

THIRD EDITION

STRENGTH BAND TRAINING

*The best exercises
and programs for sport,
rehabilitation, and fitness*



PHIL PAGE • TODD ELLENBECKER

Strength Band Training

THIRD EDITION

Phil Page

PhD, PT, ATC, CSCS

Todd Ellenbecker

DPT, MS, SCS, OCS, CSCS



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—Phil Page

To Gail, the love of my life. Thanks for your amazing
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—Todd Ellenbecker

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EXERCISE FINDER

Title	Primary muscles affected	Primary sport applications	Attachment required	Page number
CHAPTER 5: JOINT AND MUSCLE ISOLATION				
Shoulders				
Lateral raise	Middle deltoid	Basketball, football, hockey	No	42
Front raise	Anterior deltoid	Basketball, football, hockey	No	43
Scaption	Rotator cuff, deltoids	All sports	No	44
Shoulder internal rotation at side	Rotator cuff	Baseball, golf, softball, swimming, tennis, volleyball	Yes	45
Shoulder external rotation at side	Rotator cuff	Baseball, golf, softball, swimming, tennis, volleyball	Yes	46
Serratus punch	Serratus anterior, anterior deltoid	Baseball, golf, softball, swimming, tennis, volleyball	Yes	47
Elbows and Wrists				
Biceps curl	Biceps	All sports	No	48
Elbow extension	Triceps	All sports	Yes	49
Wrist flexion	Wrist flexors	Baseball, golf, softball, tennis, volleyball	No	50
Wrist extension	Wrist extensors	Baseball, golf, softball, tennis, volleyball	No	51
Forearm supination	Supinator, biceps	Baseball, golf, softball, tennis, volleyball	No	52
Forearm pronation	Pronator teres	Baseball, golf, softball, tennis, volleyball	No	53
Ulnar deviation	Forearm flexors and extensors	Baseball, golf, softball, tennis, volleyball	No	54
Radial deviation	Forearm flexors and extensors	Baseball, golf, softball, tennis, volleyball	No	55
Hips				
Hip internal rotation	Hip rotators	All sports	Yes	56
Hip external rotation	Hip rotators	All sports	Yes	57
Hip flexion	Iliopsoas, rectus femoris	All sports	No	58
Hip extension	Gluteus maximus	All sports	No	59
Hip abduction	Gluteus medius	All sports	No	60
Hip adduction	Hip adductors	All sports	Yes	61
Knees				
Knee flexion	Hamstrings	All sports	Yes	62
Knee extension	Quadriceps	All sports	Yes	63
Terminal knee extension	Quadriceps, vastus medialis	All sports	Yes	64

Title	Primary muscles affected	Primary sport applications	Attachment required	Page number
Ankles				
Ankle dorsiflexion	Tibialis anterior	All sports	No	65
Ankle plantarflexion	Gastrocnemius, soleus	All sports	No	66
Ankle inversion	Tibialis posterior	All sports	No	67
Ankle eversion	Peroneals	All sports	No	68
CHAPTER 6: UPPER BODY STRENGTH				
Chest				
Chest press	Pectoralis major, anterior deltoid	Basketball, football, hockey	Yes	72
Chest fly	Pectoralis major, anterior deltoid	Basketball, football, hockey	Yes	73
Push-up	Pectoralis, triceps	Basketball, football, hockey	No	74
Shoulder push-up plus band	Serratus anterior	Baseball, tennis, volleyball, softball	No	75
Forward punch	Anterior deltoid, serratus anterior	Baseball, tennis, volleyball, softball	Yes	76
Supine pullover	Pectoralis, latissimus dorsi	Basketball, football, hockey	Yes	77
Dynamic hug	Serratus anterior	Baseball, softball, swimming, tennis, volleyball	Yes	78
Upper Back				
Seated row	Rhomboids, middle trapezius	Baseball, softball, swimming, tennis, volleyball	Yes	79
Reverse fly	Rhomboids, middle trapezius	Baseball, softball, swimming, tennis, volleyball	Yes	80
Shrug	Trapezius, rhomboids	All sports	No	81
Lat pull-down	Latissimus dorsi	All sports	Yes	82
Bent-over row	Rhomboids, middle trapezius, latissimus dorsi	All sports	No	83
Linton external rotation	Rotator cuff, scapular stabilizers	Baseball, softball, swimming, tennis, volleyball	No	84
Bilateral extension with retraction	Rhomboids, posterior deltoid, latissimus dorsi	Baseball, softball, swimming, tennis, volleyball	Yes	85
High row	Rhomboids, middle trapezius	Baseball, softball, swimming, tennis, volleyball	Yes	86

> *continued*

> Chapter 6, *continued*

Title	Primary muscles affected	Primary sport applications	Attachment required	Page number
Shoulders and Arms				
Biceps curl at shoulder level	Biceps, anterior deltoid	All sports	Yes	87
Upright row	Upper trapezius, deltoid	Basketball, football, hockey, swimming	No	88
Overhead press	Deltoids, upper trