet. This is a great example of a golf shot requiring tremendous body control and strength to pull off consistently. When a golfer does not have strength and control, there is often too much movement through the impact zone, and good shots become more a matter of chance than good technique. The single-leg reaching squat builds both functional leg and core strength while requiring a tremendous amount of stability and balance. This exercise won't guarantee that you will make these difficult golf shots every time, but it should increase your chances of success.

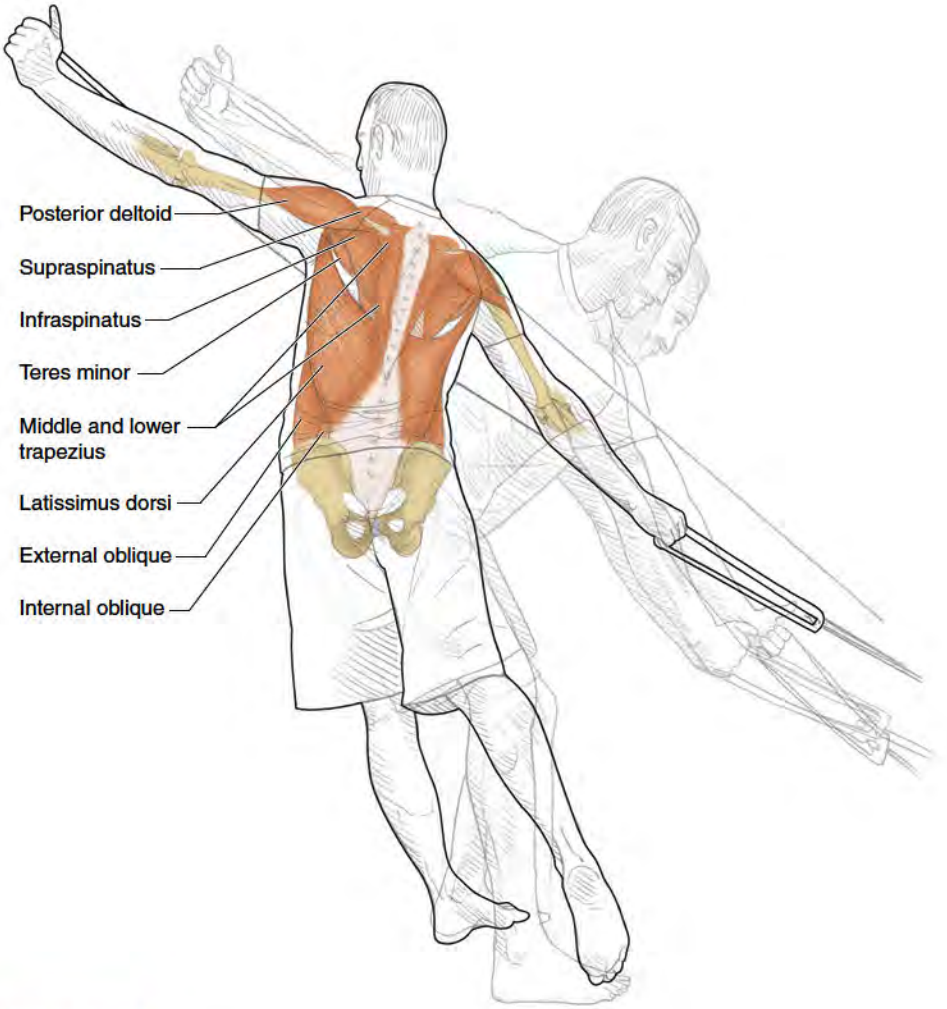


VARIATION

Supported Single-Leg Squat

To make this exercise a little less demanding, you can try holding on to a railing or doorknob with both hands. This allows you to concentrate less on balance and more on proper positioning of your body as you push the hips backward to lower into the squat and push the hips forward to rise out of the squat. As you get more comfortable, try putting less weight on the railing until you can do the movement with no support at all.

ASYMMETRICAL OPENER ROTATION



Execution

1. Attach tubing to an immovable object close to the ground and hold a handle in each hand. Get into your golf address position, facing the attachment point with your palms facing each other. This is the start position.
2. Keep your right elbow straight and rotate to the top of your backswing position while keeping your left arm static and your eyes fixated on the attachment point.
3. Initiate the downswing movement with your legs while pulling with your straight left arm into the follow-through position of a punch shot. Let your head rotate toward the target with your body.

4. During the downswing motion, allow the right arm and band to relax and move freely.
5. Return to the start position and repeat.
6. Repeat the exercise in the opposite direction.

Muscles Involved

Primary: Latissimus dorsi, rotator cuff (infraspinatus, supraspinatus, subscapularis, teres minor), posterior deltoid, internal oblique, external oblique, middle and lower trapezius

Secondary: Serratus anterior, rhomboids

GOLF FOCUS

During the downswing, power is generated by the legs and transmitted through the core and into the arms. When the energy generated in the legs reaches the shoulder complex, the muscles stabilizing the shoulder blade must be strong and work in concert with the muscles of the core. The asymmetrical opener rotation helps strengthen the core and shoulder stabilizers simultaneously. Using a piece of tubing is a great way to improve your shoulder and core stability to help transfer the power from the ground through your torso and into the arms just before impact. In the illustration, you can see that the target-side shoulder blade is maintaining its descended position at the onset of the downswing. This position allows the shoulder to be properly stabilized and mobilized throughout the swing so maximal energy transfer can occur.

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ROTATIONAL RESISTANCE AND DECELERATION FOR INJURY-FREE SWINGS

The movements that make the golf swing unique also make it challenging. The swing begins with the golfer at a standstill, feet and pelvis perpendicular to the target. The golfer then moves the club away from the target to the top of the backswing before powerfully accelerating toward the target. The golfer must then decelerate both body and club to zero and finish with the feet still relatively perpendicular to the target while most of the body is rotated toward or even beyond it.

This is an incredibly uneconomical and difficult body movement. Can you imagine telling a baseball pitcher, a shot put thrower, or a javelin thrower that movement has to begin perpendicular to the target, with the feet in the same position throughout the movement? These athletes would not only throw with significantly less velocity but also have a much greater likelihood of injury.

Elite ball strikers who have long careers and minimal injuries can effectively decelerate the golf club. All too often, players, golf coaches, and trainers focus on developing club-head speed with little to no concern for how the player decelerates the club. Even at the highest levels of golf, many players create incredibly high club and ball speeds but develop career-altering injuries as a result.

Players like Jason Day move through the swing with high velocity, but the efficiency in slowing down the club could be improved. An inability to slow the club down causes injuries, especially to the lower back, shoulder, and neck. Rickie Fowler has been working hard with his body coach, Dr. Troy Van Biezen, to improve his ability to decelerate. The results show because Rickie is better able to stay in balance through his finish, and his rate of injury has significantly

decreased. Dustin Johnson creates tremendous club-head speed but is able to use his body effectively to slow down the club in a very short time, in part due to his work with his trainer, Joey Diovisalvi. Gary Woodland and Kevin Chappell use the DEAP Strategies developed by the DEPTH Systems (DepthSystems.com) to improve their potential to slow down these incredible speeds over very short distances. Extraordinarily efficient!

Being unable to decelerate the club brings injured players of all ages and from all levels to our training and treatment centers. One of the keys to implementing a return-to-sport strategy is to address the body's ability to decelerate, using the joints, muscles, and connective tissues to minimize the stress on these tissues. This requires the golfer to control each joint through the necessary range of motion and develop the proficiency to resist and decelerate force by improving the resiliency and function of tissues. Forces are better dissipated throughout the body, minimizing the stress placed on any one tissue. Examples of easy, helpful preparation exercises that improve segmentation include shoulder blade circles, foot pronation and supination, and segmental cat camel described in the warm-up, mobility and balance, and body awareness chapters.

Once a golfer has control of each joint complex, rotational resistance and deceleration are the next elements of focus. We can begin to focus on three main strategies:

1. Resist force isometrically (rotational resistance)
2. Resist force isometrically at one area of the body while performing dynamic movement at other areas of the body (dynamic rotational resistance)
3. Decelerate force eccentrically

This chapter has a specific order to ensure you achieve a proper base of golf fitness before adding the next piece. The chapter is organized as follows.

We begin the chapter with examples of exercises that require isometrically controlling the body against the pull of gravity. Consider these exercises rotational resistance. When performing any exercise that requires an isometric hold, hold the involved joints at the same angle throughout the exercise. There should be no bending, straightening, or rotating. With an isometric hold, you are resisting motion. These exercises do not focus on creating much movement (often the movement is focused on one specific joint or limb), but instead require you to resist movement, such as the alternating arm reach from an abdominal plank (or knee-down abdominal plank). The movement of the right arm and resulting decreased support on the right side of the upper body and trunk increases the need for the left shoulder, trunk, pelvis, and legs to resist gravity; the resulting rotary force pulls the right side of the body toward the ground.

The next phase includes exercises that require you to prevent movement in one area of the body while moving in a different plane with another section of the body—for example, the antirotational back lunge. We refer to this combination of isometric control in one area of the body while performing a dynamic multijoint movement at another section of the body as dynamic rota-

tional resistance. In this exercise, the tubing pulls the athlete either to the left or right (depending on which side of the body the tubing is attached), and the athlete must try to keep the hands in front of the body (using an isometric-style contraction) throughout the exercise while performing back lunges. This is a much more difficult exercise and places a great emphasis on the muscles and joint complexes in the shoulders, trunk, pelvis, hips, legs, and feet, all muscles and joints required for deceleration.

The last section of this chapter focuses on exercises that emphasize slowing, or decelerating, movement—for example, a depth drop. In the depth drop, gravity pulls the body down while the athlete attempts to slow the drop as quickly as possible. The athlete requires many muscles and joints to contract eccentrically (slowing down while lengthening). This is a much more demanding task than exercises involving isometric contractions against a resistance, so they should be performed once the athlete has shown the capacity to resist force adequately in an isometric manner first.

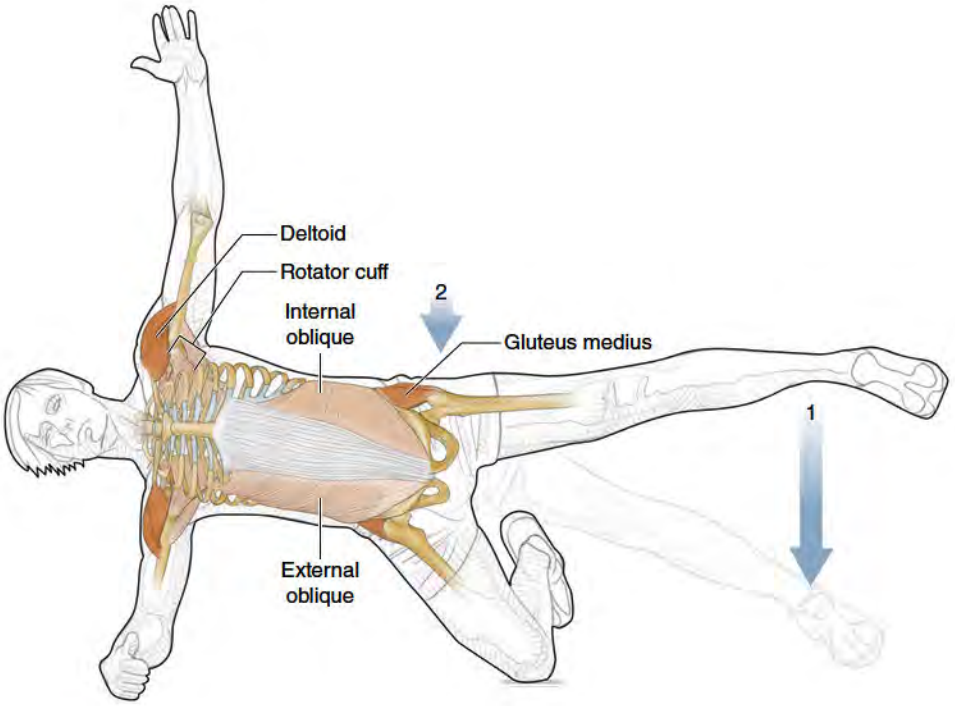
The body is intuitively intelligent. Most athletes will find that creating speed will increase dramatically as the ability to decelerate improves. The faster our bodies can slow down, the more speed the body will allow to be generated. Consider this example.

Imagine you are driving a car toward a brick wall. You have only 20 feet in which to slow down the car. If the car has old, inefficient brakes, you probably won't accelerate much before the 20-foot point. This example represents a body with a limited range of mobility (chapter 3) and poor rotational resistance and deceleration potential.

Now, let's put new brakes in the car, increase the braking distance from 20 feet to 100 feet, and make the wall out of marshmallows. My guess is that most of you would allow yourselves to drive at a much higher speed before decelerating. Why? Because you have more distance to slow yourself down, and the mechanism to slow yourself down is more effective. Slowing down a golf swing is similar: Your range of motion is greater and your joints are stronger at the end range.

Rotational resistance and deceleration training can achieve this potential only when performed on a body that has already built the prerequisite mobility (joint and body control) discussed in chapter 4. Trying to do this in reverse order would significantly limit potential golf fitness gains and increase injury probability.

HALF SIDE PLANK HIP SERIES



Execution

1. Lie on your right side, supported by your right forearm and knee. Bend your right knee to 90 degrees and lift your hips. Lift the left leg so it is parallel to the ground. Your head, hip, and the foot of the top leg should form a straight line.
2. Hold this position for 10 seconds.
3. Slowly lower the left leg to the ground while keeping the hips off the ground and lifted to the ceiling. Lift the top leg so it is parallel to the ground. Repeat 8 to 10 times.
4. Lift the left leg in the air so it is parallel to the ground and hold it there. Lower the right (bottom) hip 1 inch (2.5 cm) toward the ground; don't move at the shoulder. Lift the right hip up again and repeat until you complete the desired number of repetitions.
5. Repeat on the other side.

Muscles Involved

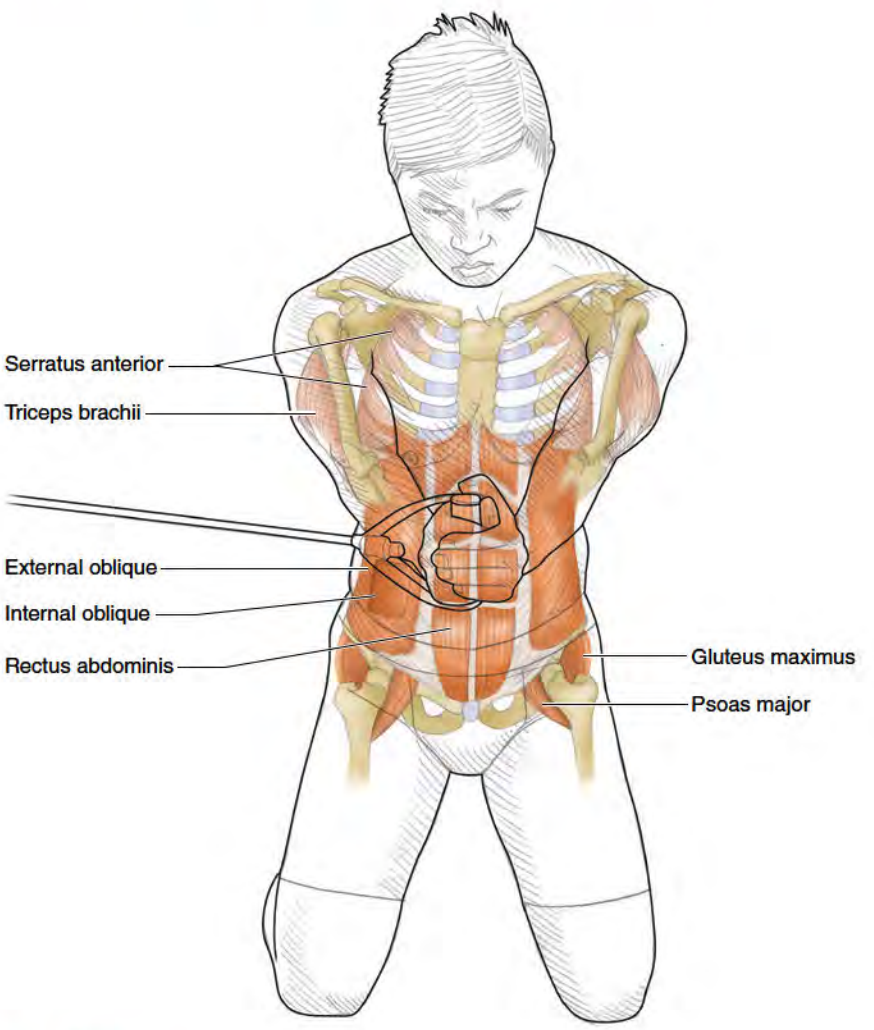
Primary: Gluteus medius, deltoids

Secondary: Rotator cuff (infraspinatus, supraspinatus, subscapularis, teres minor), internal oblique, external oblique, quadratus lumborum, trapezius

GOLF FOCUS

One of the main problems amateur golfers have is not being able to drive hard onto their target side through the downswing. They also lack sufficient hip rotation and the ability to stabilize the pelvis at impact without sliding toward the target. This move requires a tremendous amount of strength in the hip and pelvic stabilizers. The half side plank hip series is a great exercise to develop strength throughout the entire pelvic region. When these movements become easier in the gym, you will definitely notice more stability as you move through the swing on the course.

KNEELING PALOFF PRESS



Execution

1. Tie a resistance band around an immovable object so it is about chest high when you are on your knees.
2. Move away from the attachment point until a reasonable amount of tension develops in the resistance tubing. The level of resistance can be increased as you adapt and become better at this exercise.
3. Kneel with the object on your right, hips hinged as if addressing a golf ball. Maintain this spinal position for the entire exercise.
4. Hold the resistance band in both hands, with your hands pushed straight out in front of your chest. Because of the hip hinge, your hands will point slightly toward the ground.

5. Bend your elbows and bring your hands back toward your sternum while resisting any rotation.
6. Return your arms to the straight-arm position. Repeat 8 to 15 times, depending on the resistance and your ability.
7. Turn your body around so the object is on your left side and repeat.

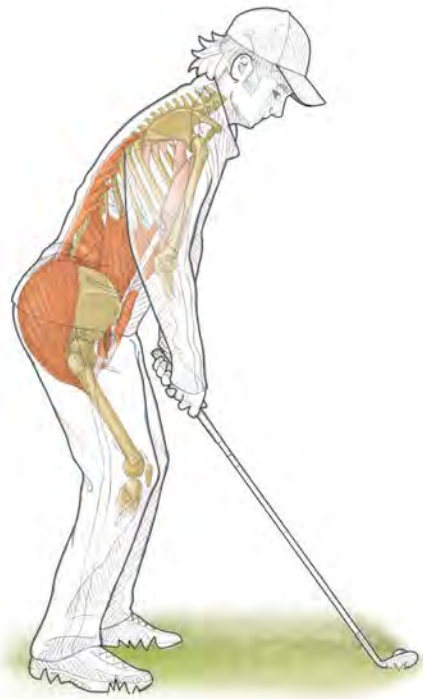
Muscles Involved

Primary: Psoas major, rectus abdominis, erector spinae (iliocostalis, longissimus, spinalis), gluteus maximus, external oblique, internal oblique

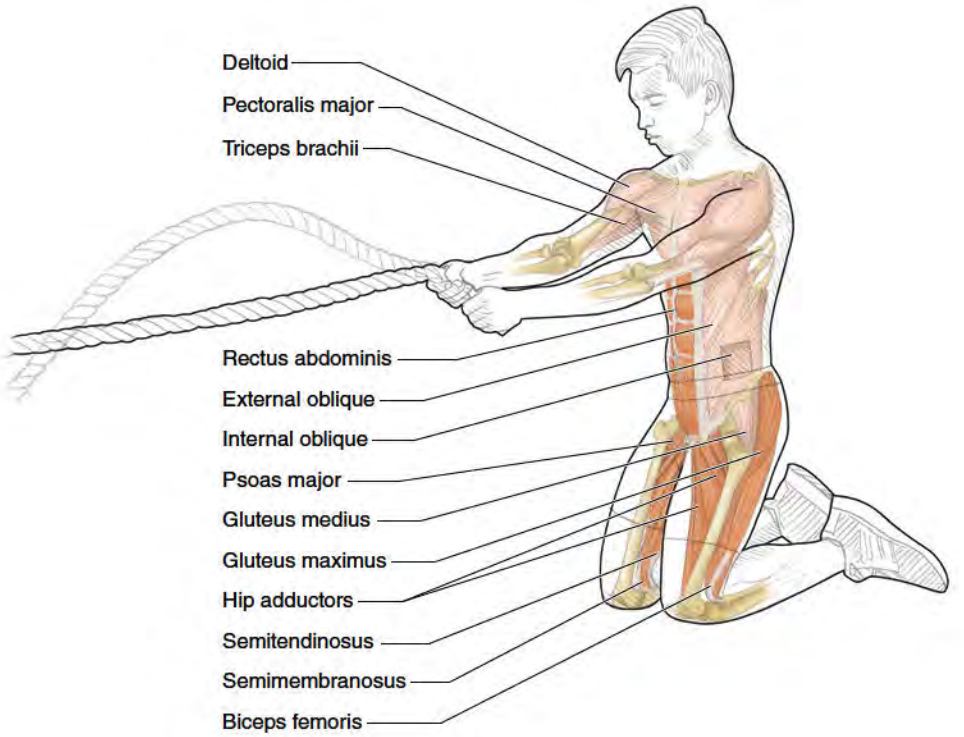
Secondary: Serratus anterior, triceps brachii

GOLF FOCUS

If the strength to slow down the body after impact is not developed, the rotational forces within the swing will pull the body out of position, resulting in poor swing planes and increasing stress to the joints. This exercise will help you create the neurological control and strength necessary in the big muscles of the pelvis and torso to protect the spine and slow down the club and body postimpact. As you improve the execution of this exercise, increase the resistance in the band so you can start mimicking the intense rotational forces present when crushing the ball with your driver.



KNEELING BATTLE ROPE: BEAT THE WAVE



Execution

1. Kneel on both knees with your head, spine, hips, and thighs stacked on top of each other. Remain as tall as possible throughout the exercise. (Don't bend at the hips!)
2. Hold one end of a battle rope in both hands while facing your workout partner.
3. Keep your elbows straight and directly in front of you during the entire exercise, trying to resist any movement.
4. Have your partner rapidly move the rope in vertical, horizontal, or diagonal waves.
5. Attempt to resist any motion created by these waves for 30 seconds. Repeat 3 times.

Muscles Involved

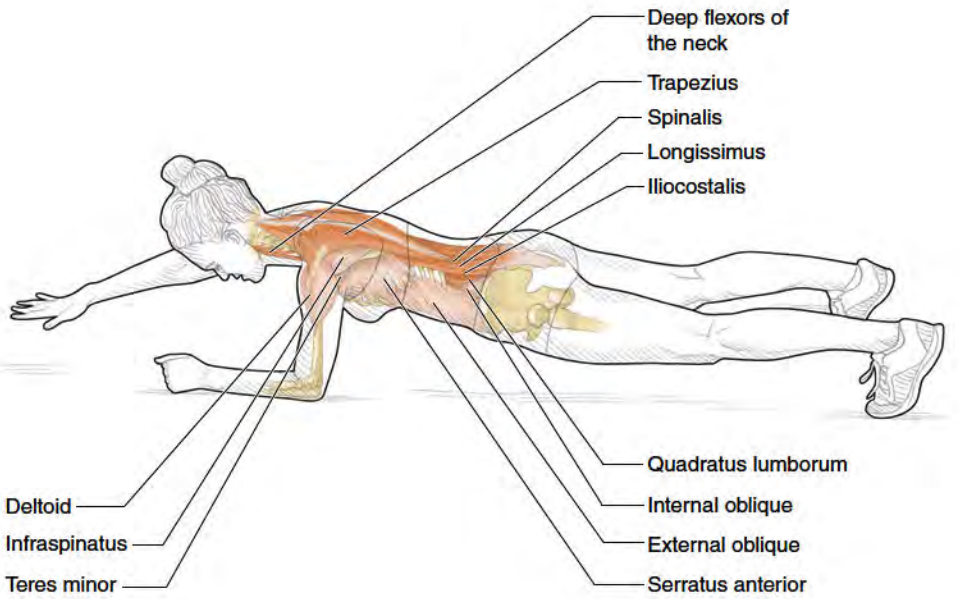
Primary: Hip adductors, gluteus maximus, rectus abdominis, psoas major, hamstrings (semitendinosus, semimembranosus, biceps femoris)

Secondary: Gluteus medius, deltoids, internal oblique, external oblique, pectoralis major, triceps brachii

GOLF FOCUS

When you play a course like Augusta, or any number of hilly courses around the world, the odds of you finding a flat lie anywhere other than a tee box is often quite low. So, your body needs to not only generate force while the spine is in various tilts and positions but also must also resist forces that act on it from any number of angles. By "beating the wave," you are building a body that can handle any of the unpredictable postures and high loads it will experience next golf season!

ALTERNATING ARM REACH IN ABDOMINAL PLANK



Execution

1. Begin in a push-up position, on your hands and toes.
2. Bend your elbows to 90 degrees and support your body on your forearms and toes. Your elbows should be under your shoulders and your palms flat on the floor.
3. Pull your chin in slightly, as if you were making a double chin, and keep the top of your head, spine, and legs in a straight line.
4. Reach your right arm out in front of you and straighten it. Your hand should be about an inch off the ground. Pause for a second. Return the right arm so that the forearm is back on the ground and repeat with your left arm.
5. Perform 5 to 12 repetitions per side.

Muscles Involved

Primary: Erector spinae (iliocostalis, longissimus, spinalis), quadratus lumborum, rectus abdominis, deep flexors of the neck, trapezius

Secondary: External oblique, internal oblique, serratus anterior, deltoids, rotator cuff (infraspinatus, supraspinatus, subscapularis, teres minor)

GOLF FOCUS

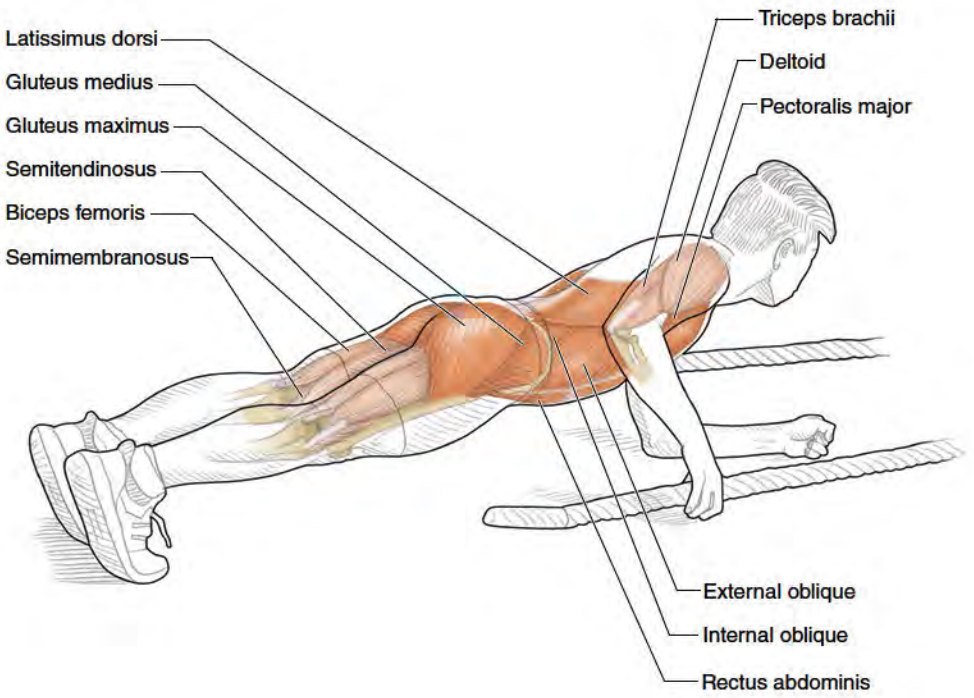
Whether you are carrying your bag or pushing a cart around the golf course, you need a strong support system for your pelvis and core because they resist the pull of gravity. The reaching abdominal plank exercise forces the arms, shoulders, torso, pelvis, and hips to work together to maintain a neutral alignment and build strength and resiliency within the body.

VARIATION

Alternating Arm Reach in Kneeling Abdominal Plank

If you struggle to keep your pelvis and spine neutral when performing this exercise or if you struggle from back or shoulder pain, you can modify the exercise and reduce the stress to the body by putting your knees on the ground. This will shorten the distance between your support (knees instead of toes) and the spine, reducing the difficulty. This modification is a great way to focus on your alignment and for anyone returning from injury.

BATTLE ROPE PULL IN PLANK



Execution

1. Loop the battle rope around an immovable and smooth object, such as a post from a squat rack. Set up the rope so that only a couple feet of rope are on the right side of the pole (short side) and the remainder of the rope is on the left side (long side). Between the two sides of the battle rope, but closer to the right side, set up in an abdominal plank on your forearms and toes.
2. With your right arm completely straight and reaching overhead, grab the short side of the rope. Maintain a long spine throughout the exercise and attempt to avoid pelvic drop, rotation, or tilt.
3. Holding the rope, pull your right hand from the overhead position and along your body until the right hand is near the right hip.
4. Release the rope and reach your right hand overhead again. Repeat the motion. Continue until you have pulled the entire battle rope to the right side, and the left side of the rope is only a few feet long.
5. Slide your body slightly to the left and repeat with the left hand.
6. Repeat, using 2 or 3 lengths of rope on each side.

Muscles Involved

Primary: Gluteus maximus, gluteus medius, internal oblique, external oblique, rectus abdominis, psoas major, latissimus dorsi, pectoralis major, transversus abdominis, quadratus lumborum

Secondary: Triceps brachii, deltoids, hamstrings (semitendinosus, semimembranosus, biceps femoris)

GOLF FOCUS

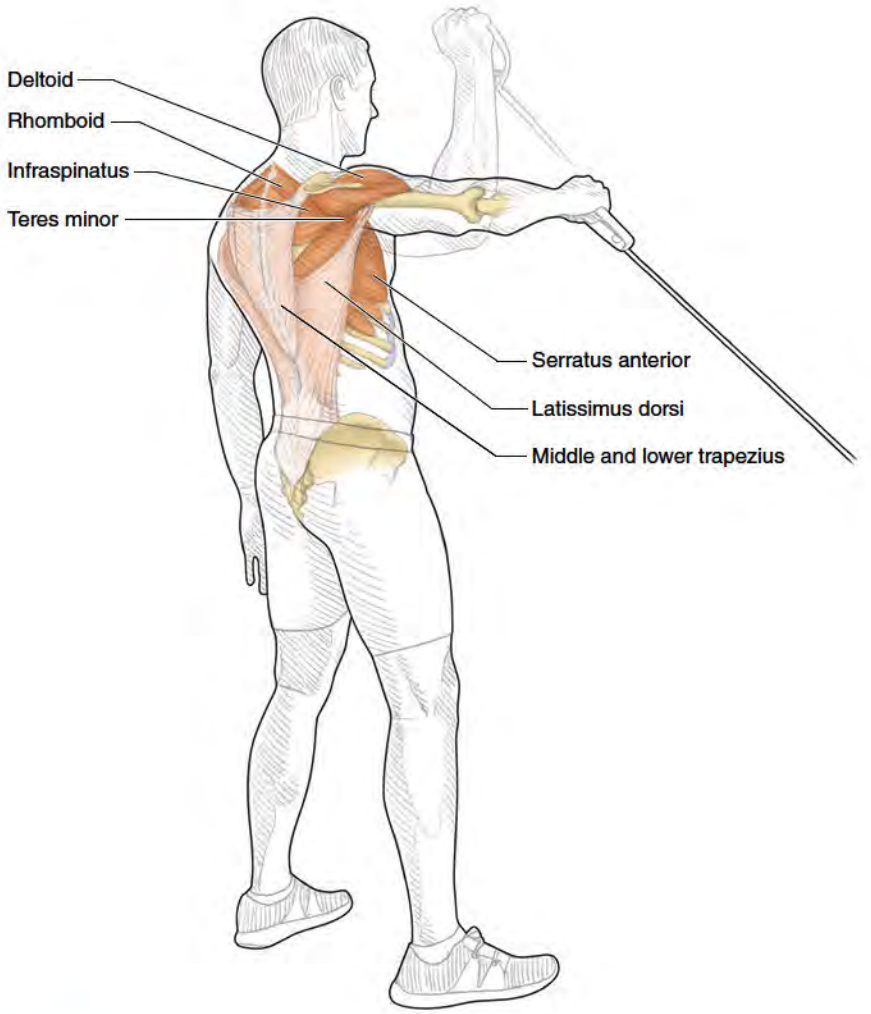
The lead arm pulls the body and club toward the target at the start of the downswing, and the latissimus dorsi muscle is one of the main contributors to this action. Then, as the trail arm moves through impact and across your body into the finish position, the same large muscle on the other side of your body lengthens while trying to slow down the body. The latissimus dorsi attaches to your pelvis and continues to the opposite gluteus maximus. It is instrumental for shoulder, lower back, and pelvis stability, and the battle rope pull in a plank posture allows you to work this muscle through a large range of motion while stressing the spine and pelvis with significant loads like those experienced in the golf swing. Developing efficiency in this exercise will greatly improve your ability to control your body and maintain pelvis, spine, and arm relationships through all phases of the swing.

VARIATION

Battle Rope Pull in Kneeling Abdominal Plank

This exercise is similar to the previous one, except you'll have your knees on the ground instead of your toes. This makes the exercise easier. Again, the key is to keep your spine long and your pelvis level and stable.

STEP BACK INTERNAL SHOULDER ROTATION



Execution

1. Attach a band to an immovable object in front of you, somewhere between the floor and waist height. Stand upright with good posture, holding the tense band in your right hand out in front of you.
2. Set your shoulder blade so that it is depressed and retracted. Rotate your shoulder externally with your right arm out to the right side, so that the shoulder and elbow are at 90 degrees. Your elbow should be positioned around the height of your shoulder, and the forearm should be perpendicular to the ground (the forearm may be leaning forward or backward of perpendicular, depending on the range of your shoulder external rotation).

3. Once the shoulder is set in the proper position, step back without changing arm position to increase the tension in the band.
4. Hold this position for 8 seconds, then *slowly* allow the shoulder to internally rotate until the forearm is parallel to the ground.
5. Return to the start position and perform 8 repetitions. Repeat with the left shoulder.

Muscles Involved

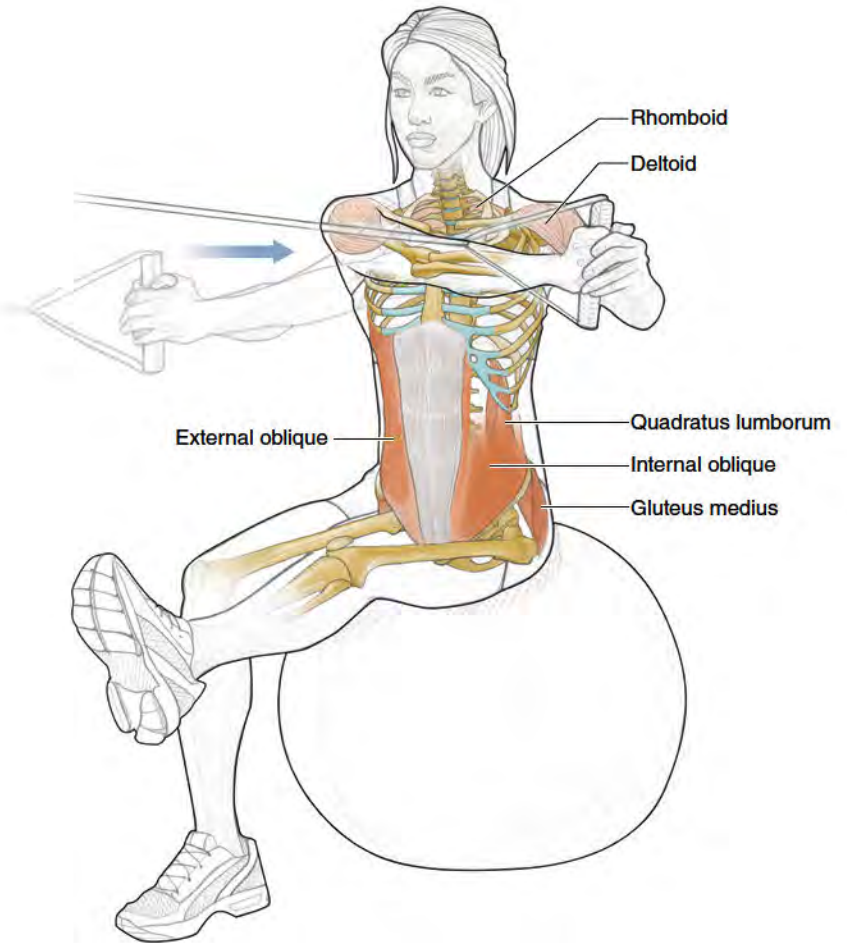
Primary: Infraspinatus, teres minor, rhomboids, deltoids, serratus anterior

Secondary: Latissimus dorsi, middle and lower trapezius

GOLF FOCUS

Shoulder mobility is obviously very important to a good golf swing, but so is your ability to properly rotate the shoulder throughout the swing. As you move into the backswing, the muscles controlling the scapula must be able to stabilize it so that the shoulder can properly and fully rotate. However as the swing continues, you must also be able to properly stabilize the shoulder complex during the transition and then eventually control movement as the shoulder moves into internal rotation. This allows you to stay on path during the downswing and allows you to properly decelerate the club during the follow-through to avoid injury.

SINGLE-LEG HORIZONTAL CHOP



Execution

1. Sit on a stability ball with your left leg off the ground, your right leg on the floor, and your right knee and hip bent 90 degrees.
2. Attach resistance tubing to a stable object directly to your right.
3. Hold the tubing handle in both hands, elbows locked and arms straight out in front of you. The tubing should be at a 90-degree angle to your arms.
4. Keep your head and knees pointing forward while you rotate your torso fully to the left.
5. Perform the desired number of repetitions. Repeat on the opposite side.

Muscles Involved

Primary: Gluteus medius, external oblique, internal oblique, quadratus lumborum, intrinsic muscles of the foot

Secondary: Deltoids, rhomboids, tibialis posterior, fibularis longus

GOLF FOCUS

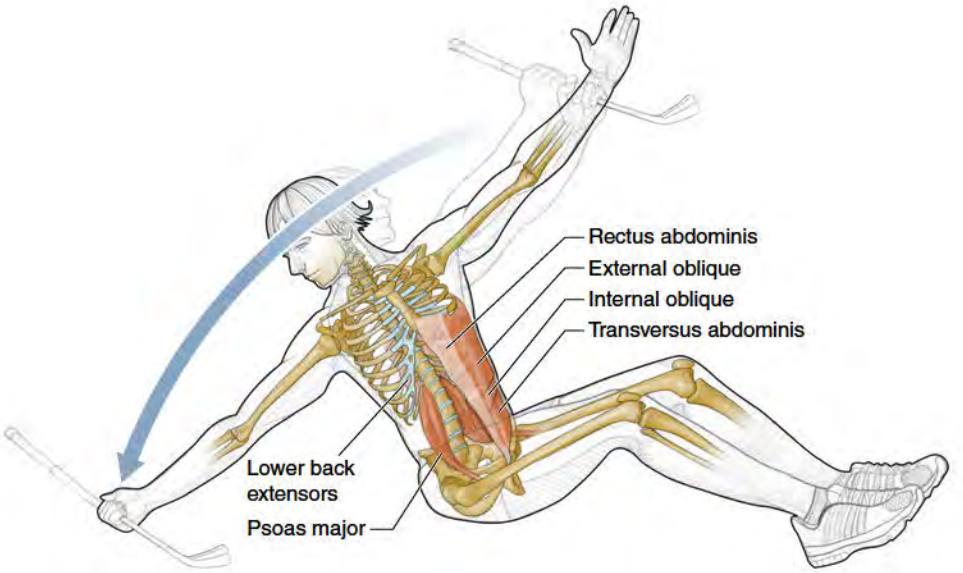
The golf swing presents the body with many challenges because of the large ranges of motion involved and the highly rotational aspect of the sport. Many people do not have difficulty balancing on two feet, but add a high-speed golf swing to the mix, and instability shows in many parts of the body. This exercise begins to strengthen the stability of your hips while incorporating a rotational component with resistance. Every swing you take on the golf course requires you to stabilize your hips as you rotate your torso around them. Without this key ability, many swing faults will develop, and consistent ball striking will never occur. Keep your feet, knees, and hips all in one line during the exercise, without moving from side-to-side. This will help prevent swaying and sliding in your golf swing and give you a solid base from which to swing.

VARIATION

Single-Leg Horizontal Chop With Cable

This exercise can also be performed with an adjustable cable machine and a pulley handle. Place the cable at shoulder height so that it is at a 90-degree angle to your body in the start position. Perform the same motion.

V-SIT WITH ROTATION AND SINGLE-ARM REACH



Execution

1. Sit with your knees bent, legs together, and heels on the ground. Your arms should be straight out in front of you, with both hands grasping a golf club.
2. Lean back slightly until you feel your abs contract. You should have a normal neutral arch in your lower back.
3. Club in hand, reach back with the right arm, rotating your torso and head at the same time.
4. Contract the abdominals on the left side and return to the start position.
5. Perform 5 to 8 slow repetitions or until you are not able to maintain the neutral spine position of the lower back.
6. Rest and repeat on the left side.

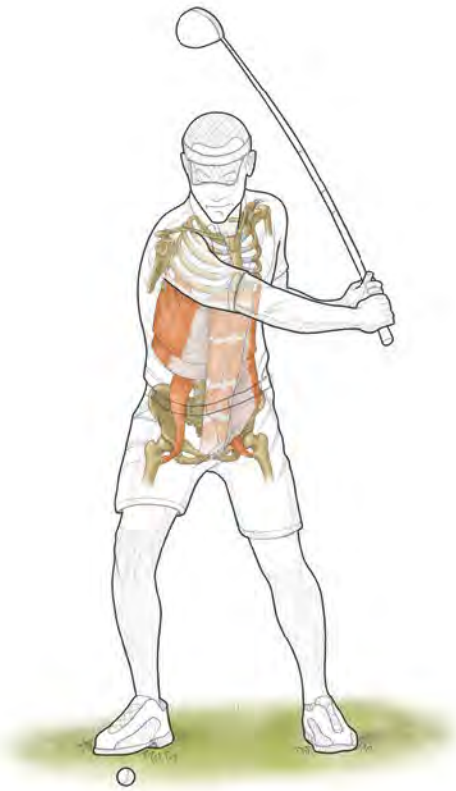
Muscles Involved

Primary: Psoas major, transversus abdominis, internal oblique, external oblique

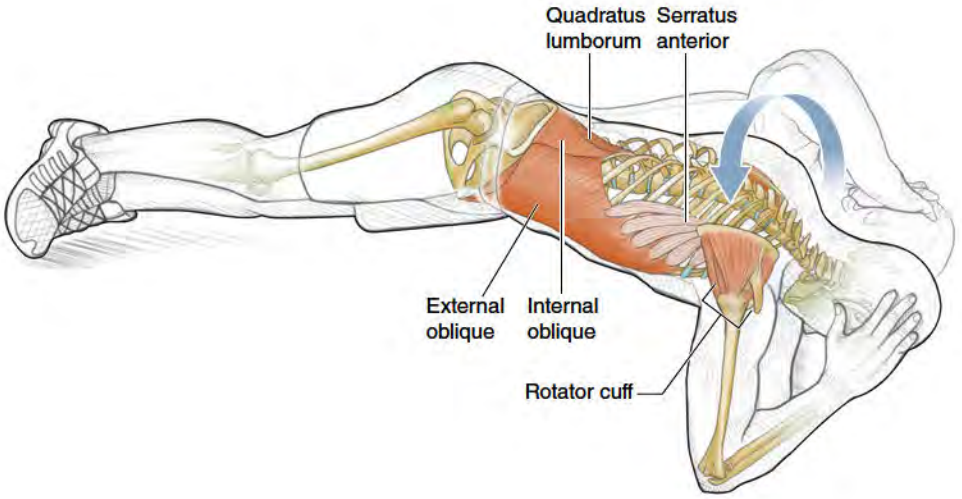
Secondary: Lower back extensors, rectus abdominis

GOLF FOCUS

Maintaining a large radius with a straight lead arm as the downswing begins requires tremendous control of the spine and a great deal of flexibility in the pelvis, abdominal, and shoulder regions. A limitation in any of these areas will result in a shortened radius (bent elbow) between the shoulder and hand. This results in poor sequencing and decreased power generation. A loss of radius also requires other compensations throughout the body to get the club face square at impact.



ROTATING SIDE PLANK



Execution

1. Get into a full side plank position on your left forearm, and place your right hand behind your head.
2. Slowly turn your torso, hips, and right elbow toward the floor, moving your torso and hips as one unit.
3. Generate the movement with your obliques and left shoulder. Do not just move your elbow.
4. Slowly return to the start position, focusing on using the same muscles in a controlled manner.
5. Perform the desired number of repetitions. Repeat on the opposite side.

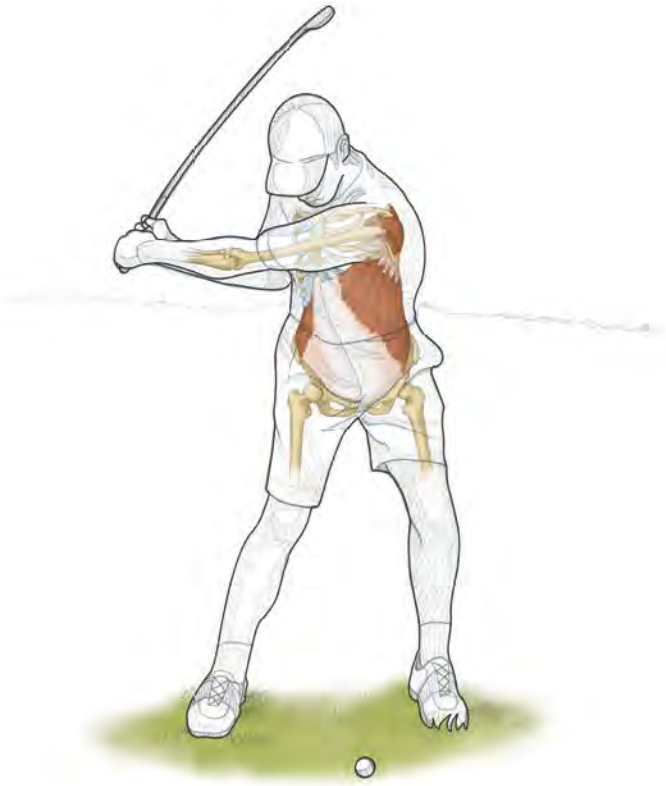
Muscles Involved

Primary: External oblique, internal oblique, quadratus lumborum, rotator cuff (infraspinatus, supraspinatus, subscapularis, teres minor)

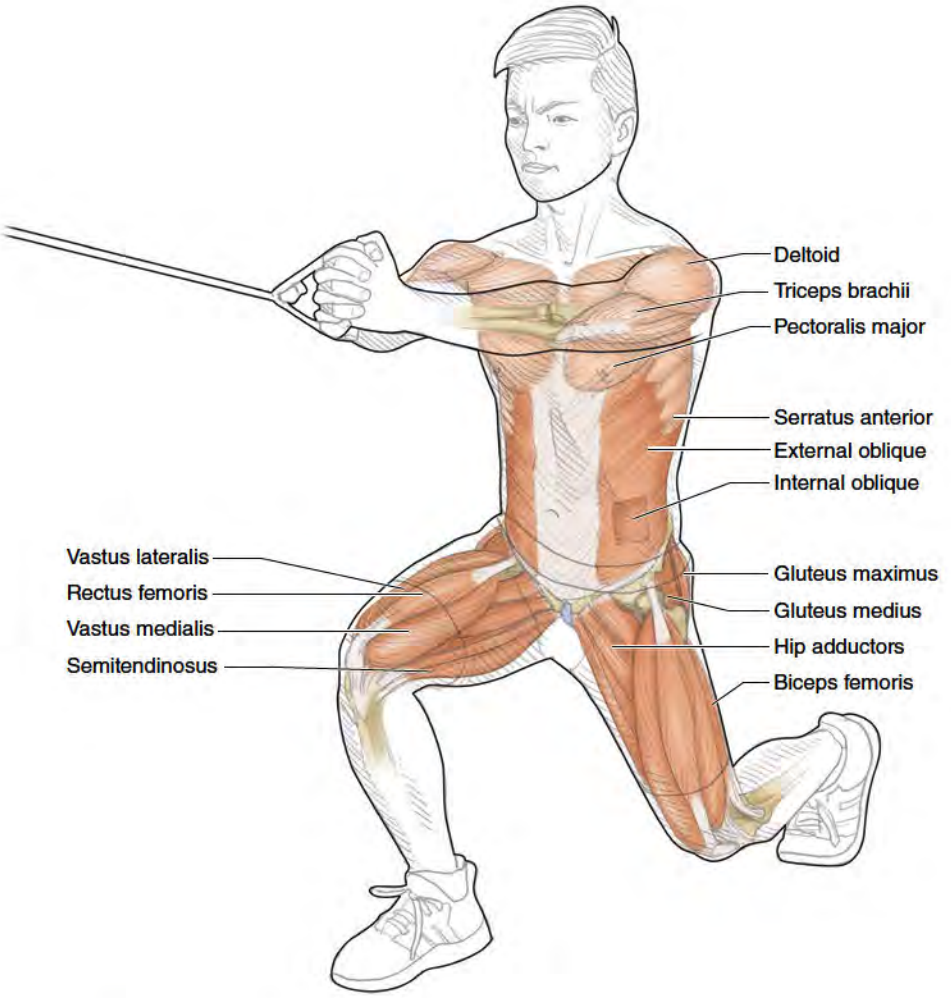
Secondary: Serratus anterior

GOLF FOCUS

On long holes, you will have to take a powerful second shot with a long club to get close to the green. This requires increased precision with your movements as well as an increased ability to generate power. Rotating side planks not only train the muscles that assist with pelvis and torso stability but also strengthen your shoulders. This will improve your ability to create club lag to generate increased club-head speed. As club length and swing speed increase, more strength is needed to maintain proper technique. When performing this exercise, concentrate on using your obliques and shoulder muscles to complete the movement. This precision during the exercise will train your muscles for a good carryover into your swing.



ANTIROTATIONAL BACK LUNGE



Execution

1. Attach a band or tubing to an immovable object at waist height.
2. Stand so the tubing attachment is to your right. Hold the handle in both hands.
3. Step sideways, away from the tubing attachment, to create light tension in the tubing.
4. Push the handle away from your body so that both arms are straight and the handle is aligned with the midline of your body. You will attempt to keep the handle in this midline position throughout the exercise.

5. Step back with your left leg into a back lunge and then return to a standing position.
6. Repeat with your right leg.
7. Perform 5 to 10 repetitions per leg.

Muscles Involved

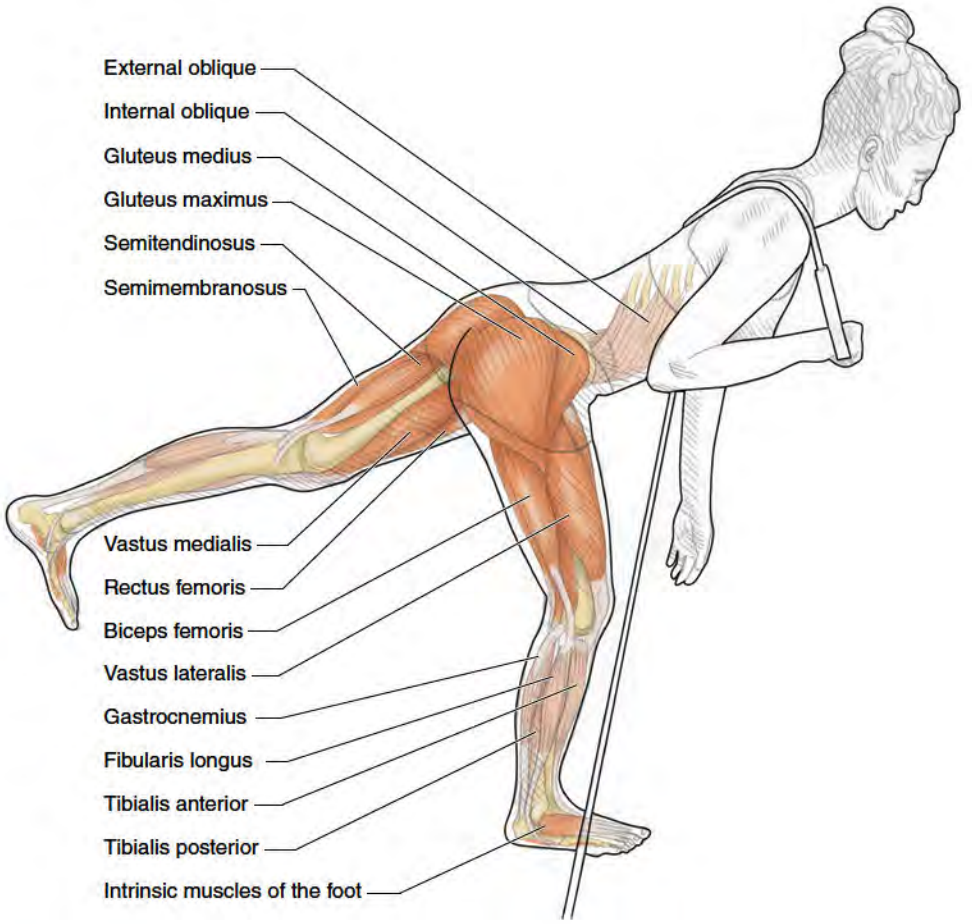
Primary: Gluteus medius, hip adductors, quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), hamstrings (semitendinosus, semimembranosus, biceps femoris), gluteus maximus, external oblique, internal oblique

Secondary: Deltoids, serratus anterior, pectoralis major, triceps brachii

GOLF FOCUS

Resisting trunk rotation in transverse, sagittal, and coronal planes while using the big muscles of your legs, hips, core, and shoulders is exactly what is required to slow the body down after impact has been made with the ball. One of the things underappreciated in elite ball strikers is how big their glutes, quadriceps, and hamstrings are. Kevin Chappell, Gary Woodland, Byeong-hun An, Henrik Stenson, Rory McIlroy, and Jon Rahm all have these muscles in abundance. The legs are the key to both generating speed and slowing it down.

ANTIROTATIONAL ROMANIAN DEADLIFT



Execution

1. Attach a band to an immovable object near the ground to your right. Wrap the band across the front of your body, under your left shoulder, and around the top of your back. Grab the band with your right hand. Keep your right elbow bent and by your right side.
2. Stand on your right foot with your knee slightly bent. Lift your left foot about 6 inches off the ground.
3. Keeping your entire spine straight, bend forward at the waist while bringing your left leg behind you. Your head, spine, and the elevated leg should maintain their relationship with each other throughout the exercise. This

means the distance between the heel of the elevated leg and the top of your head should remain constant.

4. Return to the start position. Avoid any rotation in your body the entire time.
5. Perform 8 to 10 repetitions and then repeat on the opposite side.

Muscles Involved

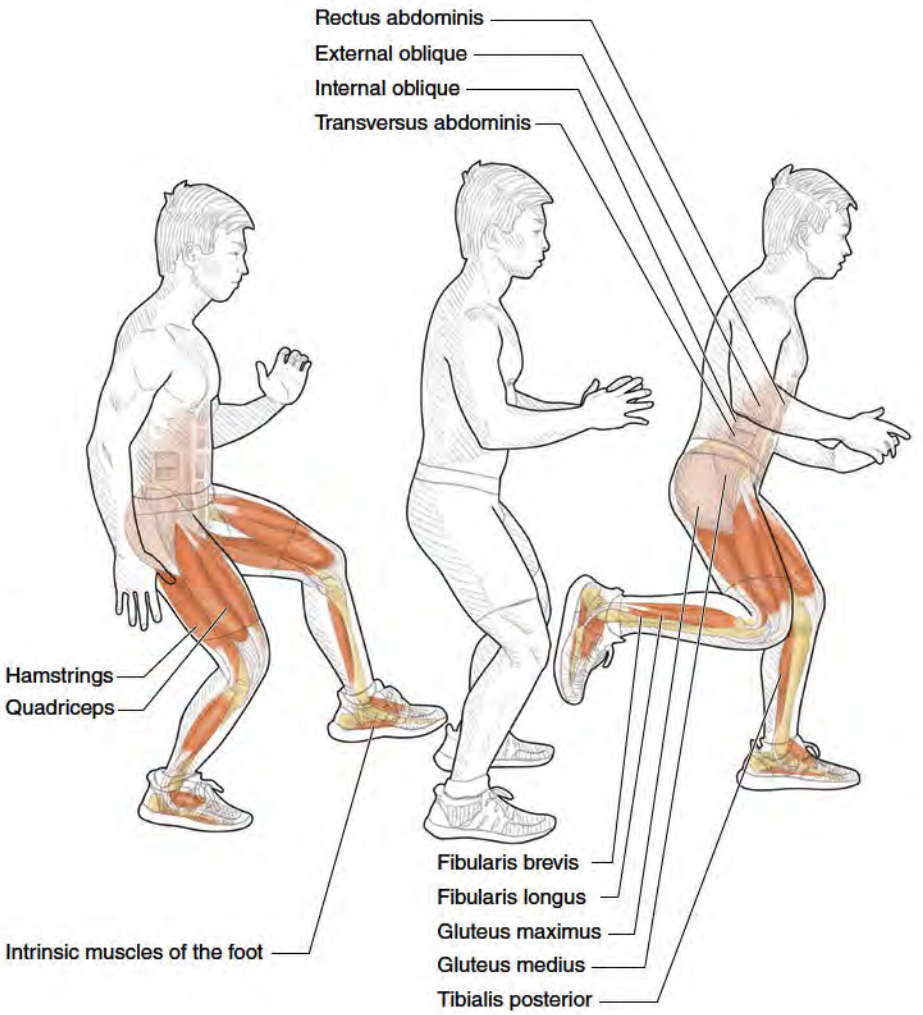
Primary: Intrinsic muscles of the foot, gluteus maximus, gluteus medius, hamstrings (semitendinosus, semimembranosus, biceps femoris), quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius)

Secondary: Tibialis posterior, tibialis anterior, fibularis longus, external oblique, internal oblique, gastrocnemius

GOLF FOCUS

Many golfers are not able to control their spines as loads and forces increase. One of the main reasons for this is that we live primarily in a sagittal plane world, and our bodies often do not experience transverse and frontal plane movements, never mind high forces through these planes. The antirotational Romanian deadlift challenges the body through all planes and helps build resiliency in the spinal, pelvic, shoulder, and foot stabilizers. There is a lot of value with this exercise when you learn to master it; you will be able to control your spinal position despite the high velocity and forces in the swing.

FORWARD AND BACK DECELERATION JUMPS



Execution

1. Stand in an athletic position, with your feet pointing straight ahead, knees slightly bent, and spine upright.
2. Step, or slightly jump, forward with your left foot. Land only on your left foot, bending your left knee to help absorb the force. Make sure to keep your knee over your foot and don't let your hips sway to the side.

3. Once you're stable, step or slightly jump backward with your right foot. Land on your right foot, just as you did with your left foot.
4. Perform 8 to 10 repetitions. Switch sides so you move forward with your right foot and back with your left foot. Do 8 to 10 repetitions.

Muscles Involved

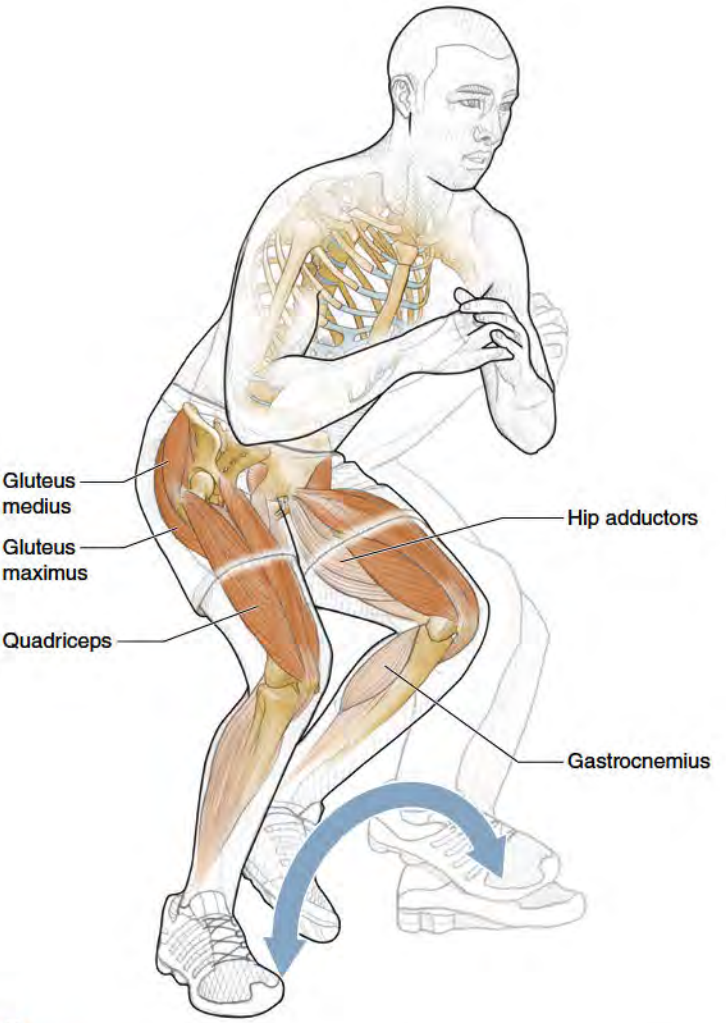
Primary: Quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), hamstrings (semitendinosus, semimembranosus, biceps femoris), fibularis longus, fibularis brevis, intrinsic muscles of the foot, tibialis posterior

Secondary: Transversus abdominis, internal oblique, external oblique, gluteus maximus, gluteus medius, rectus abdominis

GOLF FOCUS

Learning how to absorb different directions of force through your foot, pelvis, and core makes it easier to adjust and control your body as you drive down into impact and rapidly decelerate the club, regardless of the club you are using or the lie experienced. The deceleration jumps challenge the muscles along the back, front, and sides of the body to help create balance and resilience. This lets you take a bigger swing and have the confidence your body will respond accordingly.

LATERAL STEP INTO LATERAL BOUND



Execution

1. Stand mostly on your right foot with your knees slightly bent.
2. Take a big step to the left. Land on your left foot, with your left knee slightly bent, your right knee bent, and your right foot about 12 inches off the ground. Do not allow your hip or torso to move to the outside of your left foot.
3. Step or jump back to the right and repeat. Perform 5 to 15 repetitions per side, depending on your progression and the distance you are jumping.
4. Over time, you will be able to do this exercise without drifting or swaying on the landing. This may take days, weeks, or months, depending on your beginning capabilities. Once you are able to do this, progress to a side-to-side hop and eventually to full bounding or jumping side-to-side.

Muscles Involved

Primary: Gluteus medius, gluteus maximus, quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius)

Secondary: Gastrocnemius, hip adductors

GOLF FOCUS

Creating power within the golf swing comes from your ability to generate speed from the ground and transfer it to the club head. An efficient transfer allows you to hit the ball with all the power you create during the backswing and downswing. As you move into the transition phase of the swing, power is generated as weight distribution shifts to your lead leg. Your lower body initiates this power drive, and once you stabilize your hips, this same energy is transferred up the chain until it eventually reaches the club head. This exercise will help you generate more power from your lower body as well as stabilize it more effectively so all the energy you create within the swing is sent to the ball at impact. This ultimately leads to a more powerful swing and increased distance. The beautiful thing about the lateral step and lateral bounding exercises is they teach you to not only accelerate but also decelerate!

VARIATIONS

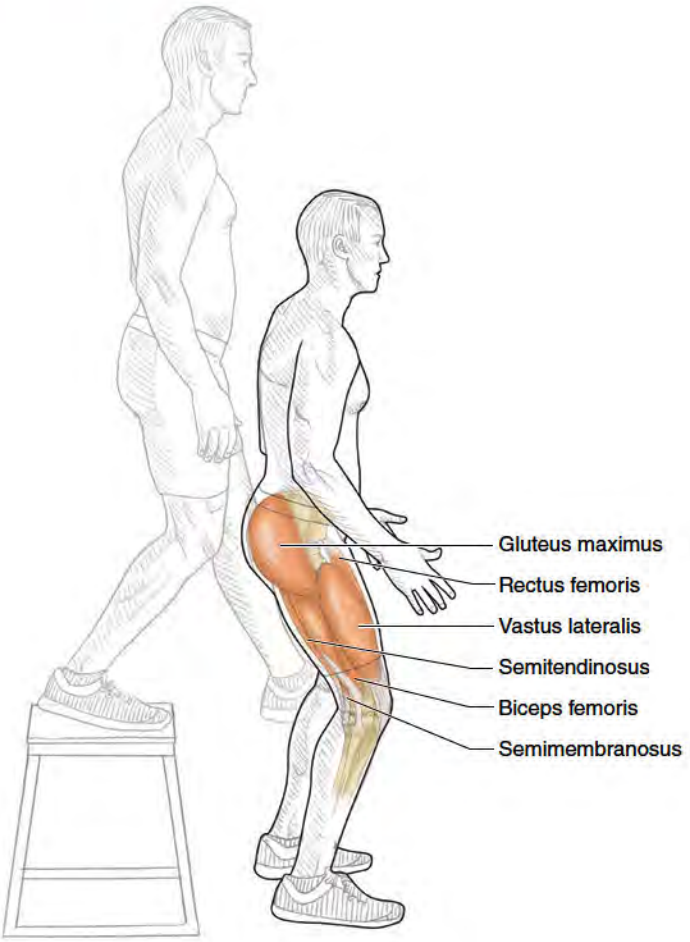
Lateral Bounding With Medicine Ball

Using a medicine ball provides increased resistance and creates a more intense balance challenge since the arms cannot be used for stability. Hold the medicine ball just in front of your chest, with your elbows bent.

Lateral Bounding With Turns

This simple addition will greatly challenge your balance and stability as well as help you work on your golf turns. Once you land, place your arms across your chest and rotate your torso, first toward the stance leg and then to the opposite side.

DEPTH DROP



Execution

1. Stand on top of a bench or plyometric box.
2. Step off the bench or box and land with your feet approximately hip-width apart while allowing your hips and knees to bend as you lower into a squat position.
3. Attempt to use as little a squat as possible to slow the body's descent and make sure to use your entire foot during the landing so that you don't put all your body weight on your toes.
4. Stand back on top of the bench and do the desired number of repetitions (5 to 10 repetitions).

5. As you become better at slowing down your body over weeks and months of training, you can stand on progressively higher plyometric boxes to increase the load and difficulty.

Muscles Involved

Primary: Quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), gluteus maximus, hamstrings (semitendinosus, semimembranosus, biceps femoris)

Secondary: Hip adductors

GOLF FOCUS

One of the components of any good golf swing is having the leg strength to transfer body weight onto the lead leg and extend the hips up through impact. This move creates a tremendous amount of force applied against the ground, which in turn applies it back to the golfer. This is the initial step in creating power within a golf swing. At the same time, you must be able to resist various forces to keep proper posture throughout the swing. The depth drop will help develop leg and hip strength while requiring the muscles in these areas to work eccentrically to decelerate your body. Externally rotating the feet makes it easier to move the hips through the lowered position and often applies less stress to the knees.

VARIATION

Depth Squat With Weight Vest

An easy way to add a greater level of difficulty to the depth drop exercise when you don't have a taller bench or box to stand on is to add a weight vest. The weight vest maintains the added mass close to your center and allows your arms to move as needed to decelerate your body.

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6

STRENGTH FOR INCREASED DISTANCE

Determining the level of strength a player must have to play his best is difficult. Some of the longest hitters on the PGA Tour would not be considered overly impressive in the weight room, yet smaller players, such as Justin Thomas and Rickie Fowler, are still able to create incredible club speeds and move the ball long distances. What makes this possible? Other players, such as Dustin Johnson and Bubba Watson, are able to use their long limbs and levers to use physics and geometry to create high club-head speeds. DJ looks at home in the gym while Bubba does not. By contrast, Rory McIlroy, Jason Day, Jordan Spieth, and Kevin Chappell emphasize the gym in their training programs to help minimize the stress of the golf swing on their bodies and get a competitive edge with the ability to smash the ball out of the rough when required.

In over a decade working on the PGA Tour, we have seen the positive effects of strength training on player performance. However, some players focus heavily on a strength-based program and improve dramatically in their gym performance but see minimal improvement on the golf course. In some extreme cases, players lost distance and suffered more regular injuries after performing a strength-focused training program. Why do some players excel and other fail when it comes to using strength training to improve on-course capability and performance?

In most cases, the answer is surprisingly simple. Players who have seen incredible success after focusing on a strength-based training program had previously, or simultaneously, developed the required mobility, body awareness, and neurological control necessary to perform strength-based exercises properly and allow movement through the preferred range of motion in the golf swing. The players without successful carryover of strength training did not. The category of former PGA Tour players is littered with golfers who tried to improve themselves in the gym but did not appreciate the necessity of building a competent base of mobility and body control before focusing on strength enhancements. Many of these players developed injuries and regressed or merely maintained their levels of performance.

Golfers can be above average in strength in the gym while training with machines or free weights, but if they are not able to transfer that gym strength to the golf course, they are wasting a great deal of the time they spend on fitness. Traditional bodybuilding has little to no place in developing a strong body for golf. It is focused too much on individual muscles and not on movement.

The brain stores movements at a much greater capacity than it stores the understanding of individual muscles. When specific areas in the brain are activated or signaled, a motor program (movement) occurs. Athletic movements and daily activities require multiple areas of the body to work simultaneously or in coordination, so traditional body-part focused training has little place in an athletic training program.

Additionally, most traditional strength and power training programs involve the arms and legs moving together in the same direction and with the same joint angles. Upper body examples include the bench press, pull-up, pull-down, triceps pull-down, and dip. Each exercise requires a stable or stiff thoracic spine to support the movement. The problem is very few athletic scenarios require a stiff thoracic spine with both limbs moving in the same way. Throwing a ball, taking a golf swing or a shot in hockey, swinging a bat, running, and throwing a punch all involve the athlete's thoracic spine moving (flexing, extending, rotating) to effectively position the extremities while one arm pulls and the other arm pushes. Traditional training exercises do not encourage this type of movement among the affiliated joint complexes. In fact, these exercises promote the opposite pattern, and the result can often be seen in the stiff gait exhibited by long-time gym rats who walk with almost no motion in the trunk and with an arm swing isolated to the glenohumeral joint (shoulder).

We are not saying that muscle strength does not matter, but if the individual muscles cannot communicate and work with each other, that strength will be useless in a golf swing. For this reason, it is crucial to formulate your fitness routine with exercises that not only improve individual muscle strength but also improve the way muscles work together. This is what we mean by creating functional strength and not just raw strength (figure 6.1).

With a progressively younger, more athletic, and better-trained athlete becoming the norm on the PGA Tour, a golfer's body has to move as well as possible to keep up. One of the main reasons 40-year-old Henrik Stenson was able to win a legendary duel with 46-year-old Phil Mickelson at the 145th Open Championship was because of the priority both players placed on their bodies for years before competing in that major championship. These two athletes illustrate one of our observations over a decade of working on the PGA Tour: Proper mobility and body awareness are an important part of an athlete's training program.

To be truly strong in golf, you need strength through the entire range of motion involved during the golf swing. A weakness at any joint through any section of the motion will create a breakdown in the golf swing. Lifting weights in one plane using a bench or traditional machines greatly limits the functional strength you can develop and eliminates the need for your body to create and maintain stabilization through a full range of motion while performing an exercise. This

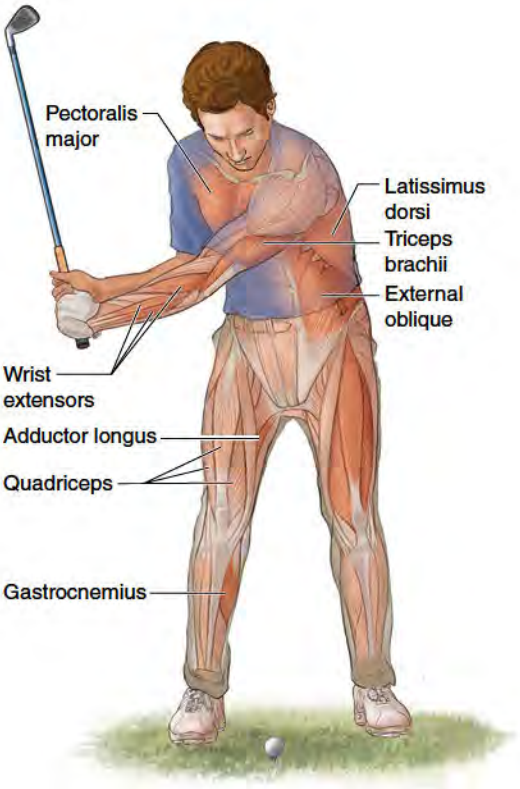


FIGURE 6.1 Functional strength requires muscles to communicate with each other throughout the swing.

ability to stabilize the body while in motion is needed in golf and therefore must be heavily incorporated into your exercise routine. With this as part of your strength training focus, the strength you gain in your fitness training begins to have a much greater carryover to the golf course.

For this reason, we have formulated this chapter to include exercises that expand on movements and concepts described in the previous chapters and combine them into more functional movements. The exercises in this chapter should be performed only when the exercises in the mobility (chapter 3), balance and proprioception (chapter 4), and rotational resistance and deceleration (chapter 5) chapters can be completed comfortably and with good form. If you have already developed the prerequisite level of body control and are able to perform the exercises in the strength and power chapters easily, you are sure to see incredible benefits after the movements in this chapter are incorporated into your training program.

Many people think that golfers do not need to be strong since they are not running, jumping, or knocking over other people. This attitude is probably because the word *strength* typically conjures up images of a guy with huge

muscles benching 300 pounds (135 kg) in the gym. Although this is one form of strength, there are many others. We have already explained that golfers require *functional* strength to perform at the highest levels. There is also another key reason that strength is important: injury prevention.

The average person would never associate *golf* with *injury*. However, as all professional golfers and avid amateur players know, injuries are prevalent throughout the sport and in fact are almost inevitable. The statistics on injuries at the touring level are staggering. About half of all touring professional golfers will have some injury each year that will cause them to miss many weeks of golf. Of those playing, up to 30 percent are actually playing injured. Those numbers are very high, and any injury in a given year can be the difference between keeping the tour card or not. For touring professionals, the tour card is their job ticket. Lose the card, lose the job. For nonprofessional golfers, an injury may mean missing many months of golf or, even worse, deciding to quit golf altogether. For these reasons alone, you should increase your golf strength so you can prevent injuries as much as possible.

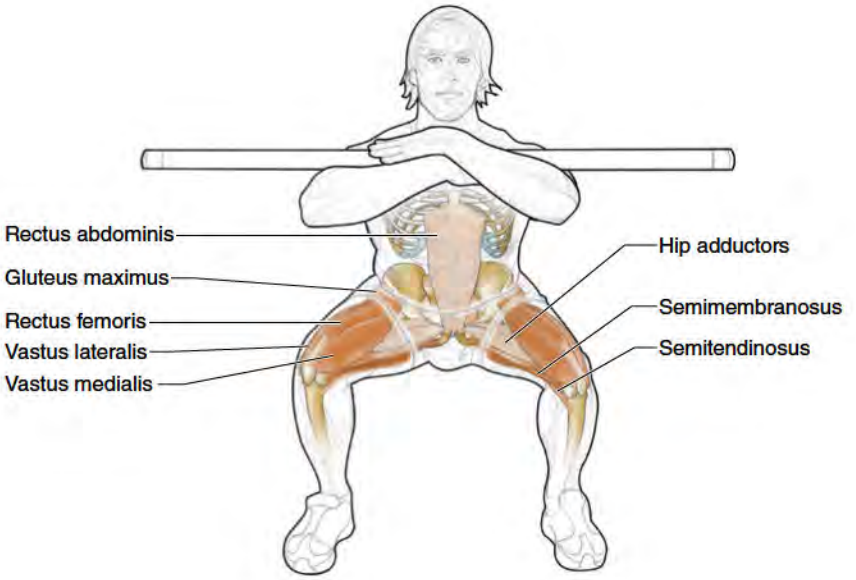
Two types of injuries occur in golf: connective tissue and muscle injuries. Although there are no heavy loads to carry or move in golf (unless you are a caddy!), very high forces develop because of the speed of the swing. The muscles and joints not only help create these forces but also must be able to generate opposing forces to slow down and ultimately stop the swing. As muscle

strength—both individual and functional—increases, so does your ability to withstand the forces in the golf swing. If you do not possess adequate strength and resiliency in the muscles and connective tissue to create and slow down these forces, then injury is sure to occur.

By properly incorporating the exercises in this chapter into your exercise program, you will see rapid improvement in both your confidence and physical competence in your golf swing. As an added bonus, you avoid taking time off because of injuries, which would slow down the progression of your game. As your success with these exercises improves, so will the ease with which you are able to control your body on the course. Become *functionally strong* and you will become *golf strong*!

Initially perform the following exercises with a load that allows 8 to 12 repetitions. For exercises that require resistance tubing, cable machines, or free weights, start with a low resistance that allows you to complete 3 sets of 12 repetitions per set. When you can complete 3 sets of 12 repetitions, increase the resistance or weight and complete a lower number of repetitions, but be sure you are able to maintain appropriate form throughout. For exercises that require only body weight, begin with 2 or 3 sets of 6 to 8 repetitions. Once you can easily complete 3 sets of 8 repetitions, increase to 10 repetitions. Some exercises may require other ranges of repetitions. In these cases, the number of repetitions is included with the exercise instruction.

FRONT SQUAT



Execution

1. Stand with your legs about shoulder-width apart and your feet slightly turned outward. Hold a bar across your chest with your arms crossed to support the bar. Elbows should be shoulder-height, if possible.
2. Your knees should face straight ahead and be above the ankles, not dropping in toward the center.
3. Lower into a squat position by pushing your buttocks backward while simultaneously pushing your knees laterally. Your heels and big toes should remain on the ground, with a noticeable arch under your feet.
4. Push into the ground and return to the start position. Repeat.

Muscles Involved

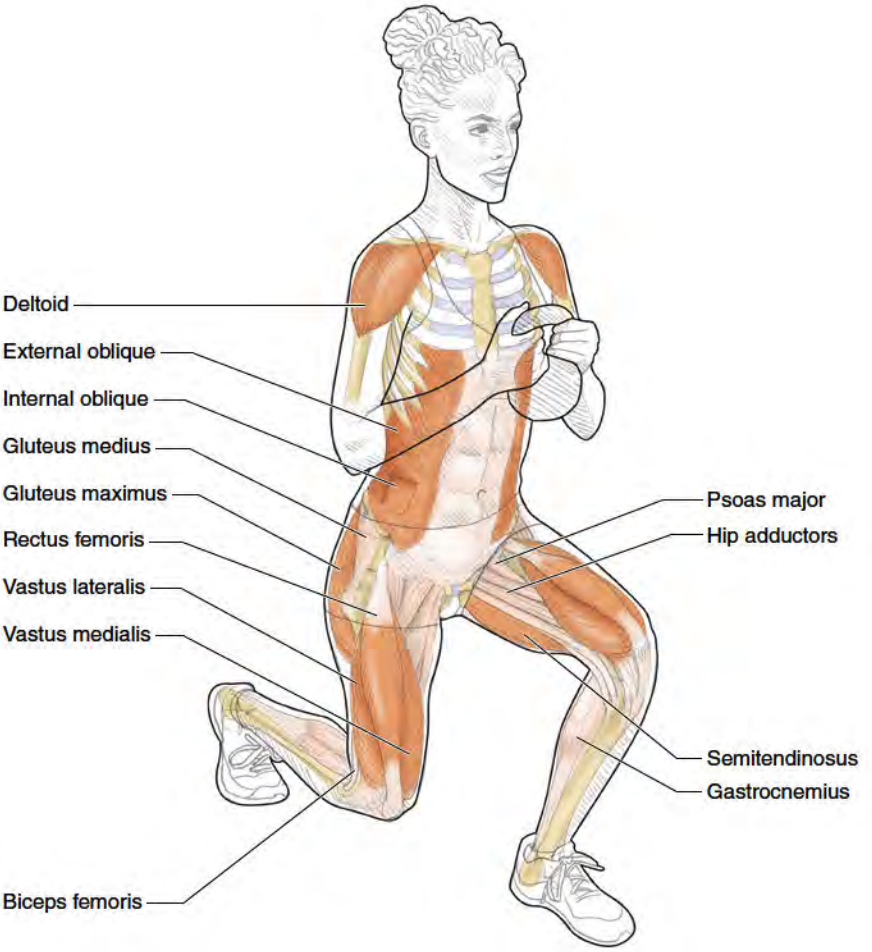
Primary: Gluteus maximus, hamstrings (semitendinosus, semimembranosus, biceps femoris), quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius)

Secondary: Rectus abdominis, hip adductors

GOLF FOCUS

As we have mentioned throughout this book, power needs to be generated by the legs driving into the ground. The front squat is a fantastic exercise to build strong muscles throughout the legs and buttocks. We have all seen the best golfers in the world drive using their pelvises just before impact. This pelvis drive helps anchor the golfer into the ground and allows for proper transmission of that power through the body into the club. Use this exercise to help produce more strength in your pelvis and in your golf game. Start with very little to no weight, and as you become stronger, add a little weight at a time. In the illustration, you can see the golfer creating a strong extension through the pelvis and really taking advantage of the large muscles in the legs and buttocks to derive maximum energy from the ground.

GOBLET WALKING LUNGE



Execution

1. Stand with your feet shoulder-width apart as you hold a dumbbell or kettlebell in both hands about 6 inches in front of your chest.
2. Step forward with your left foot and lower your right knee to just above the ground. Do not allow the left knee to fall toward the midline of the body past your left big toe. Your knee should remain in line with your foot.
3. Walk forward by pushing off the right foot and pulling the left knee into extension.
4. Repeat on the opposite leg.

Muscles Involved

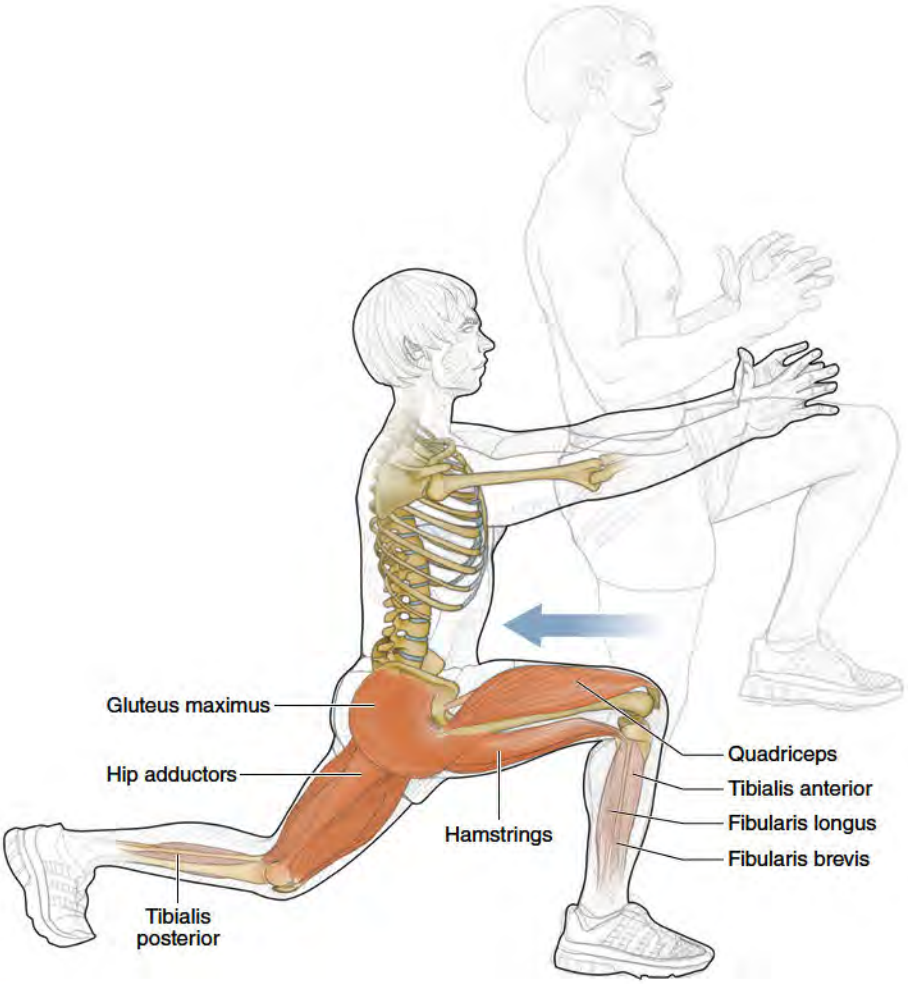
Primary: Quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), gluteus maximus, hamstrings (semitendinosus, semimembranosus, biceps femoris), deltoids, internal oblique, external oblique

Secondary: Gluteus medius, psoas major, gastrocnemius, hip adductors

GOLF FOCUS

The goblet walking lunge is a great way to add strength to the hips and legs while also training proper movement patterns of the lower body. Maintaining the proper alignment of the hips, knees, and ankles during the golf swing is crucial to transferring power efficiently from the ground all the way to the upper body. At many points in the swing, the hips, knees, and ankles need to remain stable while other parts of the body are creating force. These lunges help you gain this stability and strength in your lower body while you maintain an upright torso. Being able to control both of these will lead to better energy transfer and more consistent ball striking.

KNEE-UP REVERSE LUNGE



Execution

1. Stand on your right leg with your left knee raised to hip level and bent 90 degrees, left thigh parallel to the ground.
2. Reach your left leg straight back behind you and touch your foot to the ground.
3. Drop your left knee straight down to about 2 inches above the ground.
4. Push through your right heel and return to the start position.
5. Perform the desired number of repetitions and repeat with the opposite leg.

Muscles Involved

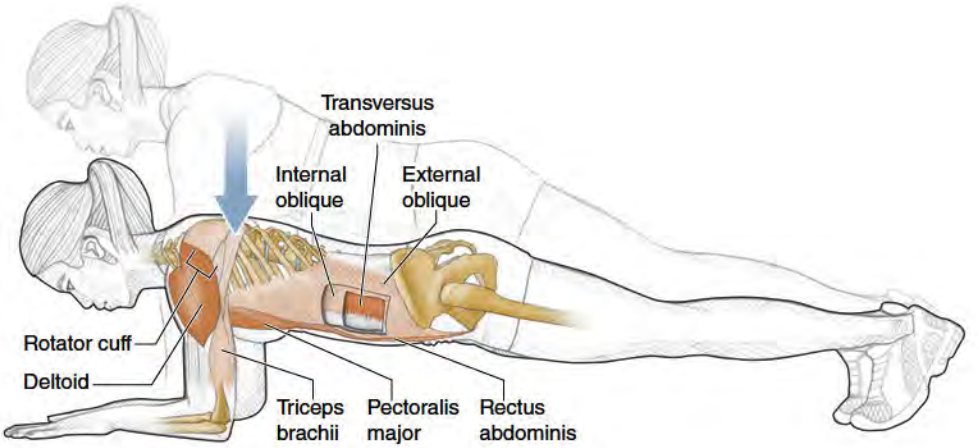
Primary: Gluteus maximus, quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), hip adductors, hamstrings (semitendinosus, semimembranosus, biceps femoris)

Secondary: Tibialis anterior, tibialis posterior, fibularis longus, fibularis brevis

GOLF FOCUS

This is a great exercise to not only challenge your balance but also gain some strength in your legs. Keeping proper form is crucial in order to work the muscles properly and get the most efficient results. Keep most of your weight on your front heel while going into the reverse lunge and when coming up from it. This activates your glutes as much as possible. Also, the foot that you step back with should only lightly touch the ground. This forces you to keep the weight on your front heel and challenges your balance as much as possible. The knee-up reverse lunge gives you the strength, balance, and muscle control you will need for shots that require a little extra power.

PUSH-UP TO PLANK



Execution

1. Start in a push-up position with your hands directly under your shoulders.
2. Lower yourself one arm at a time until your weight is supported by your forearms and toes (like the plank).
3. Try not to have much side-to-side hip movement through the transitions.
4. Return to the start position by pushing up one arm at a time.
5. Perform the desired number of repetitions.

Muscles Involved

Primary: Deltoids, pectoralis major, rectus abdominis, transversus abdominis

Secondary: Triceps brachii, internal oblique, external oblique, rotator cuff (infraspinatus, supraspinatus, subscapularis, teres minor)

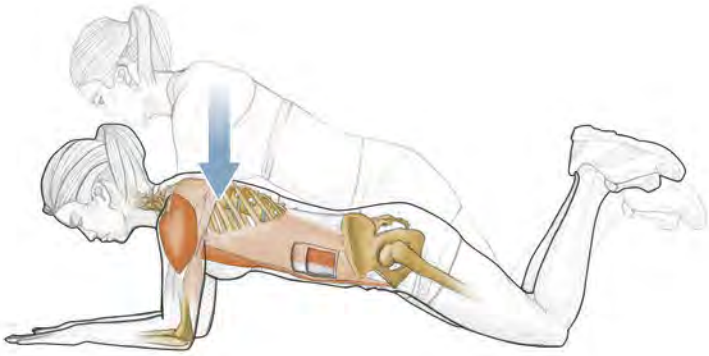
GOLF FOCUS

Every golfer has felt the disappointment of walking down the fairway after hitting a wonderful tee shot to find that the ball has run just through the fairway and is now lying in thick rough. It's a short-iron shot to a hard green, and a little spin on the ball sure would help keep the ball relatively close to the flag. Henrik Stenson, Gary Woodland, and Byeong-hun (Ben) An easily execute these approach shots. Why? Well, besides having exceptional technique, they are also very functionally strong from their feet right through their legs, core, shoulders, and arms. They are able to drive through the rough without losing much club-head speed or club stability and still create enough ball compression to generate some spin on the ball as it exits. The push-up to plank is a difficult exercise to do properly, but it will help generate strength from the pelvis and through the core, shoulders, and arms.

VARIATION

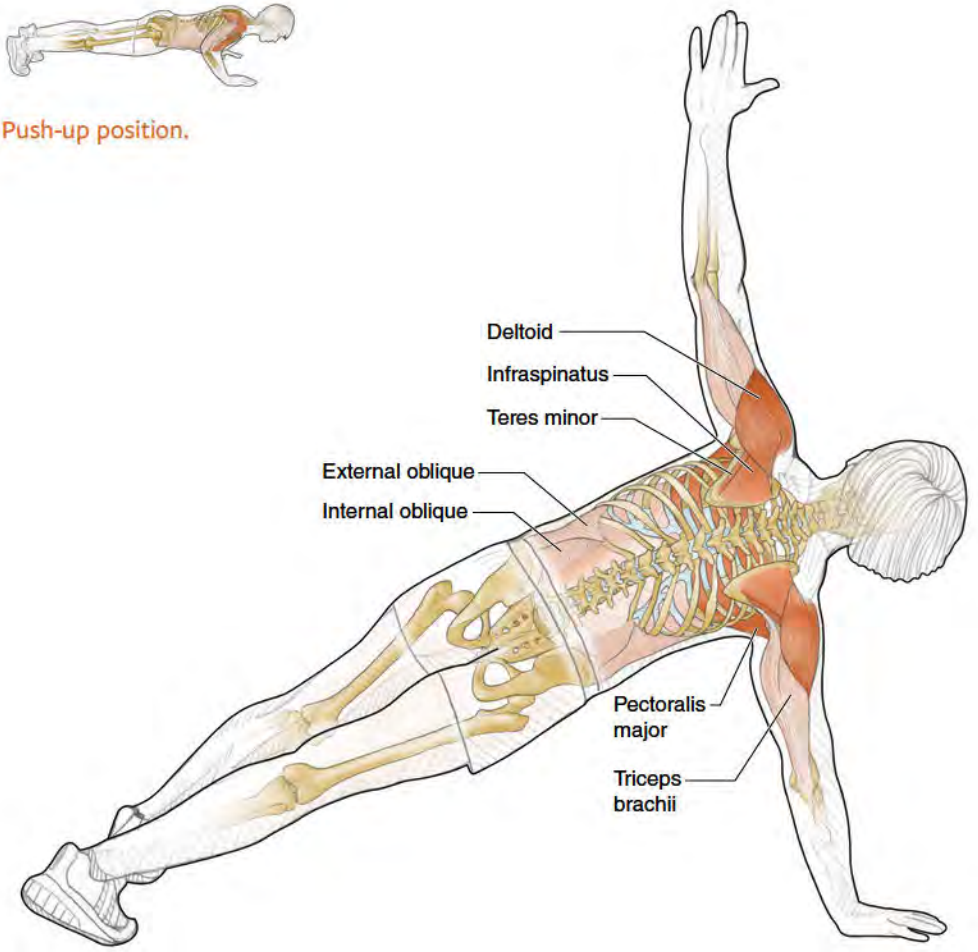
Push-Up to Plank From Knees

If you do not have the strength to do this exercise while on your toes, you can try modifying it by keeping your knees on the ground. This is a great version for golfers just learning this movement.



T PUSH-UP

Push-up position.



Execution

1. Begin in a push-up position.
2. Do a normal push-up, but on the way up, balance on your right hand, lift up your left hand, and rotate your torso to the left.
3. Turn until your chest is facing directly to the left and your left hand is pointing straight to the ceiling.
4. Return slowly to the beginning push-up position and repeat on the opposite side.

Muscles Involved

Primary: Infraspinatus, teres minor, deltoids, pectoralis major

Secondary: Triceps brachii, external oblique, internal oblique

GOLF FOCUS

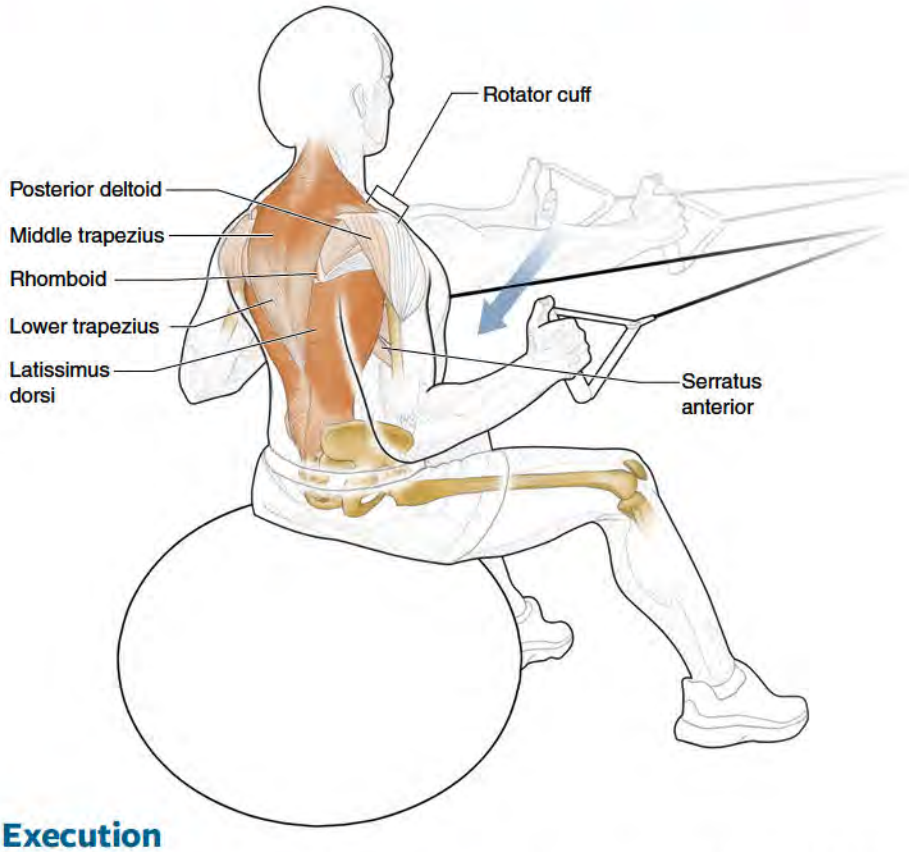
So you don't release the club early in the downswing, you have to maintain proper arm and shoulder angles. The strength and stability required to do this accentuates as the length of the club increases. Therefore, when you are required to use one of your fairway woods for a second shot, this shoulder stability becomes crucial for avoiding poor swing technique. T push-ups not only strengthen the stabilizing muscles of the shoulder but also help you gain greater control over these muscles. To do this exercise correctly, you must generate most of the movement from your planted shoulder. Pivoting the body around the shoulder places great demand on these muscles. This will help you control your swing at a much higher level.

VARIATION

T Push-Up With Dumbbells

Perform the same exercise, except use 5- to 10-pound (2.5 to 5 kg) dumbbells. This will work the same muscles but presents a much greater challenge to the stabilizing muscles. Progress to the variation only when ready because this exercise also challenges the wrist stabilizers.

SEATED ROW WITH TUBING



Execution

1. Wrap tubing around a stationary object with equal lengths of tubing either side of the object. Hold on to a handle in each hand. Sit on a stability ball with your back straight, knees bent, and heels on the floor.
2. With your elbows straight, allow your shoulder blades to separate from each other. This is your start position.
3. Keep your body steady as you squeeze your shoulder blades back and down, bringing them together (and away from your ears) while you bend your elbows and pull them toward your sides.
4. Return to the start position.
5. Perform the desired number of repetitions.

Muscles Involved

Primary: Rhomboids, middle trapezius, latissimus dorsi

Secondary: Serratus anterior, lower trapezius, posterior deltoids, rotator cuff (infraspinatus, supraspinatus, subscapularis, teres minor)

GOLF FOCUS

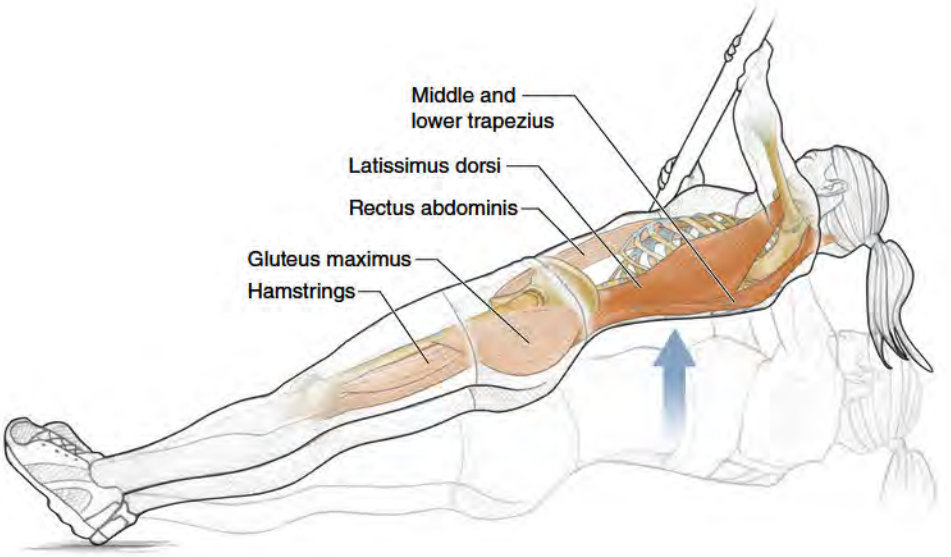
As mentioned in the mobility chapter, it is important to have proper control of the shoulder blades. When a golfer is able to pull the shoulder blade in toward the spine and away from the ear, it places the shoulder complex in an advantageous position for external rotation of the glenohumeral (shoulder) joint. Most golfers struggle to pull their target blade (left shoulder blade in a right-handed golfer) into retraction and depression (down and back). If the shoulder blade is not able to move into this position, the ability to externally rotate the shoulder joint is severely limited. In addition, a target-side shoulder blade that moves into and remains in an elevated and protracted position (up and forward) makes it very difficult to continue to rotate the torso to the target on the downswing, impact, and follow-through portions of the golf swing. As a consequence, the golfer will come out of the shot into early extension, and the result will be a weak push or a nasty hook. Neither option is preferable. By being able to move the shoulder blades into retraction and depression (back and down), a golfer can greatly increase the ability to rotate the torso and decrease the likelihood of coming out of the shot and hanging back through impact.

VARIATION

Seated Row With Cable

If you are at a gym, you can perform this exercise on a cable machine designed for a seated row. The advantage of using a cable machine over tubing is that the tension remains constant throughout the entire range of motion (as compared with the increased resistance experienced as tubing stretches). Just be careful to leave your ego at the door and use good form. It is common to see people crank up the weight as soon as they get on this machine, which is a surefire route to bad form and an injury! If you cannot hold your shoulder blades in place during the entire exercise, you are using too much weight.

INVERTED ROW



Execution

1. Lie on your back underneath a bar parallel to the floor and secured slightly higher than arms' length above you. (The bar on a Smith machine works well for this exercise.)
2. Take a wide grip on the bar and hang so that your body is completely straight, slightly off the ground, and supported by your heels.
3. Keeping your body straight, pull yourself toward the bar so that the bar reaches the middle of your chest.
4. Return slowly to the start position and repeat.

Muscles Involved

Primary: Latissimus dorsi, middle trapezius, lower trapezius, rhomboids

Secondary: Rectus abdominis, gluteus maximus, hamstrings (semitendinosus, semimembranosus, biceps femoris)

GOLF FOCUS

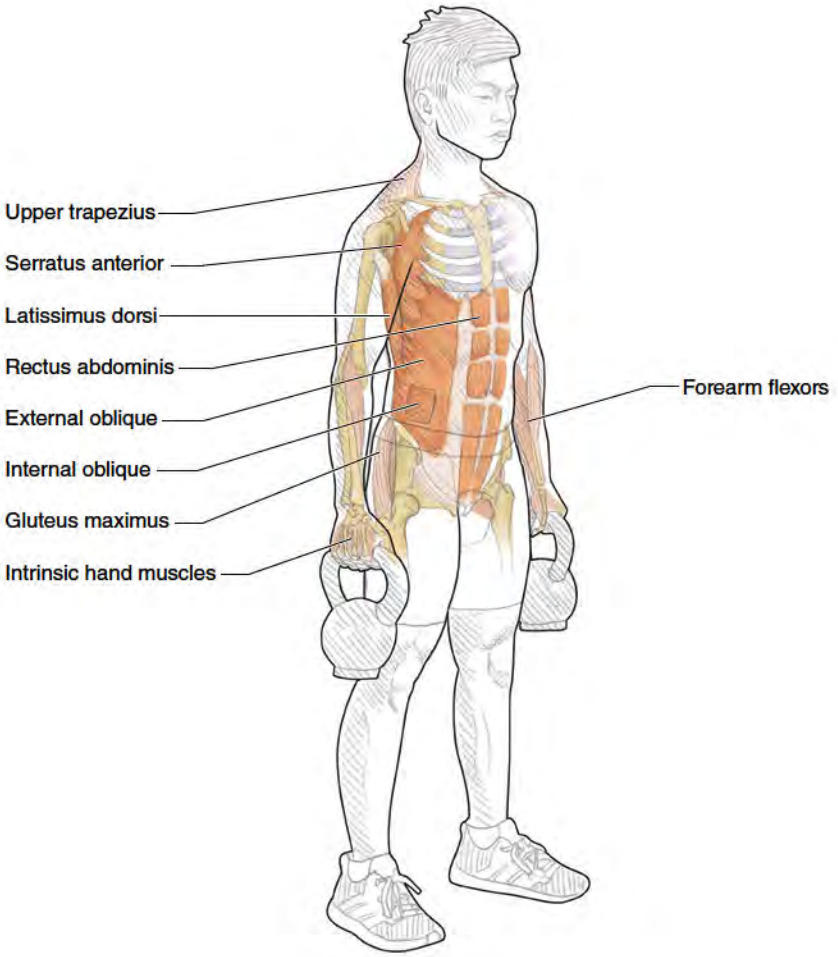
As you move into the extreme ranges of motion in the golf swing, it becomes more difficult to maintain proper body angles and correct posture. It is important to keep your body completely straight and create the movement with the muscles in your back. This will strengthen your abdominal muscles (as they resist the tendency of your hips to fall toward the ground) as well as the muscles of your upper and middle back. These back muscles need the strength to maintain proper spinal posture when you are in full backswing. Without this strength, your upper back will want to begin rounding, and your shoulders will want to roll forward. This loss of posture in the backswing can make it nearly impossible to get the club back on path in the downswing and return the club face square for impact. Inverted rows will help prevent this costly swing fault and give you the strength you need to maintain proper posture.

VARIATION

Assisted Pull-Up

If inverted rows are too difficult to do correctly, try the assisted pull-up. However, you must have access to an assisted pull-up machine. The assisted pull-up focuses more directly on the latissimus dorsi muscle. Keep your shoulders down and back as much as possible, and focus on pulling with your back muscles.

ISOMETRIC FARMER HOLD



Execution

1. Hold one heavy kettlebell in each hand.
2. Stand completely upright, with shoulder blades back. Keep shoulders level with each other.
3. Keep good posture, with a tall spine and engaged glutes while maintaining engagement of the anterior and posterior torso.
4. Hold for 30 to 40 seconds.

Muscles Involved

Primary: Rectus abdominis, external oblique, internal oblique, serratus anterior, latissimus dorsi

Secondary: Gluteus maximus, middle and upper trapezius, forearm flexors, intrinsic hand muscles

GOLF FOCUS

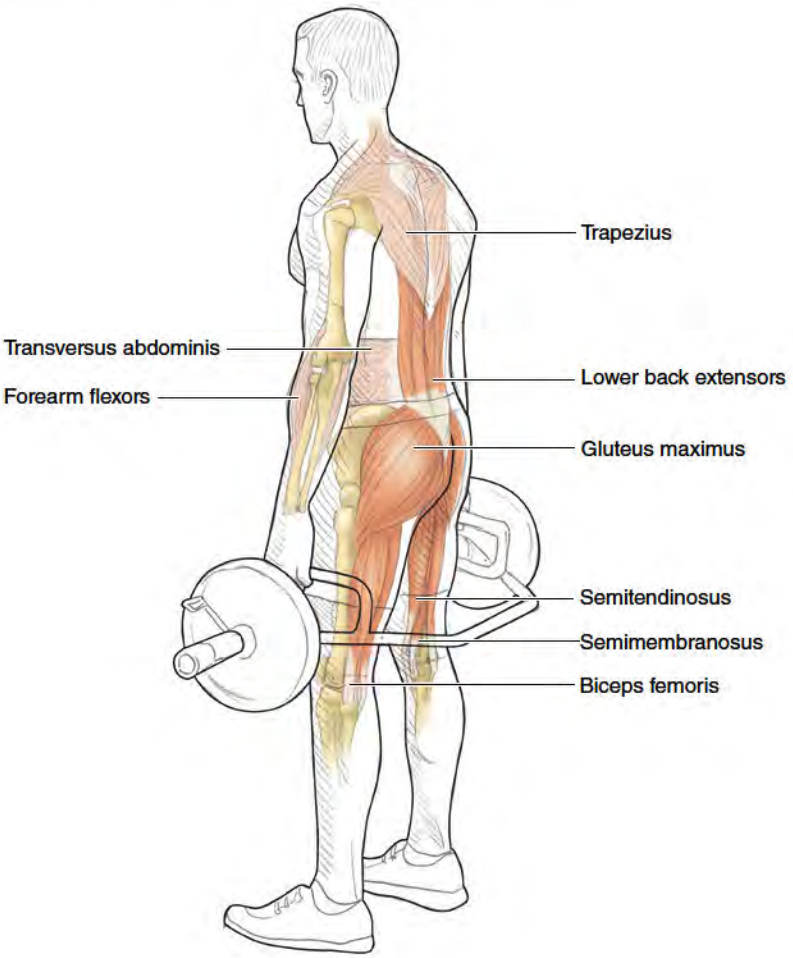
One of the keys to true power transfer occurs just before impact as the pelvis and torso rapidly decelerate. This deceleration allows the energy to transfer quickly from the body to the club. This deceleration of the pelvis occurs in conjunction with bracing through the torso and a resulting acceleration of the arms and then the club. The isometric farmer carry requires the lateral stabilizers of the hip, spine, and shoulder to work in unison to avoid lateral bending. This is exactly the level of motor control and tissue activation that will enable the greatest yardage gains off the tee. Carry more in the gym to carry greater yards off the tee.

VARIATION

Single-Arm Isometric Farmer Carry

To increase the challenge to the abdominal and pelvic musculature, hold just one kettlebell. This will cause the stabilizers to work harder and resist rotation and lateral flexion. Be sure to maintain perfect posture throughout the entire 30 to 40 seconds and perform on both sides.

DEADLIFT WITH HEX BAR



Execution

1. Stand inside the hex bar with your feet slightly more than shoulder-width apart. Use a weight that allows you to easily complete 8 to 12 repetitions with good form.
2. Lower your body so you can grab the bar by hinging at the hips and pushing your hips and pelvis back and down. As your hips move back, your torso will move forward but keep your shoulders over your feet, not in front of them. Your arms will be perpendicular to the ground if you are in correct position.
3. Grab the bar with extra pressure on your pinkies. Keep spine straight, chin tucked (slight double chin), and shoulder blades pulled back. Maintain this position of the spine, chin, and shoulder blades throughout the exercise.

4. Drive up to a standing position by pushing through the heels and moving your hips up and forward. Your weight will move more into your forefeet as you straighten to a tall standing posture. In the top position, the knees are straight and hips pushed forward. You should feel all throughout your body.
5. Lower the hex bar under control until the bar returns to the floor or you are no longer able to maintain a long spine (rounding the lower back is not recommended for most athletes).

Muscles Involved

Primary: Gluteus maximus, hamstrings (semitendinosus, semimembranosus, biceps femoris), lower back extensors

Secondary: Trapezius, forearm flexors, rectus abdominis, transversus abdominis, psoas major

GOLF FOCUS

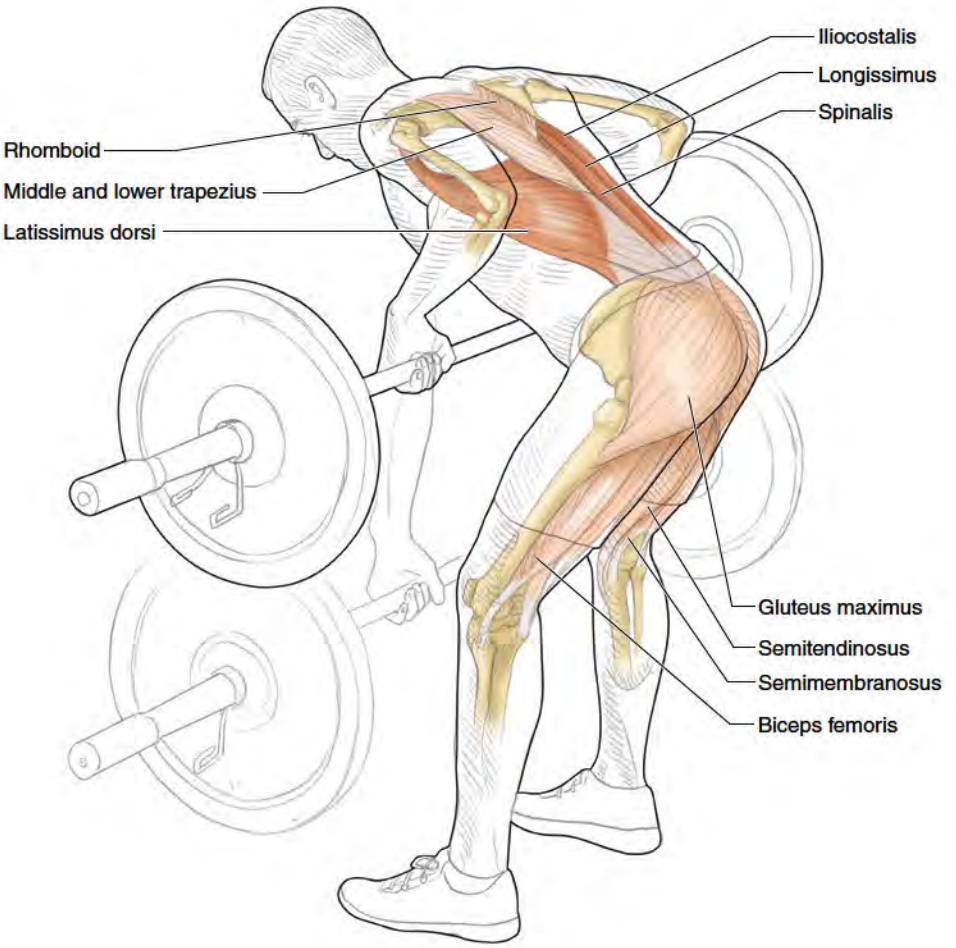
The deadlift is an important movement. It ensures that the proper muscles are working when you need to bend forward at the waist. In the golf swing, you must be able to use your glutes and hamstrings to not only support and stabilize your lower body through the backswing but also generate power in transition to the downswing. This exercise will help you learn how to move efficiently and use the strength of the glutes and hamstrings without placing excessive stress on the lower back. This is crucial for your golf swing so that you can create as much power as possible while staying away from positions and movements that will increase your risk of injury. Keep your back straight throughout the entire exercise so that all movement comes from your hips. The hex bar is a helpful tool that ensures you will use correct form during this exercise.

VARIATION

Deadlift With Barbell

Perform the same exercise with a barbell. Make sure that barbell stays as close to your body as possible throughout the exercise.

BENT-OVER BARBELL ROW



Execution

1. Hold a barbell in a wide grip. Stand with feet about shoulder-width apart and knees slightly bent.
2. Hinge forward from the hips to lower the torso toward the ground, keeping the chest upright and the shoulder blades down and back. This is the start position.
3. Keep your body steady and pull the barbell toward your torso without letting your shoulders elevate.
4. Lower the bar under control to the start position and repeat.

Muscles Involved

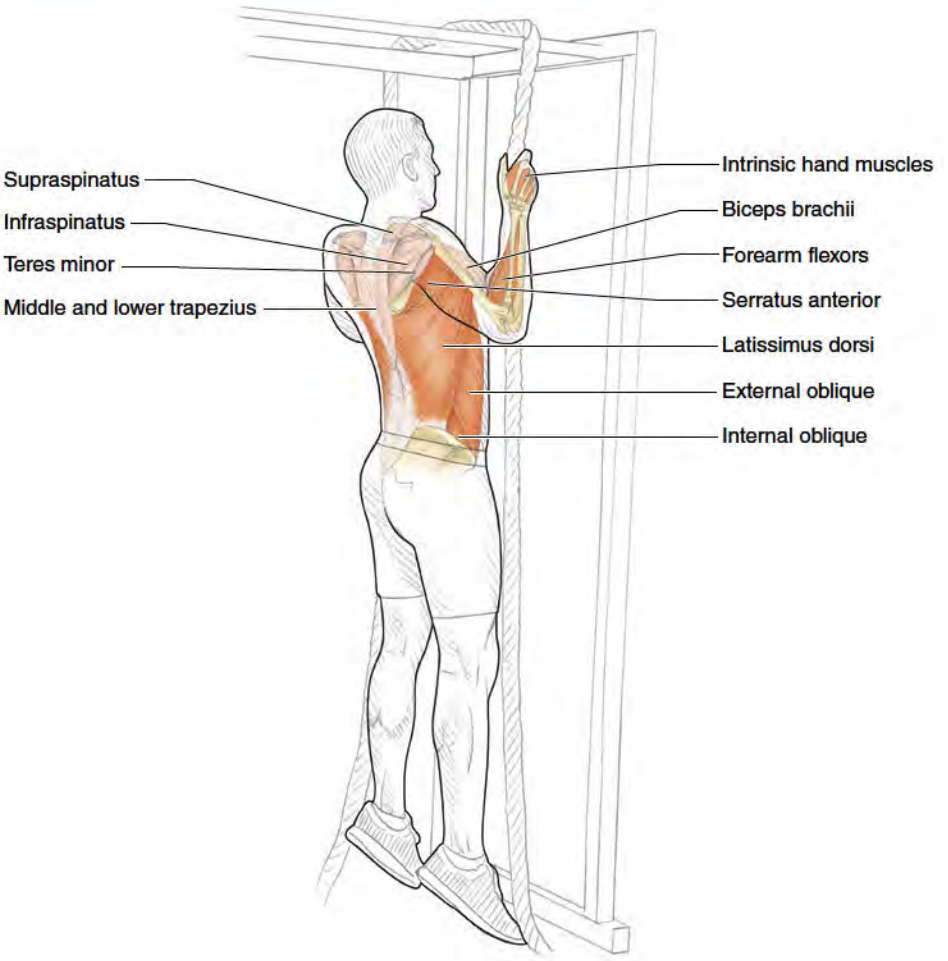
Primary: Latissimus dorsi, erector spinae (iliocostalis, longissimus, spinalis)

Secondary: Gluteus maximus, hamstrings (semitendinosus, semimembranosus, biceps femoris), rhomboid, middle and lower trapezius

GOLF FOCUS

One of the most difficult aspects of the golf swing for most amateurs and many professionals to master is the ability to resist coming out of the shot. This is especially true as the club gets longer and the moment arm and torque increases dramatically. The level of activation required in the hip, pelvis, and spinal stabilizers—such as the psoas, glutes, erector spinae, quadratus lumborum, and multifidus—is tremendous, and the scapular stabilizers—such as the middle trapezius and rhomboids—must be able to control the shoulder blade to allow the big latissimus muscles to work effectively. The bent-over barbell row reinforces proper hip hinge and strengthens the tissues required to maintain pelvis and spine angles. Start with a lighter weight and maintain impeccable form. Slowly increase the amount of weight on the bar for this full-body exercise.

BATTLE ROPE GRIP PULL-UP



Execution

1. Wrap a battle rope around the top of a squat rack or an immovable, elevated horizontal object so two ropes hang toward the ground shoulder-width apart.
2. Stand between the two ropes and hold one in each hand.
3. Start in a squat position so that arms are overhead with the elbows straight.
4. Attempt to do a pull-up by bending your elbows and pulling them down to your lower ribs. When your body moves up so that your shoulders or chest are in line with your hands, you have reached the top position. Attempt to use your legs as little as possible with each repetition.

5. As your arms and torso fatigue, you will need to use your legs a little more. It is common for an athlete initially to use the legs substantially to complete the prescribed number of repetitions.
6. Perform 8 to 10 repetitions.

Muscles Involved

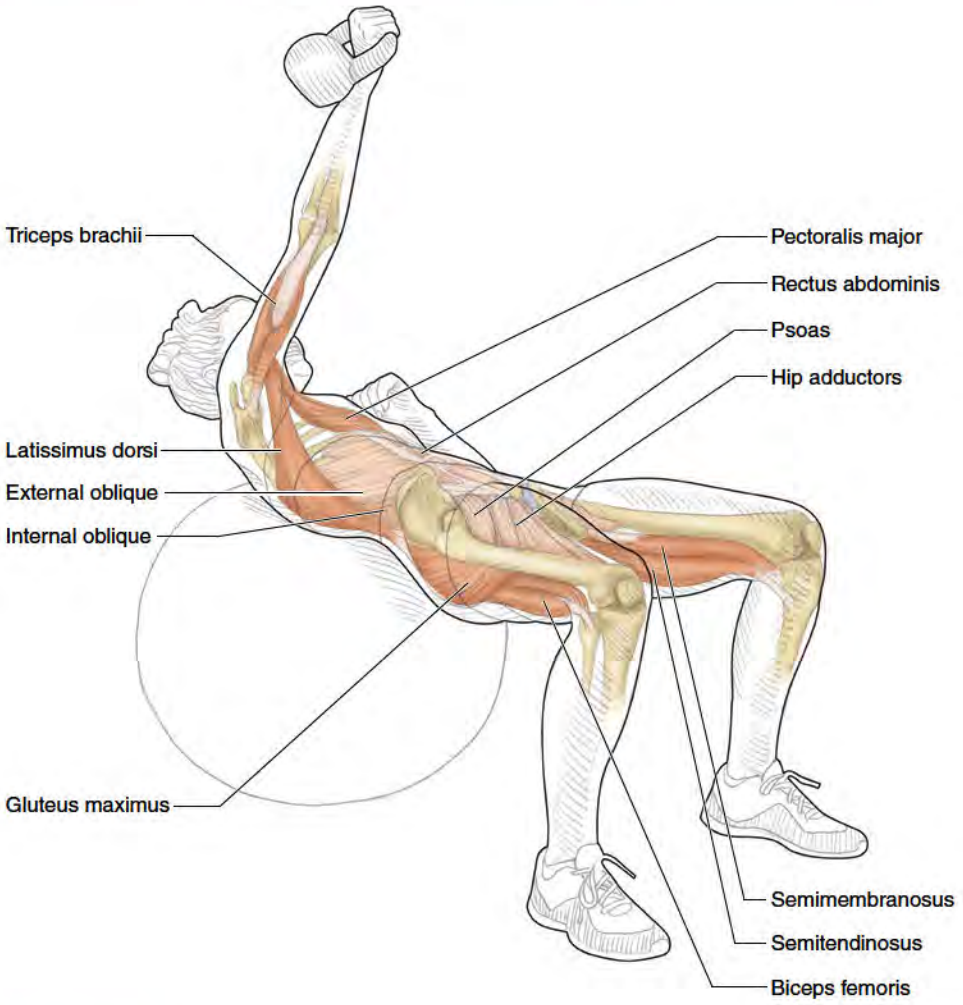
Primary: Latissimus dorsi, serratus anterior, external oblique, internal oblique, forearm flexors, intrinsic hand muscles

Secondary: Middle and lower trapezius, biceps brachii, rotator cuff (infraspinatus, supraspinatus, subscapularis, teres minor)

GOLF FOCUS

A strong grip, good forearm and shoulder strength combined with spinal stability, and a strong pull from the latissimus muscles are needed to blast the ball out of the thickest rough and toughest lie. The benefit of the battle rope pull-up is that it requires a tremendous amount of spinal control compared to a normal pull-up to prevent the body from swinging on the ropes. The other major benefit of the battle rope pull-up is that you can position yourself so that your feet are just able to touch the ground when you have pulled up into the top position. This means you can use your legs like a spotter and build the strength in your hands, forearms, shoulders, and core incrementally in a way that isn't possible with regular pull-ups. Give yourself a chance to make the deep rough an advantage over your peers by building up your hand, forearm, and shoulder strength with the battle rope pull-up.

SINGLE-ARM ROTATION PRESS



Execution

1. Set up with your shoulders on a stability ball and your feet flat on the ground.
2. Engage your glutes so that your pelvis is parallel to the ground.
3. Hold a kettlebell in your right hand just outside your chest and point your left arm straight to the ceiling. This is the start position.
4. Drive your left elbow down into the ball while simultaneously pressing the right arm up toward the ceiling until the right shoulder blade comes off the ball.

5. Return to the start position and do 6 to 12 repetitions. Then switch the kettlebell to the other hand and repeat.

Muscles Involved

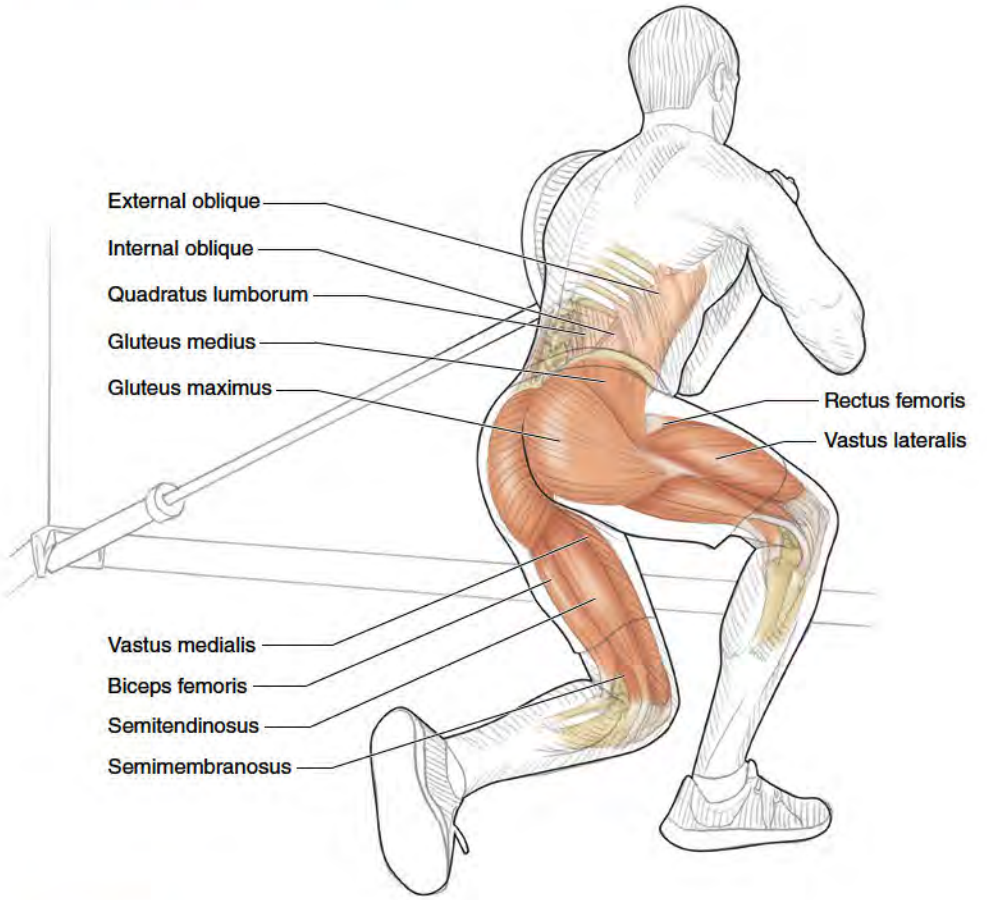
Primary: Pectoralis major, latissimus dorsi, triceps brachii, gluteus maximus, hamstrings (semitendinosus, semimembranosus, biceps femoris)

Secondary: Psoas, hip adductors, rectus abdominis, internal oblique, external oblique

GOLF FOCUS

During the golf swing, a right-handed golfer requires the left arm to pull and initiate rotation of the trunk so that the right shoulder is positioned appropriately for an effective right arm push. This motion of the upper extremity occurs while the big muscles of the legs and hips are driving the hips into extension. In the single-arm rotation press, a powerful pull of the free arm instigates the prerequisite thoracic rotation necessary to press the weight in the other hand toward the ceiling. This movement requires significant support from the legs, hips, and core. When carried over onto the course, this increased support leads to big drives and longer shots with the irons.

ALPINE SQUAT



Execution

1. Anchor one end of a barbell into a corner to your left so that it doesn't move. Put one 10-pound bumper plate on the opposite side of the barbell.
2. Stand facing the bar with the anchor point on your left. Stand 12 to 18 inches to the right of the end of the barbell. Pick up the end of the barbell with two hands and lean your left shoulder into the bumper plate so your body is leaning to the left. Lift your left leg off the ground.
3. Lower into a single-leg squat while continuing to keep pressure with your shoulder against the bumper plate. Due to the arc created by the barbell, you will move slightly to the right as you squat.
4. Return to the start position by pushing into the ground with the right foot. As you stand, you will move toward the left.
5. Repeat 4 to 8 times and then turn around and repeat with the other leg.

Muscles Involved

Primary: Hamstrings (semitendinosus, semimembranosus, biceps femoris), gluteus maximus, gluteus medius, quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius)

Secondary: Quadratus lumborum, internal oblique, external oblique

GOLF FOCUS

Being able to push the trail foot maximally into the ground to initiate abduction and extension of the hip is one of the cornerstones to the big drivers of the golf ball. Rory McIlroy, Dustin Johnson, Justin Thomas, and Gary Woodland all have an incredible drive off the back foot as they explode into the downswing. The alpine squat is unique because it encourages hip abduction and extension in a closed chain and facilitates better use of the foot and ankle to create better ground and foot interaction. Just make sure to get a little extra weight into your heel at the low point of your squat so you can push off and transition the weight slightly forward on your foot as you get to the top position.

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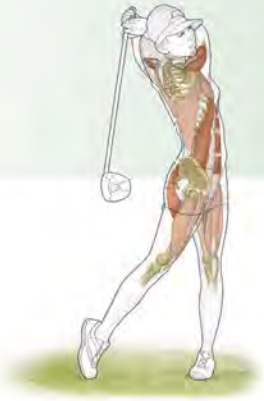


7

EXPLOSIVE POWER FOR LONGER DRIVES

We have entered the generation of power golf. It is no longer possible to compete regularly if you cannot move the golf ball a great distance. Sure, a few golf courses on the PGA Tour still reward accuracy and shaping the golf ball (Hilton Head and Colonial come to mind), but most golf courses place a premium on high club speeds and the smash factor. As of October 2017, the top 10 world rankings included Jason Day, Sergio Garcia, Justin Rose, Rory McIlroy, Dustin Johnson, Henrik Stenson, Hideki Matsuyama, Justin Thomas, Jordan Spieth, and Jon Rahm—no short hitters in the group. The ladies tour featured Sung Hyun Park, Lexi Thompson, Suzann Petterson, Michelle Wie, Brittany Lincicome, and Yani Tseng—another group of bombers. The rankings of junior, college, and developmental tours are full of players who hit the ball farther than many PGA Tour professionals. The sport is becoming more athletic at an exponential rate. If you aren't working on creating more speed, you will be the first in your group to hit the approach and be stuck using the longer, more difficult clubs on every hole you play. This does not lead to success very often.

We've mentioned that the golf swing is one of the most dynamic movements in all of sport. Consider the tremendous force required to accelerate the club from 0 miles per hour at the top of the backswing (as it changes direction) to more than 100 miles per hour (160 km/h) at impact and then back to 0 miles per hour at the end of the swing. Kevin Chappell's swing was measured with a club speed of more than 129 miles an hour during a PGA Tour event in 2017. This occurs in a mere 0.20 seconds. Yes, in one-fifth of a second, these athletes are able to accelerate the club's head at the top of the backswing (figure 7.1) from 0 to more than 120 miles per hour and back to 0 again in the finish position. It truly is a remarkable feat of athletic performance.

Before we go any further, we should consider the definition of power. Power is work divided by time. Knowing that time is a key component of the power

formula, it is easy to see that few movements in sport are as truly powerful as an elite-level golf swing. But what allows a player to create such power? If we consider the players we noted earlier from the men's official World Golf rankings, we must appreciate the variability in the body type represented. Jason Day, Dustin Johnson, Justin Thomas, Hideki Matsuyama, and Henrik Stenson have very different frames, body weight, lever systems, and swing styles. The common thread tying these players together, which allows each one to hit the ball in excess of 300 yards on an average drive, is not pure strength. Instead, it is their ability to exploit their bodies in an integrated, efficient manner. They are using and controlling motion through the full available range of joint complexes throughout their bodies and place significant value on maintaining and improving their bodies. Each has developed both the prerequisite range of motion and the ability to control it to perform their versions of the golf swing.

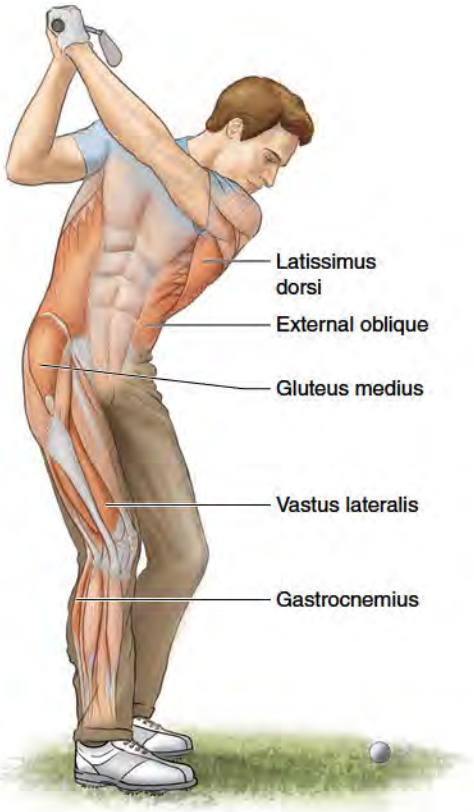


FIGURE 7.1 Golfer at the top of the backswing.

Additionally, each of these players has his own golf swing fingerprint. They swing the club in a way unique to the abilities of their own bodies. They haven't tried to make their swings look like a formula or method. Using the swing best afforded by their own physical skill sets ensures the most efficient, powerful and least stressful swing for that player.

Two problems with the more traditional bodybuilding style of fitness training for golf are that individual joint complexes often are loaded in isolation from the rest of the body and in opposition to how the human body was designed to work and the training programs don't include purposeful, explosive movements. Most trainers, coaches, and golfers don't consider the highly robust nature of the golf swing when thinking about golf fitness. Instead, many consider golf a sport for potbellied old men who sit in a golf cart for four to six hours while socializing. However, we want you to understand why power is important to golf and show you how to train for power effectively and transfer it directly to your golf swing (figure 7.2).

Understanding the tremendous power required during a high-level golf swing might finally influence the degree and method of practice a golfer undertakes. An Olympic lifter would never perform hundreds of repetitions of a power snatch

because the lifter appreciates the level of mental and physical fatigue that would accumulate and would recognize the opportunity for injury and degradation of technique would be higher than the potential positive return. Golfers who smash balls by the hundreds during a typical practice session somehow don't appreciate the level of stress their bodies and minds are accumulating during these prolonged practice sessions, which are the norm for juniors and young professionals. Many elite juniors, collegiate players, and young professionals have had their golf careers end early due to excessive practice habits and the accumulation of physical and mental stress.

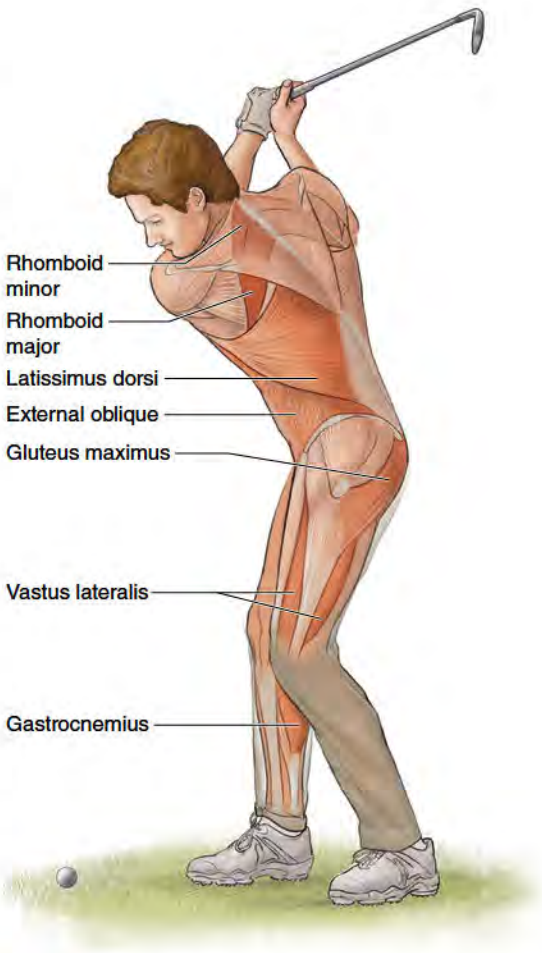


FIGURE 7.2 The golf swing is an explosive movement.

A common and significant error when designing training programs is including power-based programming before developing the prerequisite mobility, body awareness, and strength needed during the power phase. For the movements included in this power chapter, it is paramount to first develop and own the skill sets found within the preceding chapters in this book. This is why the strength and power chapters are the closing chapters in this book and not the opening chapters. Every exercise in this chapter requires balance, mobility, and strength. Therefore, these skill sets must be trained appropriately before you attempt movements that focus on developing power. Following this advice will not only help you avoid injury but also make your power training more effective.

This chapter is dedicated to golfing athletes who want to take their bodies to the highest levels and achieve explosive capabilities. We have included various training modalities, including upper body and lower body plyometrics as well as short power movements using medicine balls, tubing, kettlebells, barbells, and body weight. Remember, by definition, power requires movements to be quick, not necessarily performed with the heaviest load. We are more concerned with proper technique coupled with speed than we are with the amount of weight being moved.

Understand that power training is not necessarily designed to build large muscles. Strength training programs are often more successful at obtaining those results. Power training programs, on the other hand, help train the body's nervous system to react faster while placing a significant demand on the body's connective and contractile tissues in both concentric and eccentric fashions. Because this requires a more rapid transmission of information through the body, it leads to a quicker and more explosive reaction to stress, a necessity for golfers to maximize ball and club-head velocities (figure 7.3). When reaction time is trained, improved, and controlled, it can produce massive power and longer ball flight, a top priority for many golfers.

There are many aspects involved in gaining true, useful power in the golf swing. It's not all about one facet of fitness; it's about creating a solid foundation on which power can be built. Even if you train correctly and have a body fit for golf, you must always be cautious when training with speed because injuries can be more prevalent. This is why it is important to warm up before doing

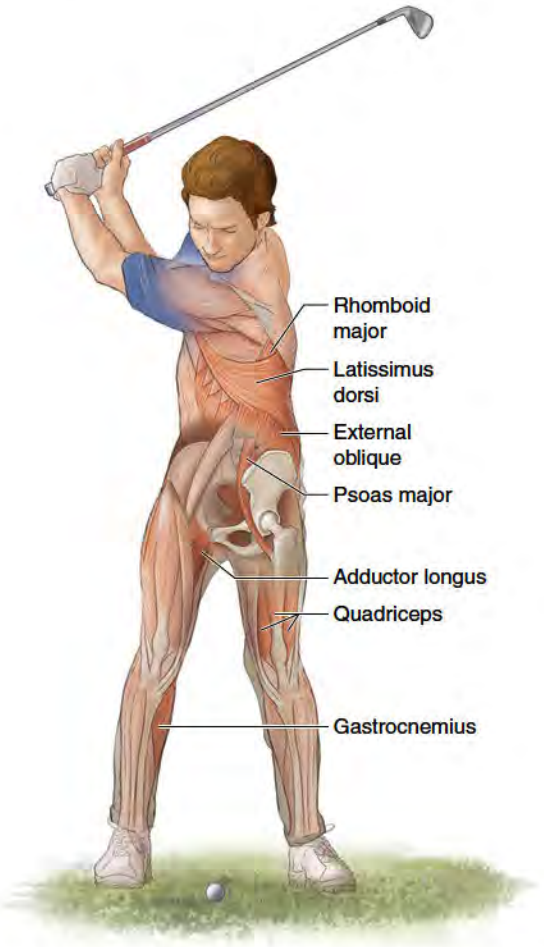


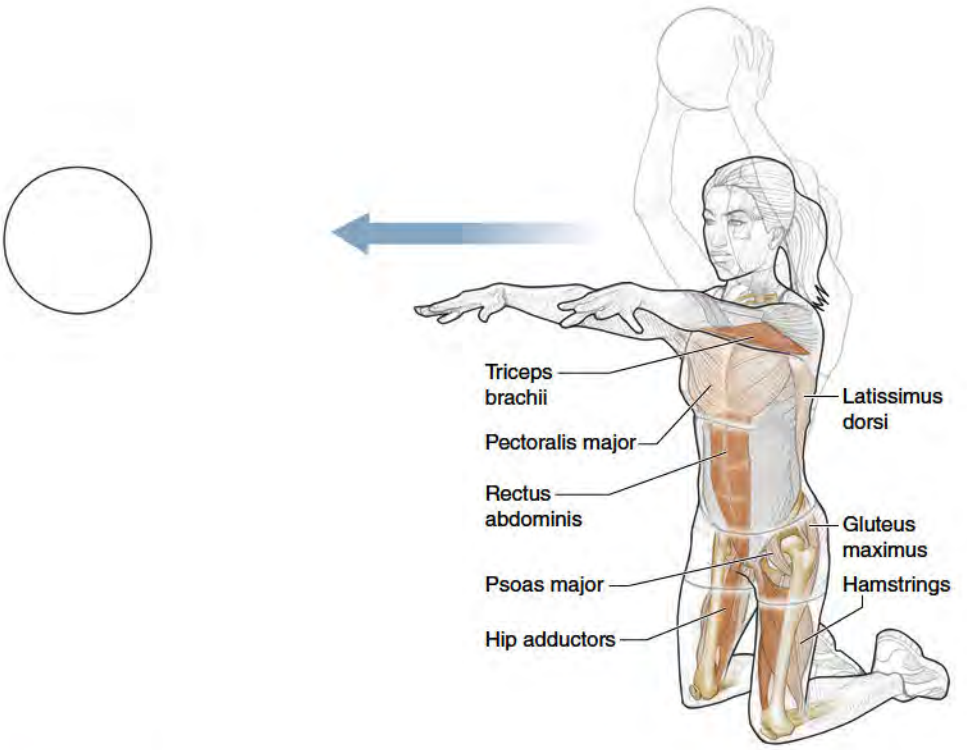
FIGURE 7.3 Power training leads to faster reactions and more explosive movements.

power exercises. We suggest doing multiple movements in which you move all body parts, muscles, and joints through the full range of motion required by the power exercises. Begin each movement slowly and with a small range of motion, gradually increasing both speed and motion. Your goal is to not only get your body loose and used to going through full ranges of motion but also actually warm up your body so the muscles are better prepared to move and protect. Properly warming up does take a little bit more time, but it pays off by helping to keep you on the course and out of the doctor's office.

Unless otherwise noted, perform 5 to 10 repetitions of the exercises in this chapter. For exercises that require resistance tubing, a cable machine, or free weights, start with a low resistance or weight that enables you to complete 3 sets of 10 repetitions per set. Once you can complete 3 sets of 10 repetitions, increase the weight until you can perform 8 repetitions but struggle on the last one. For exercises that use body weight only, begin with 2 or 3 sets of 5 repetitions and increase incrementally up to 10 repetitions once you can easily complete 3 sets of 5.

Although any exercise can be dangerous if not performed properly, exercises designed to create power are often more strenuous on the body and should be performed under the supervision of an experienced fitness professional and after you have medical clearance. If you experience any discomfort while performing these movements, consult a qualified professional for guidance.

KNEELING SOCCER THROW



Execution

1. Kneel on a soft surface on the ground, your ankles bent and your toes on the ground.
2. Hold a medicine ball over your head as if for a soccer throw. Make sure the knees, hips, and head are stacked on top of each other as much as possible throughout the exercise.
3. While maintaining your stability and balance, throw the medicine ball to a partner. Maintain your height throughout the exercise.
4. Catch the ball overhead and repeat.

Muscles Involved

Primary: Rectus abdominis, hip adductors, triceps brachii, erector spinae (iliocostalis, longissimus, spinalis)

Secondary: Gluteus maximus, psoas major, hamstrings (semitendinosus, semimembranosus, biceps femoris), pectoralis major, latissimus dorsi

GOLF FOCUS

Although the overhead toss does not mimic the golf swing, it's great for simultaneously building strength and balance throughout the body. The adductor muscles of the inner thigh are often ignored during fitness training. These muscles are important for creating proper pelvis motion and core stability throughout the golf swing. This exercise is great for strengthening the muscles that help create stability of the pelvis and spine while maintaining your golf posture.

VARIATIONS

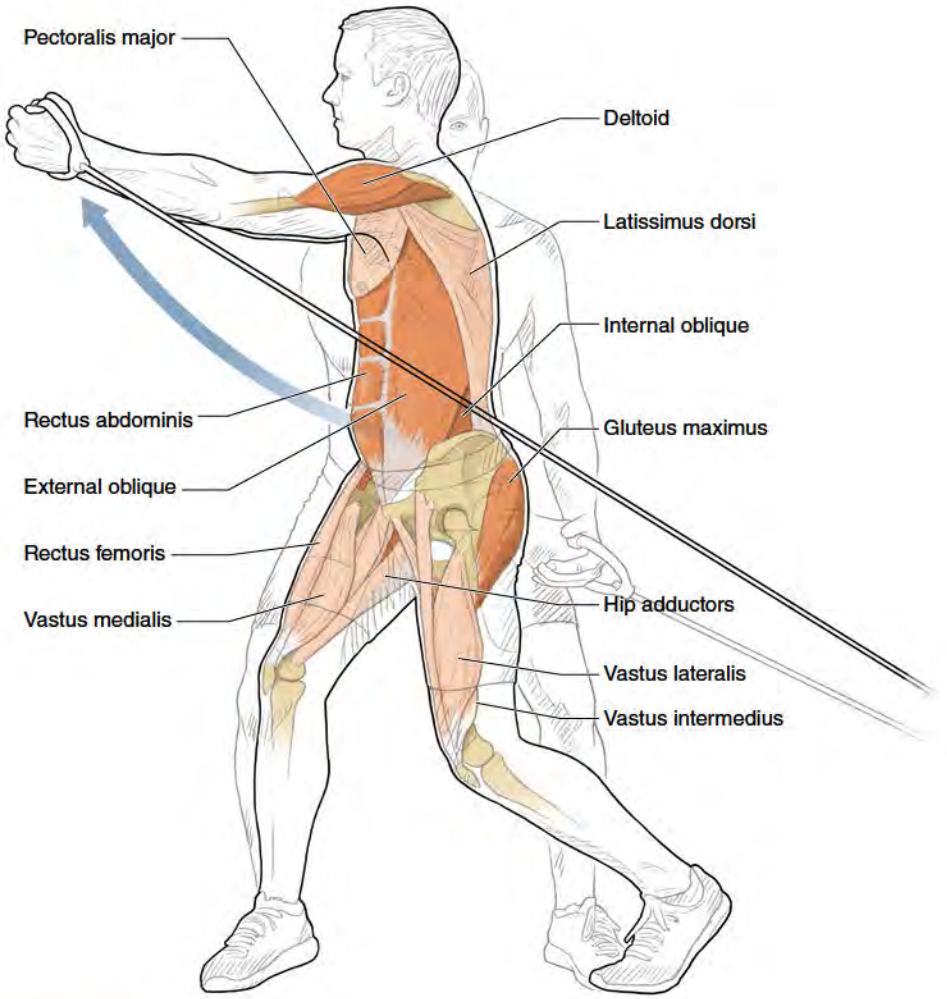
Overhead Mock Throw

When a partner is not available, you can benefit greatly from performing this exercise without actually releasing the ball. Just kneel on the ground and make mock throws of the medicine ball by bringing it over your head into a soccer throw position and then, using both arms, bringing it out in front of your chest. Perform the movement at a speed that you are able to maintain proper balance. As you become better at the balance aspect of this exercise, increase the speed at which your arms move through the movement.

Overhead Throw to Wall

When a partner is not available, you can throw the ball to a wall. Just kneel on the ground and make the same throwing motion. Start with a lighter ball and a throwing motion that you can control. As you gain better body control, increase the speed of the throw. Once you have maxed out the speed with the lighter weight, you can slightly increase the weight of the ball and again start with a slower motion. With successive training sessions, slowly build speed until you can throw with the intent of knocking the wall over while maintaining great body posture. You likely won't be able to catch the ball in the overhead position, which will remove the eccentric loading that catching the ball from your partner affords. However, this variation still loads the pelvis and trunk while you learn how to create speed in the upper extremity.

REVERSE WOOD CHOP WITH TUBING



Execution

1. Attach tubing to an immovable object low to the ground and to your left. Hold the band with two hands just inside your left knee and stand in an athletic position with your hips and knees slightly bent and your feet shoulder-width apart.
2. Keeping your back straight, pull with the right leg while pushing from the left (back) leg to quickly rotate and stand up as you pull the handle up and across your body, diagonally to your right. Your weight should be on your right leg, and you should be looking at the handle positioned in front of your sternum.

3. Slowly return to the start position. Perform the desired number of repetitions (6 to 10 in most cases) and repeat in the other direction.

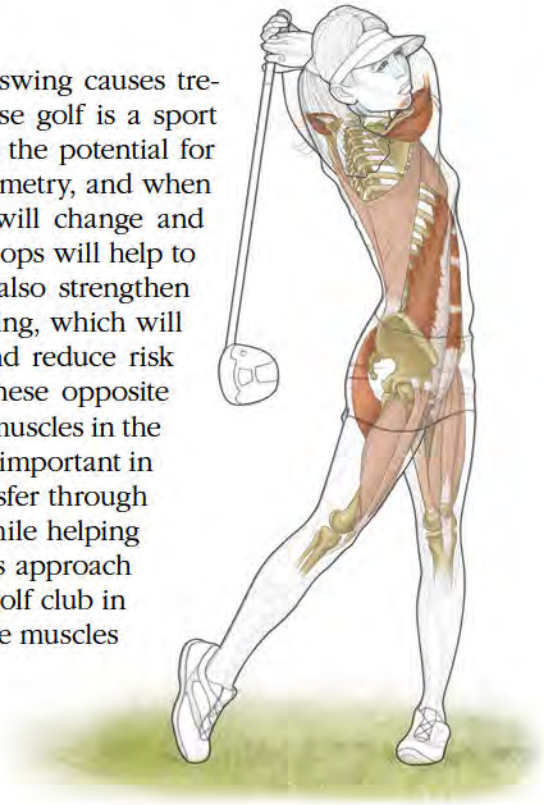
Muscles Involved

Primary: Rectus abdominis, internal oblique, external oblique, deltoids, gluteus maximus

Secondary: Quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), hip adductors, pectoralis major, latissimus dorsi

GOLF FOCUS

The highly rotational aspect of the golf swing causes tremendous stress on the body, and because golf is a sport that uses one side of the body, it makes the potential for injury even higher. The body hates asymmetry, and when it is present, body movement patterns will change and injury risks will elevate. Reverse wood chops will help to not only ensure rotational mobility but also strengthen motions opposite of those in the golf swing, which will encourage greater physical symmetry and reduce risk of injury. The muscles responsible for these opposite motions can also be seen as decelerating muscles in the golf swing. As mentioned, deceleration is important in golf, because it allows the energy to transfer through the body all the way to the club head while helping dissipate forces before the involved joints approach end range. So even though you swing a golf club in only one direction, you must also train the muscles that appear to do the opposite.

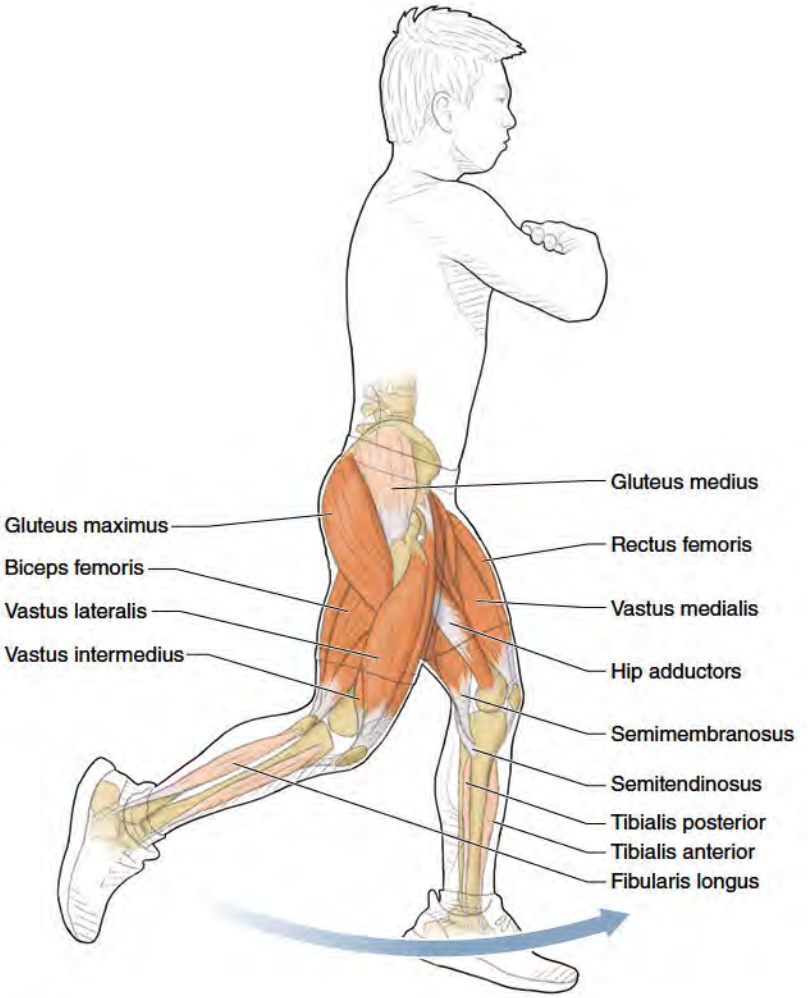


VARIATION

Reverse Wood Chop With Cable Machine

You can also use a cable machine for this exercise. Attach a rope to a low pulley and follow the same motion. Using the cable will make the dynamics slightly different because the cable motion will be more restricted. This makes correct posture and stabilization throughout the exercise even more important. Unless you are using an air-pressurized cable system, you will need to go much slower than with tubing, but the resistance will be higher. This will make the exercise more of a strength exercise and less of a power exercise.

JUMPING SPLIT SQUAT



Execution

1. Stand in a lunge position with your right foot forward and your left foot behind you.
2. Lower your left knee toward the ground into a deep lunge without letting your right knee move.
3. Push hard into the ground to explode your body up into the air.
4. While in the air, switch leg positions and land with your left foot forward and right foot back.
5. Immediately drop into the deep lunge position as you land and repeat.

Muscles Involved

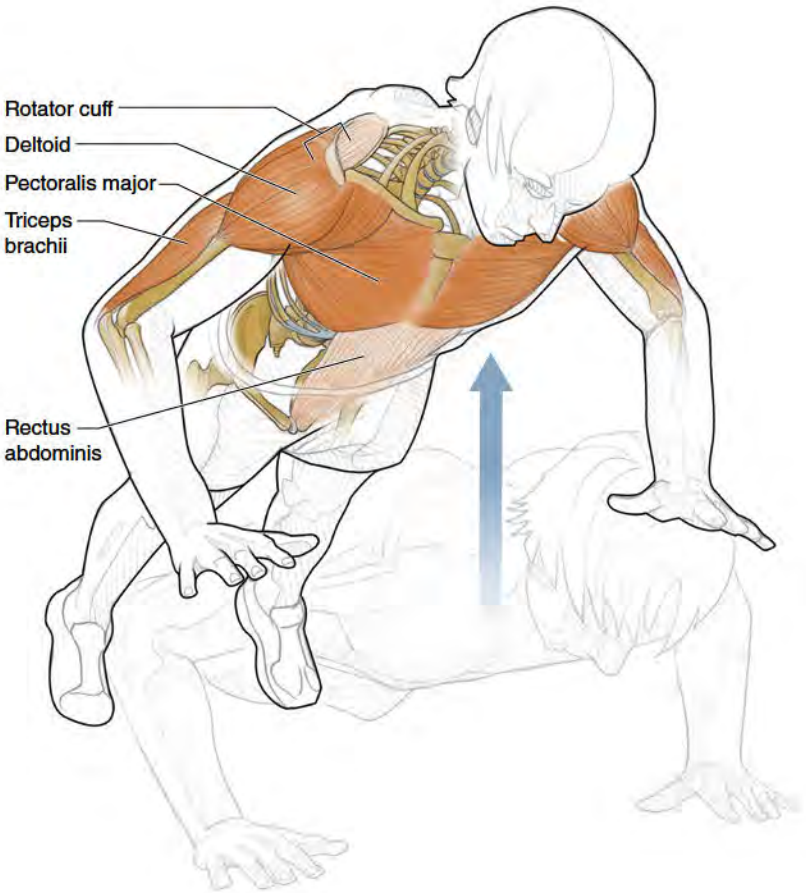
Primary: Gluteus maximus, quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), hamstrings (semitendinosus, semimembranosus, biceps femoris), hip adductors

Secondary: Gluteus medius, tibialis posterior, tibialis anterior, fibularis longus

GOLF FOCUS

This body weight exercise encourages eccentric and concentric loading of not only the gluteus, hamstrings, quadriceps, and adductors but also the tissues that help control the arches of the feet and ankle positioning, so it provides substantial value. The quicker the body can decelerate, the safer it will feel in allowing more speed in the swing through impact.

PLYOMETRIC PUSH-UP



Execution

1. Get into a normal push-up position with your hands about shoulder-width apart.
2. Lower yourself down as for a normal push-up.
3. Push up as hard and as fast as you can so that your hands come off the ground.
4. Land softly with your elbows slightly bent. Move your shoulder blades toward each other as you lower your chest and torso to the ground. Keep your body stable throughout the exercise, maintaining the position of your spine, pelvis, and legs similar to an abdominal plank.
5. Repeat.

Muscles Involved

Primary: Pectoralis major, triceps brachii, deltoids

Secondary: Rectus abdominis, rotator cuff (infraspinatus, supraspinatus, subscapularis, teres minor)

GOLF FOCUS

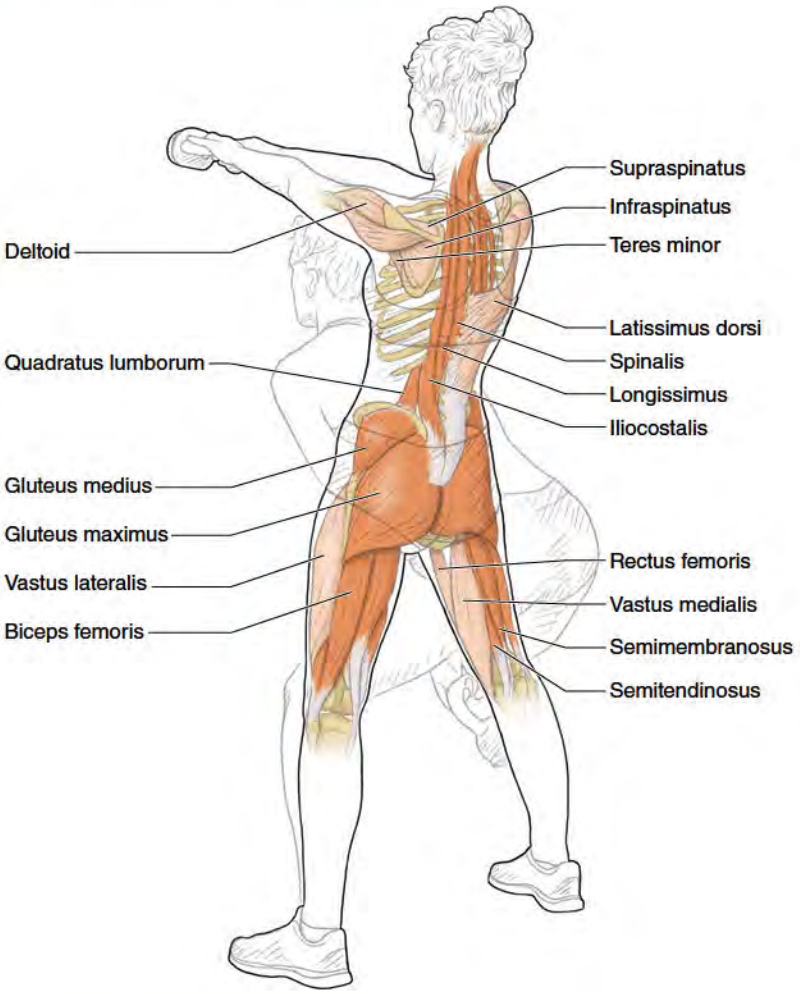
Most shots in golf do not require immense amounts of upper body strength and power. However, at certain times, these fitness components become extremely important for your shot-making potential. One of the reasons Jason Day is so good at scrambling is because he has the upper body strength and power to complete some very difficult shots. Inevitably, some of your tee shots will end up in some really deep rough. Without enough strength, you will have no other option but to safely hit back out to the fairway, and even this can be challenging. Increasing the power in your upper body by doing plyometric push-ups will give you many more options after poor tee shots. You will be able to power through the rough and get back to the fairway much more easily, and you will also have more opportunities to go for the green from a terrible lie.

VARIATION

Elevated Plyometric Push-Up

This exercise will work the same muscle groups, but it is a little bit easier to perform. Instead of being on the ground, use a bench, stairs, or counter to eliminate some body weight.

KETTLEBELL SWING



SAFETY TIP At first, use a kettlebell lighter than what you will use once comfortable with the exercise technique. Practice with the lighter kettlebell until you fully learn proper form.

Execution

1. Stand in an athletic position with both feet slightly turned out and slightly wider than hip-width. Slightly bend your knees and hinge at the hips, pushing the buttocks back and down. Position your back in a neutral to slightly extended posture. Your torso should be approximately parallel to the ground. The kettlebell should be on the ground directly below your head.

2. Grab the top of the kettlebell with both hands at midline. Lift the kettlebell slightly off the ground and let it swing between your legs. Maintain a long spine. Bend the knees slightly as the kettlebell moves back.
3. Drive your pelvis and hips forward into extension by squeezing the glutes. The hip drive should be strong enough to automatically force the kettlebell to about chest high. Your elbows should be straight throughout the movement. Do not rely on the arms to lift the kettlebell. The arms support and control the movement, but do not create it.
4. At the top of the swing, your body should be stiff to break the kettlebell's momentum. Think of your body as though it is in an abdominal plank position, but standing.
5. With straight arms, throw the kettlebell back toward your pelvis as your hips hinge.
6. Repeat for 10 to 30 seconds.

Muscles Involved

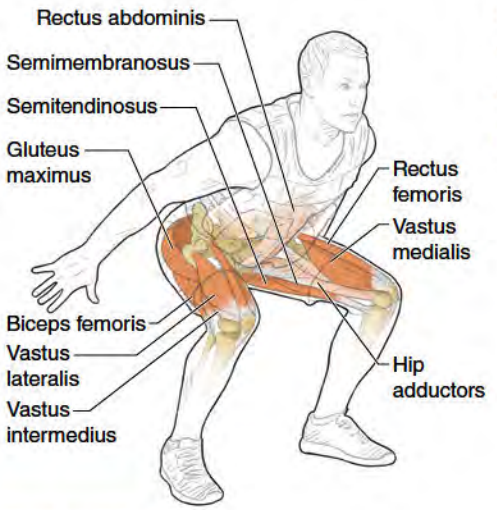
Primary: Gluteus maximus, gluteus medius, hamstrings (semitendinosus, semimembranosus, biceps femoris), erector spinae (iliocostalis, longissimus, spinalis), quadratus lumborum

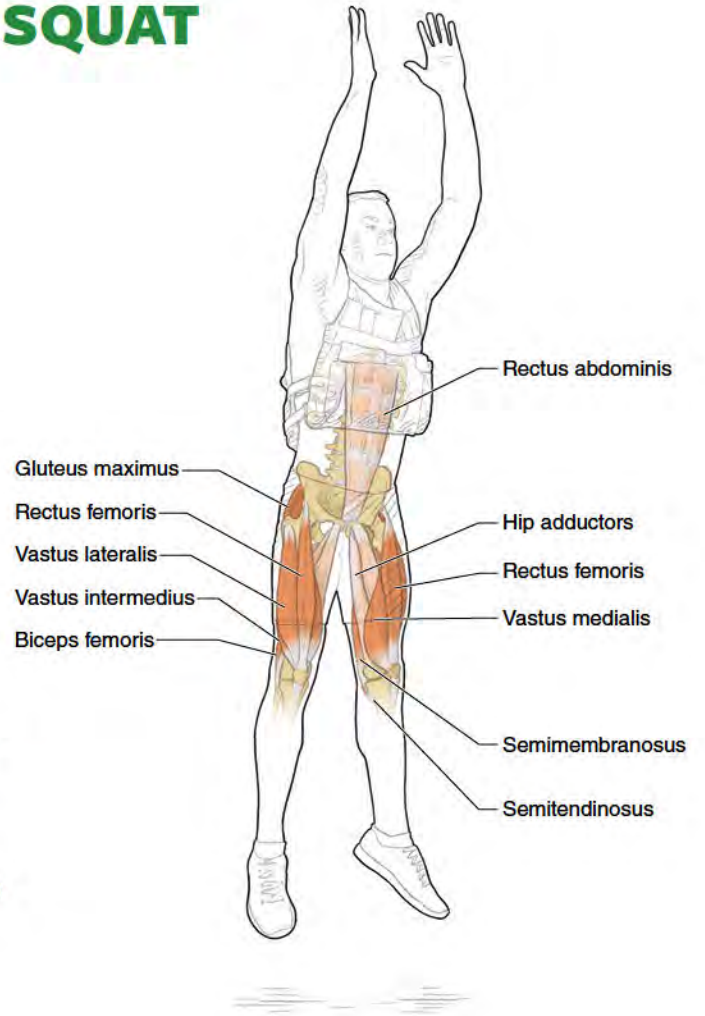
Secondary: Latissimus dorsi, quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), deltoids, rotator cuff (infraspinatus, supraspinatus, subscapularis, teres minor)

GOLF FOCUS

The ability to properly hip hinge and then create an efficient and explosive extension motion using the large muscles of the posterior hip—specifically the gluteus maximus and hamstrings—is an invaluable skill for a golfer. When you can hip hinge properly, it removes a lot of stress from the lower back and allows a more complete energy transfer from the legs up to the torso. From throwing to jumping and from sprinting to punching, the hip extension is the main driver of power in almost every sporting activity. Many golfers lack the ability to properly hip hinge and, therefore, never prepare the body appropriately to use these large muscles. Instantly enhance your power from the tees, fairways, and rough by mastering the kettlebell swing.

WEIGHTED VEST PLYOMETRIC SQUAT





Start position.

Execution

1. Wearing a weight vest, stand with your legs about shoulder-width apart, feet slightly turned outward. Hold your arms in a comfortable athletic position with your elbows bent and your hands slightly in front of your body.
2. Your knees should be above the ankles and feet and not dropping in toward the center.
3. Lower your body into a partial squat while pulling your arms down and back to prep the body for an aggressive jump.
4. Jump up as high as possible while driving the arms up toward the ceiling.
5. Land back in the starting squat position while maintaining a long spine. As soon as your feet touch the ground, focus on driving the ground away from you as you begin pushing to start the jump again.

SAFETY TIP If you have anteverted hips, stand in a more neutral stance, your feet parallel to each other and toes pointed forward instead of turned out.

Muscles Involved

Primary: Gluteus maximus, hamstrings (semitendinosus, semimembranosus, biceps femoris), quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius)

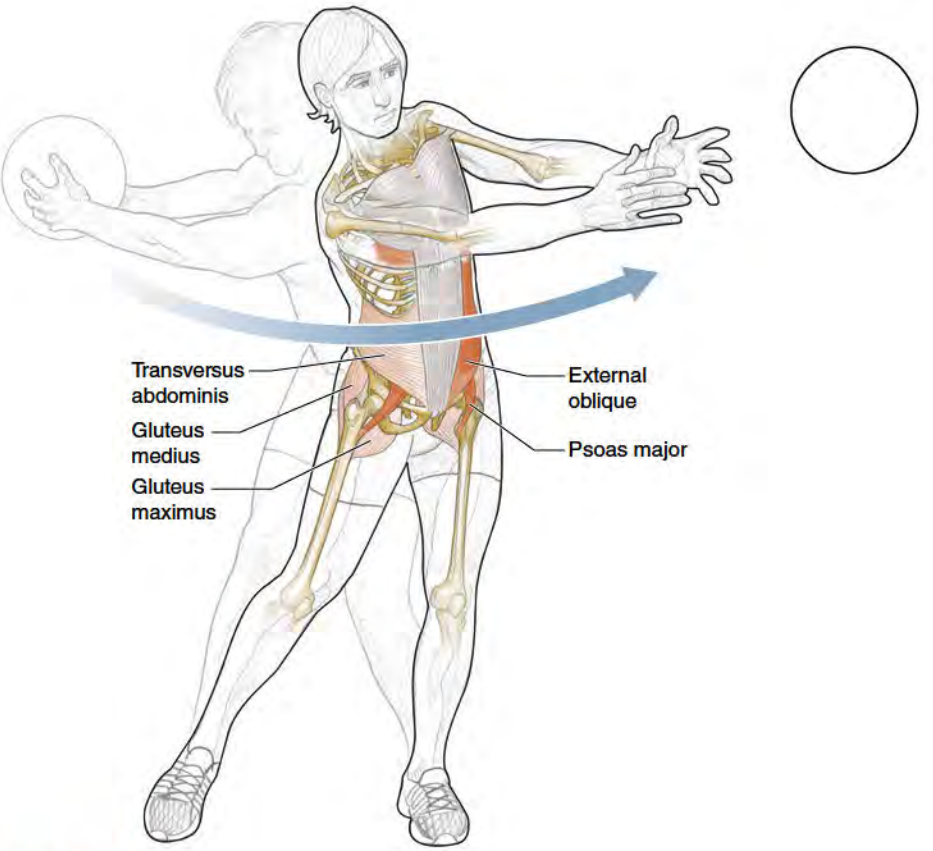
Secondary: Rectus abdominis, hip adductors

GOLF FOCUS

The weighted vest plyometric squat provides an opportunity to safely increase the resistance your body experiences while transitioning from the eccentric, force-absorbing period of the squat motion to the concentric explosive portion. For most golfers, the key is not in how high you are able to jump but how quickly and efficiently you can slow down your body and reverse direction. Improving your ability to slow down your body will make the golf swing safer because you will be able to absorb more force in a shorter time. This means you will have less speed toward the end of the swing, when many of your joints are approaching their end range of motion. In golf, most overuse injuries develop at the end range of motion. When the muscles are not able to appropriately slow down the body, the connective tissues in and around the joints (capsules, ligaments, tendons) experience greater shear and compression torque.

Conversely, a body that effectively slows down both the body and club after impact with the ball will be more likely to unlock the extra speed required to carry the bunker on the 18th hole when you need to make birdie to force a playoff. Being able to slow down the body will result in greater club-head speeds. If you can't slow down your body, your body won't let you achieve a higher club-head speed because it will intrinsically know that the extra speed could be placing your body at a much greater risk of injury.

PLYOMETRIC GOLF THROW TO A WALL



Execution

1. Stand in your golf posture a few feet to the right of a sturdy wall and hold a medicine ball in both hands. This is the start position.
2. Rotate within your golf posture to your right and into a backswing style position.
3. In one smooth movement, decelerate the medicine ball, and then initiate movement back to your left by pushing your legs down into the ground to accelerate your arms and the ball back toward the wall.
4. Release the ball toward the wall and prepare for the rebound while standing up and finishing your follow-through.
5. As the ball bounces off the wall and returns to you, return to your golf swing setup and decelerate the momentum of the ball as you again move into your backswing and perform the desired number of repetitions (6 to 10).
6. Repeat, rotating to the other side.

Muscles Involved

Primary: Internal oblique, external oblique, psoas major

Secondary: Gluteus maximus, gluteus medius, transversus abdominis

GOLF FOCUS

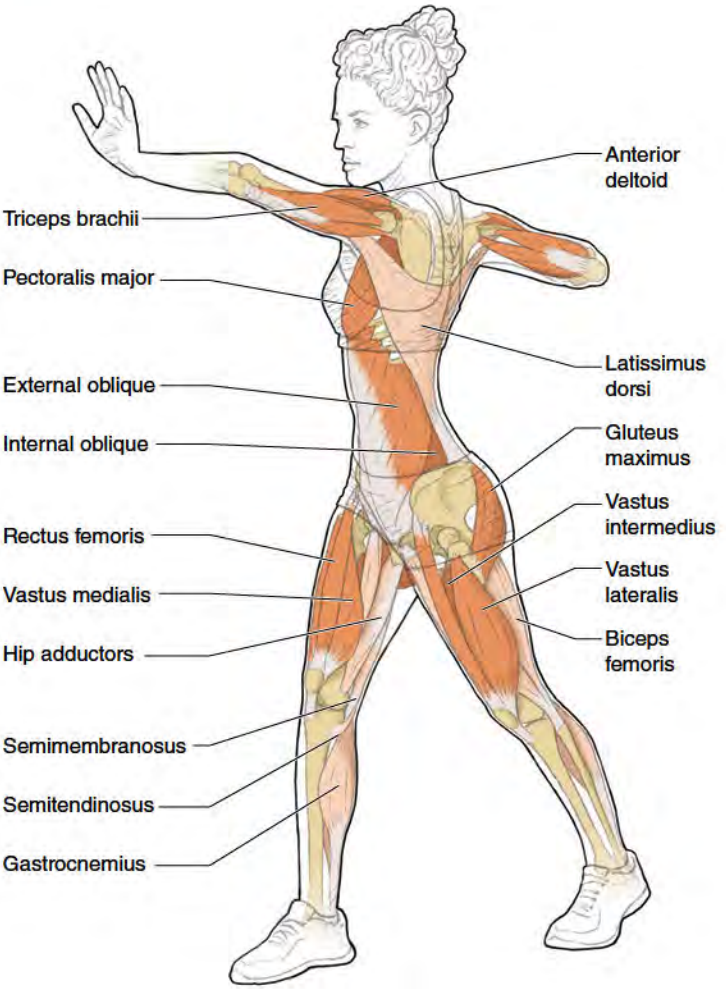
Once you come to the top of your backswing, it is important to use your core to decelerate the movement away from the target and simultaneously use your legs to begin driving your pelvis toward the target. On the downswing, true separation of the pelvis and shoulders occurs. Learning to use the legs to initiate the downswing while separating the pelvis from the upper body is an important aspect of developing power and efficiency in the swing. Plyometric golf throws help develop eccentric (lengthening) and concentric (shortening) power within the pelvis, core, and arms.

VARIATION

Golf Posture Throw to a Partner

When a wall isn't available but a partner is, perform this exercise by throwing the ball to your partner instead. Attempt to catch the ball while rotating into your backswing position and use a smooth transition to begin the leg and pelvis rotation drive toward your partner.

SHOT PUT



Execution

1. Stand with feet in a narrow stance and hold a small medicine ball (such as a SoftMed ball) in your left hand next to your left shoulder. The right arm is straight and pointing in front of you in the direction the ball will travel once thrown.
2. Bend your knees, hinge at the hips, and rotate your torso to the left so that most of your body weight is on your left foot. This is the start position.
3. Start the throwing motion by bending your right elbow and pulling it aggressively toward and behind your right hip; this will help rotate the body toward the target. At the same time, aggressively push your left foot into the ground to initiate the drive of your legs and pelvis toward the target.

4. Shift your weight onto your right leg by pulling back hard into the ground with the right foot. This will cause you to rotate completely to the right while standing up.
5. As your body rotates to the right, push the ball aggressively from your left shoulder toward the target using a shot put motion. Complete the energy transfer that began with you loading and subsequently driving from the feet, knees, and hips.
6. Perform the desired repetitions. Then do them on the opposite side.

Muscles Involved

Primary: Pectoralis major, anterior deltoids, triceps brachii, external oblique, internal oblique, gluteus maximus, quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius)

Secondary: Hamstrings (semitendinosus, semimembranosus, biceps femoris), hip adductors (lead leg), gastrocnemius, latissimus dorsi (lead arm)

GOLF FOCUS

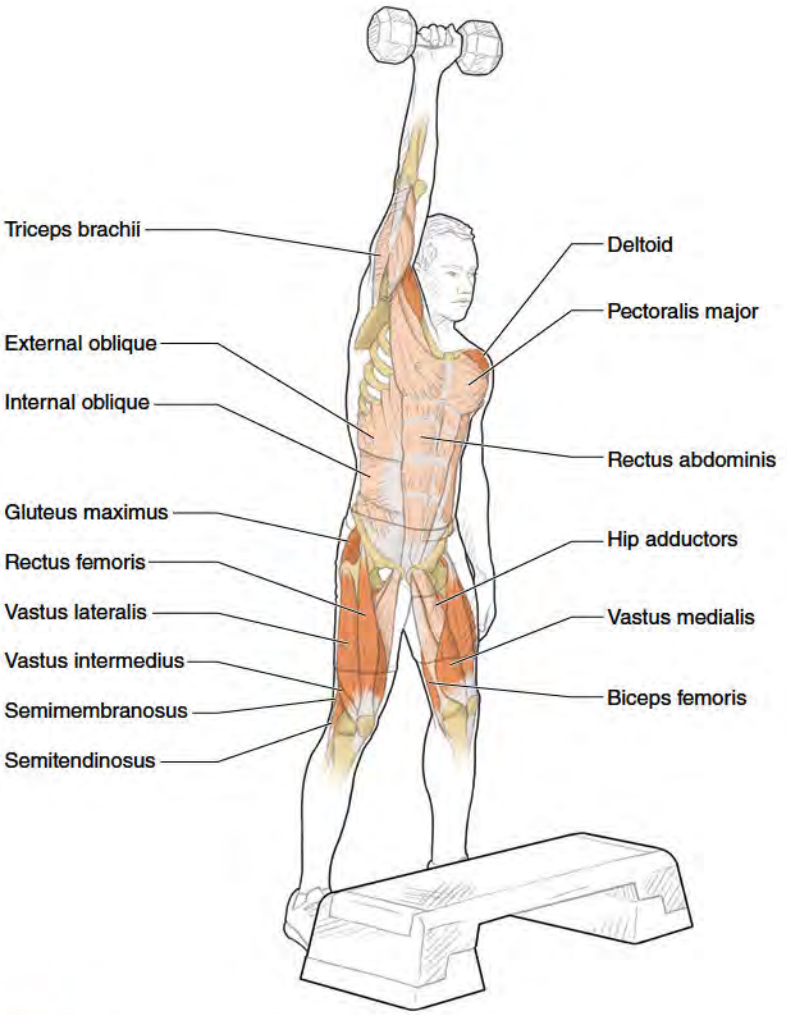
Many of the best and most consistent drivers of the golf ball are able to use the lead arm pull to make the body rotate toward the target while using the trail-side push to increase the energy transfer into the ball. The shot put throw is a wonderful exercise to synchronize the pull (lead) and push (trail) dynamic of the upper extremity with the pull (lead) and push (trail) of the legs. This is one of the best ways to ensure the body works as a complete unit during power development yet minimize excessive stress to any one limb. Graham DeLaet, who was the top-ranked ball striker on the PGA Tour for the 2013 season, uses the lead arm pull of this style of exercise to help develop the tremendous rotation he uses in the golf swing.

VARIATION

Single-Arm Tubing Punches

You can exercise this same movement pattern by using exercise tubing instead of a ball. Attach the tubing to an immovable object near the ground behind you and to your right. Grab the tubing with your right hand and perform the same movement as if doing the shot put. Hold the end position for two seconds and then return to the start position to repeat.

MODIFIED SINGLE-ARM DUMBBELL SNATCH



Execution

1. Place a dumbbell on a bench or step about 1 foot off the ground. Stand with feet slightly wider than shoulder-width directly in front of the bench. You want as little space between the dumbbell and your shin as possible.
2. Bend your knees and hinge at the hips. Grab the dumbbell with a right overhand grip. Placing the dumbbell on a bench or step (instead of lifting the weight from the ground) should encourage a long spine with no rounding of the lower back.
3. Retract the right shoulder blade as you pull yourself down slightly toward the dumbbell to load your shoulder and back. Your elbow should be straight

in the starting and finishing positions but will bend between during the actual movement portion of the exercise.

4. Drive up and forward with your hips and pull the dumbbell toward the ceiling by driving the elbow up aggressively as you stand up. Pull the dumbbell toward the ceiling and finish by standing tall with the elbow extended and stacked above the right shoulder. Keep the shoulder packed against the back of the ribs and pulled down throughout this hip and arm drive.
5. You will notice your body weight transfers forward over your foot and onto the toes as your heels lift off the ground during the aggressive drive up into the tall standing position.
6. Return to the start position and perform the desired repetitions. Then switch arms.
7. Start with a relatively light weight and focus on maintaining good posture in your spine, hips, and shoulders throughout the exercise. Use a weight that allows each of these body parts to be controlled at all times.

Muscles Involved

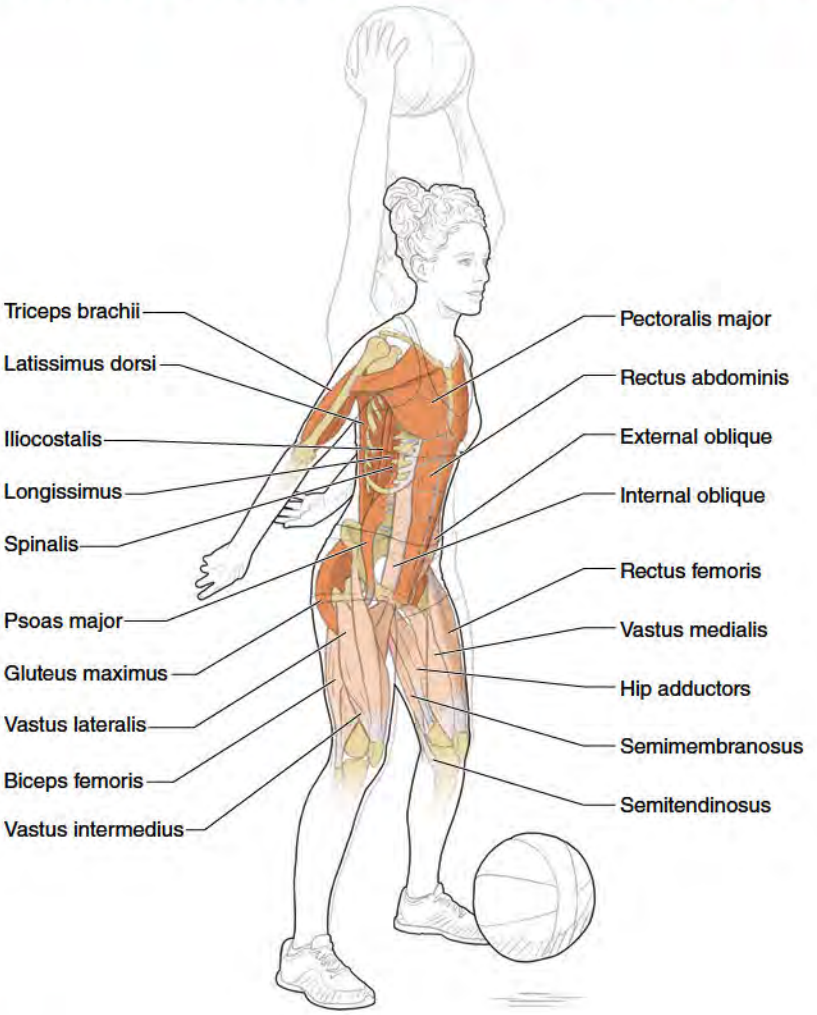
Primary: Gluteus maximus, hamstrings (semitendinosus, semimembranosus, biceps femoris), quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), hip adductors, deltoids

Secondary: Pectoralis major, triceps brachii, rectus abdominis, external oblique, internal oblique

GOLF FOCUS

As we discussed, using the legs, an efficient hip hinge, and a strong core under the influence of a well-organized system of motor control is the most effective way to improve your on-course performance, increase the shot options available to you, and decrease the likelihood of injury. The modified single-arm dumbbell snatch requires efficient synchronization of the legs, hips, and core. When performed regularly, the exercise can greatly advance your physical skill set and make thrashing your golf peers a little easier. Be sure to start this exercise with less weight than you think you need and focus on creating as efficient a movement as possible before attempting a heavier load.

MEDICINE BALL STABILITY SLAM



Execution

1. Stand with your feet about shoulder-width apart and slightly bend your knees.
2. Hold a medicine ball designed for slamming overhead while maintaining a stable torso at all times. Minimize the amount of spine bending that occurs during this exercise. You want the arms to move on a stable torso. This long, stable spine and torso is similar to the position experienced in an abdominal plank exercise and is referred to as a standing plank position.
3. Without losing your standing plank position, drive the medicine ball as hard as you can down to the floor in front of you.
4. Catch the ball as it bounces up from the floor and return the medicine ball overhead.
5. Perform the desired repetitions.

Muscles Involved

Primary: Rectus abdominis, latissimus dorsi, gluteus maximus, pectoralis major, triceps brachii, psoas major, erector spinae (iliocostalis, longissimus, spinalis)

Secondary: Hamstrings (semitendinosus, semimembranosus, biceps femoris), hip adductors, quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), external oblique, internal oblique

GOLF FOCUS

Developing the capacity to resist both internal and external forces within the muscles that protect the spine is a great way to encourage not only greater force development but also increased resiliency within the torso. Increased resiliency decreases the opportunity for injury. Many people perform plank exercises on the floor, but introducing dynamic standing plank-like exercises into your routine will help foster better coordination within the nervous system's receptors in your feet, spine, and pelvis. Better, more accurate communication within the body's nervous system will increase your performance off the tee and in those sticky lies in the rough, sand, and fairways. This exercise allows a player such as Kevin Chappell, one of the longest bombers on the PGA Tour, to develop incredible club-head speed with a relatively short takeaway and follow-through.

VARIATION

Medicine Ball Power Slam

You can modify this exercise to increase the power involved and incorporate more muscles. Instead of remaining in a standing plank during the exercise, hinge at the hips as you slam the ball into the ground. Go up onto your toes as you hold the medicine ball overhead. Drive your heels into the ground to initiate movement and then hinge at the hip as you slam the ball into the ground. Most athletes should maintain a long spine in the bottom position instead of flexing through the spine. Think of the power being generated from the hips instead of the spine. Catch the ball and repeat.

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8

PROGRAM PLANNING

Since training programs need to be designed specifically for each golfer, based on his or her needs, desires, limitations, and gifts, we analyzed the fitness programs of some of the world's best golfers to see how they use the exercises in *Golf Anatomy* during different phases of the season. The selection of exercises obviously changes based on the on- and off-course demands of the individual athlete and the accumulated stress that player has been exposed to. Additionally, the level of resistance, number of sets, rest periods, and other parameters these athletes use change day to day and week to week and depend on that athlete's biometrics, recovery, and so on.

Unfortunately, in most cases, an athlete begins working with us due to an injury or significantly limited body control. Consequently a program often begins with an emphasis on improving the quality of movement and control in individual joints. Healthy, functional joints are non-negotiable. It's unreasonable to expect a joint to magically attain the range of motion required to safely perform a complicated multijoint movement if it can't create or control an equal or greater range of motion when performing a simple single-joint movement. Yet many trainers, athletes, and coaches seem to have this expectation.

When the athlete has earned the prerequisite joint health and motor control, the focus of the program usually shifts to overall body awareness and movement efficiency. We emphasize improving the function and control of the feet, hips, spine, and shoulder complexes. We need our athletes to own the ability to move each of these areas segmentally, in isolation from neighboring joint complexes. Once they have this level of neurological control, we incorporate these joints into more complex movements that use multiple segments in a coordinated manner. Who would have an athlete do a power snatch without the necessary ankle dorsiflexion, hip hinge, or ability to perform a body weight squat? In *Golf Anatomy*, we suggest incorporating the movements described in the mobility and balance and proprioception chapters (chapters 3 and 4) to build a foundation that you can use as you progress to the strength and power chapters.

This chapter describes portions of programs used by Lydia Ko, Gary Woodland, Kevin Chappell, Graham DeLaet, and Byeong-hun (Ben) An. Lydia's program focuses on the exercises she used to build a strong foundation from the feet up

as she earned the control of each body segment. Ben's program is an example of what he did in the week before his playing season. He had already built his overall strength and power capacity during the offseason, so he tapered and focused on recovering for the heavy travel requirements that go with playing on both the European and PGA Tours. Graham DeLaet used this portion of his program to maintain a healthy and functional body after back surgery and minimize the effects of the surgery. Kevin Chappell's program is an example of a typical preround warm-up session. This program helps ensure his body is properly prepared, whether this is Kevin's first or fifth week in a row playing on the tour.

Lastly, Gary Woodland's program shows how he built his overall capacity in the middle of his off-season. Unlike many of the other programs in this chapter, Gary's program included more exercises from the strength and power chapters of this book. He already built his basic capacity and focused on building strength and transitioning to a power-focused block in his training. Most athletes playing on the world's top tours do not spend a significant amount of time in this section of their programming because there isn't enough of an off-season, and many athletes need to focus on recovery for a good chunk of their time off. When Gary performed a strength or power-focused block in his training, there was an equal emphasis on body recovery. This may include soft tissue treatment, cryotherapy, acupuncture or dry needling, hyperbaric therapy, or other treatments. If you are going to train hard and break the tissues down, you need to ensure the tissue has the environment necessary to allow appropriate recovery to occur.

Pain and inflammation are probably the greatest impediments to reaching an ultimate level of performance, whether in an elite athlete or a weekend warrior. Pain and inflammation patches may be the safest method to help provide relief for musculoskeletal conditions, from golfer's elbow to lower back pain, from shin splints and irritated meniscus to shoulder and neck pain.

FOCUS ON MOBILITY, BALANCE, AND PROPRIOCEPTION

If working on your fitness is a new experience for you or if you are coming back to fitness after a significant time away, we highly recommend spending time on the warm-up, mobility, and balance and proprioception chapters (chapters 2, 3, and 4). For most golfers, the exercises in these chapters provide the most value in terms of health and on-course performance. Each individual will have a different past when it comes to injuries, training experience, genetics, and health. If you require greater mobility or strength in the arms and shoulders, spend more time on these exercises. If you struggle with foot or hip mobility, put more emphasis on these exercises in your programming.

Lydia Ko's program (table 8.1) is a great example for the golfer who is just beginning a training program and needs to improve mobility in the feet, hips, spine, and shoulders. In Lydia's program, the exercises focus on isolating individual joint segments to acquire the ability to move them against a neighboring

TABLE 8.1 Lydia Ko's Program for Mobility, Balance, and Proprioception

Exercise	Repetitions	Notes
Big toe raise	20	Try to keep the toe coming straight up and not angled out.
Pronation supination	20	Initiate movement from the feet and not from the hips.
Segmental cat camel	5, taking 1 minute per repetition	Try to move just one segment at a time.
90/90 transition	5 to 8 per side, slow	Attempt to keep the legs as far apart as possible at all times.
Scapular circles	5 in each direction	Attempt to move only the shoulder blade. Move through as big a range as possible.
Prone swimmers for shoulders	2 in each direction, taking 1 minute per repetition	Keep your elbows and hands as high as possible at all times and move slowly.
Three-position side lunge	5 in each position	Focus on maintaining a straight knee on the side of the non-moving leg when in the lunge.
Combat frog isometrics for adduction and abduction	1 in each direction for 60 seconds	Maintain a long spine at all times.
Single-arm tubing punches	8 to 12 per side	Always get back and load the back hip so you can use your legs effectively to push off. Don't forget to pull with the free hand to drive the rotation.

segment with control. Most of us are not able to consciously move an individual joint segment in isolation. As a result, we are forced to use compensatory and inefficient coupled motion that places more stress on the muscles and connective tissues throughout the body. Once these key areas become more mobile and can be controlled with greater accuracy, you can begin to combine the body parts into more complex multijoint movements.

When Lydia first began working with Dr. Davies, many of the essential elements of the program were a challenge for her. In the past, she attempted more complex exercises before developing the prerequisite control of her body instead of building a foundation on more fundamental movements. This created poor movement patterns that were difficult to correct. You will notice that this program places significant emphasis on cultivating balance and body awareness. Ultimately she quickly mastered these exercises and advanced to more multifaceted movements.

> I never appreciated how important it was to gain control of each area of my body. When I focused on this in my training, it became possible to maximize the efficiency and the precision of my movement during the golf swing. The greatest piece of advice I can offer you is to master the basics because the basics are what all the other skills develop from.
>
> **Lydia Ko**

FOCUS ON STRENGTH AND MOBILITY THROUGH BODY-WEIGHT EXERCISES

Once you can move each joint through the necessary range of motion under the desired control, move to more complex exercises using your body weight. If you don't have significant internal and external rotation of the glenohumeral joints (shoulders), your shoulder blades can't protract and retract properly, or your thoracic spine can't extend, flex, and rotate sufficiently, do not perform crab to beast transitions. If you have developed the required motion in these joints, moving to a more demanding task is encouraged.

The program used by Byeong-hun (Ben) An (table 8.2) provides a great example for the type of exercises that could be selected once sufficient control has been obtained at each individual joint. Ben's body-weight-dominant program is quite challenging but can be made more or less difficult by increasing or decreasing the number of repetitions performed. Ben's well-balanced program will strengthen the legs, arms, and trunk through all planes of motion while also improving mobility throughout the body.

When Ben began working with Dr. Davies at the 2016 Masters, he was not able to hit a single full shot in a practice round of that tournament because of a neck injury that he had been dealing with leading up to that week. Unfortunately, the injury developed into a significant problem the week before Augusta and impeded his ability to swing a club. He was able to tee up on Thursday, and although it was a struggle, he was able to stay within reach of making the cut with a strong performance on Friday. He played beautifully on Friday but ended up missing the cut by one. He learned that the pain and dysfunction in his neck was due to a lack of control in the extension and rotation of his thoracic spine and the movement of his shoulder blades. As a result, shoulder and arm movements were placing significantly more stress on the neck and upper back than should have been necessary. Now that he moves with greater proficiency and has developed the prerequisites to more complex exercises, he can perform strength exercises with less negative stress to his body. This benefits his performance and reduces the opportunity for injury!

In Ben's program (table 8.2), you can see some of the exercises he was doing the week before starting the 2018 season. He had already put two months of work into developing his overall strength and power and was tapering his training and maintaining his movement potential while developing his energy reserves before starting a busy schedule playing on both the European Tour and PGA Tour.

> I worked hard to improve the control of my body and experienced a significant improvement in my club-head and ball velocity as a result. I never would have thought that learning how to move my body more efficiently would enable me to hit the ball so much further.
>
> **Byeong-hun An**

TABLE 8.2 Byeong-hun An's Program for Developing Strength and Mobility Through Body-Weight Exercises

Exercise	Repetitions	Notes
90/90 transition	5 per side, slow	Try to keep the front leg on the ground as long as possible while you move the back leg into external rotation on each repetition.
Spine wave from loaded beast	3 to 5	Take your time and focus on each level of the spine moving against the previous segment.
Cossack squat	5 to 8 per side	Keep your spine long at all times. It's easy to get too rounded.
Arm reach from crab	5 per arm, slow	Begin the movement with a focused push of the feet into the ground to lift the hips. Breathe through the belly and try to let the upper body and arm relax as it hangs.
Beast to crab to beast flow	3 to 5 in each direction	Focus on the shoulder movement and don't let the shoulders shrug up toward the ears.
Scorpion reach from loaded beast	2 to 3 in each direction	Make sure your arms are straight as you drive the hip up. Focus on using a clam-shell motion from the hip and not hip extension as you lift toward the ceiling.
Asymmetrical opener rotation	8 in each direction	Keep your shoulder blade low as you move into the backswing. It's easy to hike it up toward the ears.
Single-leg airplane	10 on each leg	The big toe should stay in contact with the ground at all times. Pretend there is a bug under the big toe and don't let it escape.
Kneeling soccer throw	8 to 12	Try to focus on not letting the ribs hike up when raising the ball overhead. This will keep the lower back more stable.

FOCUS ON POWER AND STRENGTH

When advanced body-weight exercises can be performed properly, it is appropriate to add an external resistance (dumbbells, kettlebells, etc.). You can emphasize improving strength and then power. Gary Woodland's program (table 8.3) shows the type of programming he did in his off-season after he prepared his body appropriately using body-weight exercises to improve his mobility and body awareness. This program, which he performed after going through a full warm-up, emphasizes power exercises initially and then strength-based training (trap bar deadlift) so the nervous system isn't fatigued when there are high demands on deceleration and acceleration, as experienced in the power

TABLE 8.3 Gary Woodland's Program for Strength and Power

Exercises	Repetitions	Notes
Kneeling soccer throw	8 to 12	Create power from the arms but maintain a braced spine.
Jumping split squat	5 to 8 per leg	Get as much air as possible on each jump.
Weighted vest plyometric front squat	5 to 8	Don't get sloppy in the lower back at the bottom of the squat.
Deadlift with hex bar	3 to 8	Pull yourself down to the ground to lock in your shoulders and lats, then focus on driving the ground away from you as you stand up.
Push-up to plank	12 per arm	Push the ground hard as you move from plank to push-up.
Single-arm rotation press	8 per side	Pull the arm without the weight to allow the trunk to rotate properly.
Goblet walking lunge	30 seconds of consecutive lunging	Pull the knee of the front leg back to drive up and out of the lunge.
Reverse woodchop with tubing	8 per side	Always return to the start position. It's easy to get sloppy if you are rushing.

exercises. This program provides a nice example of a full-body training program that stresses both power and strength.

The 2017 season was the first time that Gary Woodland played a complete season on the PGA Tour and remained injury-free. Much of this success was due to a new emphasis on maintaining his fitness training throughout the season when he would have historically fallen off a little as a result of the distractions that present themselves on tour. This new training regimen was helpful, and he integrated a regular treatment and recovery program. Since Gary was able to finish the 2017 season healthy, he was able to use the 2017-2018 off-season as an opportunity to focus on improving his strength and power capabilities. This program is an example of the type of training he performed in the middle of his off-season. You will notice that he still places emphasis on body control, balance, and mobility during this block of training, but his focus is on exploring his athletic potential.

> I needed to master the basics before I earned the right to perform these more complex movements. If you put the time and effort into owning the exercises at the beginning of this book, you will see significantly more progress in the strength and power-focused exercises.
>
> **Gary Woodland**

FOCUS ON A DYNAMIC WARM-UP

Once you have progressed through this book and have developed resilience within your body, you can change your preround warm-up to include exercises

that will prepare you for not only the upcoming practice or playing session but also future training sessions. If you think about how many preround or prepractice warm-ups an avid amateur or professional golfer does, you can appreciate how much of an opportunity the warm-up provides for improving your body over the long term.

In Kevin Chappell's program (table 8.4), we see a section of his pre-golf warm-up. His program normally takes 25 to 30 minutes. One focus of the warm-up is to challenge his areas of weakness for long-term improvement. The average professional golfer playing 25 to 30 tournament weeks will have 125 or more warm-ups per year, and this doesn't include the golf played on off weeks. There is lots of opportunity to improve! The warm-up included in chapter 2 is great for those who are just beginning their journey into fitness, but a more detailed, individualized program involving more complex exercises is appropriate as the body improves. In this warm-up, Kevin begins by activating his feet, hips, shoulders, and spine and then moves to full-body exercises that require both rotation and antirotation. He finishes with more dynamic exercises that emphasize speed and use bands to provide progressive resistance. This warm-up

TABLE 8.4 Kevin Chappell's Dynamic Warm-Up

Exercises	Repetitions	Notes
Big toe raise	20	Try to keep the toe coming straight up and not angled out.
Spine wave from loaded beast	5, taking 1 minute per repetition	Feel strong and move slowly as your spine moves from flexion to extension and extension to flexion.
90/90 transition	5 to 8 per side, slow	Attempt to keep the legs as far apart as possible at all times.
Prone swimmers for shoulders	2 in each direction, taking 1 minute per repetition	Keep your elbows and hands as high as possible at all times and move slowly.
Hand-to-toe pose	2 per side, taking 20 seconds per repetition	Feel as tall as possible. The stabilizing leg needs to be straight but the leg in the air may be bent for most people.
Kneeling Paloff press	8 to 12 per side, slow	Keep your hip hinge and spine angle constant throughout the exercise.
Antirotational Romanian deadlift	5 to 8 per side	Lower only as far as you can maintain a neutral spine. Don't let your hips open up as you lower.
Knee-up reverse lunge	8 in each position	Don't let the knee drop inward during any point of this motion.
Asymmetrical opener rotation	8 in each direction	Use the legs to create the power from the top. Hold the finish position for a full breath to engage the feet, hips, and core.
Single-arm tubing punches	8 to 12 per side	The pull is as important (maybe more important) than the pushing arm on this one.

provides a nice succession from isolated low-intensity movements to controlled full-body exercises and finally to vigorous high-velocity movements once the body is properly warm and prepared.

The warm-up also gives you a chance to make your deficiencies your strength. Many of the movements in this warm-up program focus on areas that Kevin wanted to improve in his physical capabilities. If you do the same with your warm-up, you will also notice significant improvements in the way your body is able to move and perform, both on and off the golf course.

> Most people who look at my swing think I should make it longer. Luckily, I was able to find a great coach in Mark Blackburn and knowledgeable trainers and therapists (the authors of this book) who were able to work with my body to maximize its individual potential. You need to swing the way your body moves most efficiently and not how someone else swings it. It is also important to make sure your body is warmed up for each practice session and round of golf, as a proper warm-up is more than just a physical activity. Yes, it will help you move more effectively for your round of golf, but it also provides an opportunity to shrug off the variables that are an inescapable aspect of life on the road while creating an incredible opportunity to ensure your body is sufficiently prepared each and every time you tee it up.
>
> **Kevin Chappell**

FOCUS ON INJURY REHABILITATION

This edition of *Golf Anatomy* does not have an injury prevention chapter. However, we have included an example from Graham DeLaet's postsurgical training (table 8.5), a portion of a program he used to improve the function in his feet, ankles, hips, and spine to minimize the stress placed on his repaired lower back. One of the biggest errors in rehabilitation and prevention is focusing too much on the injured tissue. In baseball, this would be similar to focusing on the elbow of a pitcher who had Tommy John surgery. If you focused only on the elbow, the rate of re-injury would be very high because you haven't changed the stress going to the elbow during the throwing motion. By improving the function of the hips, spine, and shoulder, we often can reduce the stress on the elbow and the rate of re-injury decreases significantly.

The same is true with golfers who have had a back injury. If we improve the function of the joint complexes below and above the injured area, we can significantly reduce the loads the structures in the lower back experience and considerably slash the risk of injury. If you have had a previous back injury or would like to minimize the likelihood of developing one, take some notes from Graham's program and add them into your own.

Graham struggled with back pain throughout the 2010 PGA Tour season. Unfortunately, it got to the point where he was unable to get off the floor. He underwent microdiscectomy in January 2011. He then spent the rest of 2011

TABLE 8.5 Graham DeLaet's Injury Recovery Program

Exercises	Repetitions	Notes
Big toe raise	20	This is harder than it seems.
Pronation supination	20	Focus on lifting and collapsing the arches of the foot. You will see your shin rotate back and forth as you move the arches if you are doing this properly.
Segmental cat camel	5, taking 1 minute per repetition	Go slowly.
90/90 transition	5 to 8 per side, slow	Attempt to keep the legs as far apart as possible at all times.
Pigeon pose	1 per side, taking 40 to 60 seconds per repetition	Focus on the back of the hip opening up. I like to concentrate on my breathing and focus my attention on the back of the hip.
Scapular circles	5 in each direction	These need to be slow and as big as possible.
Stork to bow	3 per leg, taking 30 seconds per repetition	Try to feel as much length as possible throughout the body.
Cossack squat	10 in each direction	Get your hips as low as possible and feel the stretch through the inner thigh. Don't round the back.
Triangle pose	5 in each position	The focus should be on the rotation and not on how straight your knees can get. Don't lose the rotation to straighten the knee.
Combat frog isometrics for adduction and abduction	1 in each direction, taking 60 seconds per isometric	Maintain a long spine at all times.
V-sit with rotation and single-arm reach	5 to 8 per side	Try to keep a natural arch in your back and rotate only as far as this can be maintained. Start with your feet on the ground.

rehabbing his back and attempting to get back to playing on tour. December rolled around, and he was still not able to play without pain. A fellow PGA Tour professional recommended that he see Dr. Davies, so he flew to Orlando to have an assessment. During the assessment, Dr. Davies found that Graham's feet, ankles, and hips were not moving through appropriate ranges, and this was placing a great deal of stress on his lower back with every swing. Due to these findings, Graham had to place significant emphasis on improving his range of motion and control at these key areas. In the program included in this book, you will find some of the exercises that he used to minimize the stress placed on his lower back.

> Improving the internal rotation of my hips and dorsiflexion of my ankles and big toes were instrumental in my ability to return to the PGA Tour. Not only was I able to return to the tour but I finished

the 2013 season ranked as the top ball striker on the PGA Tour and earned my first opportunity to play for the International team at the Presidents Cup.

Graham DeLaet

EXERCISE PROGRESSIONS

As the training programs in this chapter show, exercise prescriptions can vary dramatically. Even some of the greatest players in the world need to return to the basics and master movement potential before attempting strength and power exercises. We highly recommend you completely eliminate the notion that effective workouts always need to involve heavy sweating and lots of weight. If you can leave your ego at the door and simply master great movement, you will see the benefits on the golf course. The chapter progressions in this book were developed for a specific reason; this feature should help you decide which exercises are appropriate for you. We also created an exercise progression chart (table 8.6) to help you create your golf fitness program. This chart lists each exercise in the book in the order it appears within the chapter. The category or specific focus of the exercise is listed next to the exercise title. This correlates with the chapter where you can find the details of the exercise and any variations.

The most useful part of this chart is the category labeled prerequisites. The exercises listed in this column are the prerequisite exercises that must be mastered before you move to the exercise listed in the column on the far left. Each part of this book builds on the exercises that came before so you will become proficient at specific exercises before moving on to multifaceted ones in later chapters. Use the information in this column as a barometer to evaluate the exercises you should focus on and how quickly you can advance. You may find you are more proficient in scapular/shoulder exercises, but need more work with basic hip, foot, and ankle mobility, for example. If this is the case, you can build a program with more advanced scapular exercises, but also include hip, foot, and ankle mobility exercises from chapters 2 and 3. Or you may find that you progress through the foot and ankle exercises rapidly, but need more time to master hip and scapular exercises. In that case, use this chart to help you progress faster to advanced foot and ankle exercises as you continue with hip and scapular exercises from the first few chapters. The prerequisites column should help you know when you can progress to more advanced exercises or if you should continue to work on the basics of individual segmental movement. Don't be surprised if you find yourself initially focusing on exercises from the first couple chapters. Be honest with yourself and trust that your biggest gains on the golf course will come from mastery of the exercises in the warm-up, mobility, and balance and proprioception chapters.

TABLE 8.6 Exercise Progressions

Preworkout Warm-Up				
Exercise	**Page numbers**	**Category**	**Variations**	**Prerequisites**
Ankle Dorsiflexion Using SuperFlex Bands	22	Warm-up		
Hip 90/90	23	Warm-up		
Pigeon Pose	24	Warm-up		
Triangle Pose	25	Warm-up		
Segmental Cat Camel	26-27	Warm-up		
Scapular Circles	28	Warm-up		
Prone Swimmers for Shoulders	29	Warm-up		
Abdominal Plank	30	Warm-up		
Single-Leg Stance Hip Flexion and Knee Extension	31	Warm-up		
Three-Position Side Lunge	32	Warm-up		
Mobility for Optimal Swing Angles				
Exercise	**Page numbers**	**Category**	**Variations**	**Prerequisites**
Isometric Hip Flexor Stretch Hold (Hamstring Activation)	40-41	Mobility		
Combat Frog Isometrics for Adduction and Abduction	42-43	Mobility		Hip 90/90 (warm-up)
90/90 Transition	44-45	Mobility		Hip 90/90 (warm-up)
Single-Arm Punch With Opposite Arm Pull	46-47	Mobility		Scapular Circles (warm-up)
Spine Wave From Loaded Beast	48-49	Mobility		Segmental Cat Camel (warm-up) Prone Swimmers for Shoulders (warm-up)
Arm Reach From Crab	50-51	Mobility		Scapular Circles (warm-up) Prone Swimmers for Shoulders (warm-up) Segmental Cat Camel (warm-up)

(continued)

TABLE 8.6 *(continued)*

Mobility for Optimal Swing Angles				
Exercise	**Page numbers**	**Category**	**Variations**	**Prerequisites**
Scorpion Reach From Loaded Beast	52-53	Mobility		Segmental Cat Camel (warm-up) Prone Swimmers for Shoulders (warm-up) Single-Leg Stance Hip Flexion and Knee Extension (warm-up)
Beast to Crab to Beast Flow	54-55	Mobility		Arm Reach From Crab (mobility)
Cossack Squat	56-57	Mobility		Three-Position Side Lunge (warm-up) Ankle Dorsiflexion Using SuperFlex Bands (warm-up)
Reverse Opener for Mobility	58-59	Mobility		Scapular Circles (warm-up) Segmental Cat Camel (warm-up)
Wall Angel	60-61	Mobility	Supine Wall Angel	Scapular Circles (warm-up) Segmental Cat Camel (warm-up)
Balance and Proprioception Training for Efficient Energy Transfer				
Exercise	**Page numbers**	**Category**	**Variations**	**Prerequisites**
Big Toe Raise	66-67	Balance	Assisted Big Toe Raise	
Pronation Supination	68-69	Balance	Opposing Pronation Supination	
Isometric Heel Raise	70-71	Balance	Isometric Heel Raise Into Partial Sissy Squat	Big Toe Raise (balance)
Single-Leg Roll-Out	72-73	Balance	Single-Leg Roll-Out With Eyes Closed	Single-Leg Stance Hip Flexion and Knee Extension (warm-up)
Single-Leg Airplane	74-75	Balance	Single-Leg Golf Swing	Single-Leg Stance Hip Flexion and Knee Extension (warm-up) Triangle Pose (warm-up)
Modified Hand-to-Toe Pose	76-77	Balance	Hand-to-Toe Pose	Single-Leg Stance Hip Flexion and Knee Extension (warm-up) Three-Position Side Lunge (warm-up)

Balance and Proprioception Training for Efficient Energy Transfer				
Exercise	**Page numbers**	**Category**	**Variations**	**Prerequisites**
Single-Leg Catch	78-79	Balance	Single-Leg Catch Against Wall	Single-Leg Stance Hip Flexion and Knee Extension (warm-up) Single-Leg Roll-Out (balance)
Stork Turn	80-81	Balance	Stork Turn With Medicine Ball	Modified Hand-to-Toe Pose (balance)
Stork to Bow	82-83	Balance	Stork to Bow With Eyes Closed	Stork Turn (balance) Segmental Cat Camel (warm-up)
Straight-Leg Raise on Stability Ball	84-85	Balance	Straight-Leg Extension on Stair, Step, or Chair Unstable Leg Extension on Stability Ball	Arm Reach From Crab (mobility)
Hamstring Curl on Stability Ball	86-87	Balance	Unstable Hamstring Curl on Stability Ball Single-Leg Hamstring Curl on Stability Ball	Straight-Leg Raise on Stability Ball (balance)
Single-Leg Tug-of-War With Battle Rope	88-89	Balance	Tug-of-War With Eyes Closed	Stork to Bow (balance)
Single-Leg Reaching Squat	90-91	Balance	Supported Single-Leg Squat	Ankle Dorsiflexion Using SuperFlex Bands (warm-up) Single-Leg Stance Hip Flexion and Knee Extension (warm-up) Three-Position Side Lunge (warm-up)
Asymmetrical Opener Rotation	92-93	Balance		Scapular Circles (warm-up) Hip 90/90 (warm-up) Reverse Opener for Mobility (mobility)
Rotational Resistance and Deceleration for Injury-Free Swings				
Exercise	**Page numbers**	**Category**	**Variations**	**Prerequisites**
Half Side Plank Hip Series	98-99	Rotational resistance		

(continued)

TABLE 8.6 *(continued)*

Rotational Resistance and Deceleration for Injury-Free Swings				
Exercise	**Page numbers**	**Category**	**Variations**	**Prerequisites**
Kneeling Paloff Press	100-101	Rotational resistance		Abdominal Plank (warm-up)
Kneeling Battle Rope: Beat the Wave	102-103	Rotational resistance		Abdominal Plank (warm-up) Hamstring Curl on Stability Ball (balance)
Alternating Arm Reach in Abdominal Plank	104-105	Rotational resistance	Alternating Arm Reach in Kneeling Abdominal Plank	Abdominal Plank (warm-up) Prone Swimmers for Shoulders (warm-up) Segmental Cat Camel (warm-up)
Battle Rope Pull in Plank	106-107	Rotational resistance	Battle Rope Pull in Kneeling Abdominal Plank	Alternating Arm Reach in Abdominal Plank (rotational resistance)
Step Back Internal Shoulder Rotation	108-109	Dynamic rotational resistance		Wall Angel (mobility)
Single-Leg Horizontal Chop	110-111	Dynamic rotational resistance	Single-Leg Horizontal Chop With Cable	Single-Leg Roll-Out (balance)
V-Sit With Rotation and Single-Arm Reach	112-113	Dynamic rotational resistance		Reverse Opener for Mobility (mobility) Hamstring Curl on Stability Ball (balance) Kneeling Battle Rope: Beat the Wave (rotational resistance)
Rotating Side Plank	114-115	Dynamic rotational resistance		Half Side Plank Hip Series (rotational resistance) Abdominal Plank (warm-up) Prone Swimmers for Shoulders (warm-up)
Antirotational Back Lunge	116-117	Dynamic rotational resistance		Kneeling Paloff Press (rotational resistance) Three-Position Side Lunge (warm-up)
Antirotational Romanian Deadlift	118-119	Dynamic rotational resistance		Stork to Bow (balance) Kneeling Paloff Press (rotational resistance)

Rotational Resistance and Deceleration for Injury-Free Swings				
Exercise	**Page numbers**	**Category**	**Variations**	**Prerequisites**
Forward and Back Deceleration Jumps	120-121	Deceleration		Ankle Dorsiflexion Using SuperFlex Bands (warm-up) Single-Leg Reaching Squat (balance) Single-Leg Tug-of-War With Battle Rope (balance)
Lateral Step Into Lateral Bound	122-123	Deceleration	Lateral Bounding With Medicine Ball Lateral Bounding With Turns	Pronation Supination (balance) Cossack Squat (mobility) Single-Leg Reaching Squat (balance) Stork Turn (balance) Half Side Plank Hip Series (rotational resistance)
Depth Drop	124-125	Deceleration	Depth Squat With Weight Vest	Ankle Dorsiflexion Using SuperFlex Bands (warm-up) Combat Frog Isometrics for Adduction and Abduction (mobility) Single-Leg Reaching Squat (balance) Half Side Plank Hip Series (rotational resistance)
Strength for Increased Distance				
Exercise	**Page numbers**	**Category**	**Variations**	**Prerequisites**
Front Squat	132-133	Strength		Depth Drop (deceleration)
Goblet Walking Lunge	134-135	Strength		Segmental Cat Camel (warm-up) Antirotational Back Lunge (dynamic rotational resistance)
Knee-Up Reverse Lunge	136-137	Strength		Goblet Walking Lunge (strength) Single-Leg Stance Hip Flexion and Knee Extension (warm-up)

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TABLE 8.6 *(continued)*

Strength for Increased Distance				
Exercise	**Page numbers**	**Category**	**Variations**	**Prerequisites**
Push-Up to Plank	138-139	Strength	Push-Up to Plank From Knees	Prone Swimmers for Shoulders (warm-up)
T Push-Up	140-141	Strength	T Push-Up With Dumbbells	Scapular Circles (warm-up) Prone Swimmers for Shoulders (warm-up) Half Side Plank Hip Series (rotational resistance)
Seated Row With Tubing	142-143	Strength	Seated Row With Cable	Scapular Circles (warm-up) Prone Swimmers for Shoulders (warm-up) V-Sit With Rotation and Single-Arm Reach (dynamic rotational resistance)
Inverted Row	144-145	Strength	Assisted Pull-Up	Prone Swimmers for Shoulders (warm-up) Abdominal Plank (warm-up) Hamstring Curl on Stability Ball (balance)
Isometric Farmer Hold	146-147	Strength	Single-Arm Isometric Farmer Carry	Segmental Cat Camel (warm-up) Prone Swimmers for Shoulders (warm-up) V-Sit With Rotation and Single-Arm Reach (dynamic rotational resistance)
Deadlift With Hex Bar	148-149	Strength	Deadlift With Barbell	Prone Swimmers for Shoulders (warm-up) V-Sit With Rotation and Single-Arm Reach (dynamic rotational resistance) Antirotational Romanian Deadlift (dynamic rotational resistance)
Bent-Over Barbell Row	150-151	Strength		Deadlift With Hex Bar (strength)
Battle Rope Grip Pull-Up	152-153	Strength		Battle Rope Pull in Plank (rotational resistance) Inverted Row (strength)

Strength for Increased Distance				
Exercise	**Page numbers**	**Category**	**Variations**	**Prerequisites**
Single-Arm Rotation Press	154-155	Strength		Prone Swimmers for Shoulders (warm-up) Rotating Side Plank (dynamic rotational resistance) T Push-Up (strength)
Alpine Squat	156-157	Strength		Single-Leg Reaching Squat (balance) Lateral Bounding With Turns (deceleration)
Explosive Power for Longer Drives				
Exercise	**Page numbers**	**Category**	**Variations**	**Prerequisites**
Kneeling Soccer Throw	164-165	Power	Overhead Mock Throw Overhead Throw to Wall	Abdominal Plank (warm-up) Kneeling Paloff Press (rotational resistance) Kneeling Battle Rope: Beat the Wave (rotational resistance)
Reverse Wood Chop With Tubing	166-167	Power	Reverse Wood Chop With Cable Machine	V-Sit With Rotation and Single-Arm Reach (dynamic rotational resistance) Single-Arm Rotation Press (strength)
Jumping Split Squat	168-169	Power		Goblet Walking Lunge (strength) Knee-Up Reverse Lunge (strength)
Plyometric Push-Up	170-171	Power	Elevated Plyometric Push-Up	Abdominal Plank (warm-up) Push-Up to Plank (strength)
Kettlebell Swing	172-173	Power		Front Squat (strength) Deadlift With Hex Bar (strength)
Weighted Vest Plyometric Squat	174-175	Power		Depth Drop (deceleration) Front Squat (strength)

(continued)

TABLE 8.6 *(continued)*

Explosive Power for Longer Drives				
Exercise	**Page numbers**	**Category**	**Variations**	**Prerequisites**
Plyometric Golf Throw to a Wall	176-177	Power	Golf Posture Throw to a Partner	V-Sit With Rotation and Single-Arm Reach (dynamic rotational resistance) Single-Arm Rotation Press (strength)
Shot Put	178-179	Power	Single-Arm Tubing Punches	Single-Arm Rotation Press (strength) Reverse Wood Chop With Tubing (power)
Modified Single-Arm Dumbbell Snatch	180-181	Power		Front Squat (strength) Battle Rope Grip Pull-Up (strength)
Medicine Ball Stability Slam	182-183	Power	Medicine Ball Power Slam	Push-Up to Plank (strength) Battle Rope Grip Pull-Up (strength)

CONCLUSION

We hope you now appreciate what it takes to create a truly effective golf fitness program. Each player's program may differ, even for players at the highest skill levels. Many variables need to be considered when creating an effective and efficient fitness program. *Golf Anatomy* provides a variety of exercises so you can create a fitness program that will better prepare your body for the golf swing. Understanding how the body moves during a proper golf swing allows you to design a fitness program aimed at improving your body's ability to achieve those motions. This is the best way to use fitness to hit the ball farther, more consistently, and with more accuracy. We hope *Golf Anatomy* has given you greater insight into the mechanics of the golf swing and the best way to prepare your body to play better golf.

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ABOUT THE AUTHORS

Photo courtesy of Rob Hallves.

Craig Davies, DC, is a movement, body mechanics, and strength and conditioning coach on the PGA Tour. He has been a consultant to numerous international golf associations and international PGAs. From 2006 to 2009 he was the director of fitness and nutrition for one of the most successful junior golf academies in the United States.

Davies has had the opportunity to be the keynote speaker at a number of seminars and summits, including the Canadian Golf Performance Summit, the Ontario PGA Professional Development Seminar, and the World Golf Fitness Summit. He has extensive experience and involvement working with international team events, including the Presidents Cup and Ryder Cup. He has a long list of international golfer clients, and his professional golf client list has been a who's who of the tour elite, including such tremendous ball strikers as Kevin Chappell, Justin Rose, Y.E. Yang, Si Woo Kim, Lydia Ko, Gary Woodland, Graham DeLaet, Anthony Kim, Henrik Stenson, Sean O'Hair, Hunter Mahan, and Stephen Ames.

Davies is the president of the DEPTH Systems Institute at the Foley Performance Academy in Orlando, Florida. He provides online education courses for trainers, coaches, and manual therapists at www.DEPTHSystems.com and travels around the world to teach movement enhancement seminars to trainers. His online golf technique and movement instruction can be found at ChampionGolfFitness.com.

Photo courtesy of Dominic DiSaia.

Vince DiSaia, DC, is the founder and clinic director at Momentum Functional Health. His goal is to provide all clients with the most comprehensive health strategies to ensure that they optimize health while also performing at their highest level of competitive skill.

DiSaia has been involved in the health and fitness field for more than 15 years. He has continuously studied the most cutting-edge philosophies in health, fitness, and performance. His current postgraduate focus in functional medicine was preceded by his training as a strength trainer, chiropractor, and sports medicine expert. His approach combines optimizing both the physical capabilities of the athlete and the internal health that drives human performance. During his career DiSaia has had the opportunity to work with professional athletes from many different sports and has worked on the PGA and LPGA Tours. He enjoys sharing his knowledge with his colleagues and has previously lectured for doctors, therapists, and strength coaches on topics such as lower back pain, running injuries, golf swing biomechanics, golf fitness, and performance through health optimization. His online golf technique and movement instruction can be found at ChampionGolfFitness.com. DiSaia works with clients both in person and online, creating customized programs to help people achieve a life filled with supreme health and vitality.

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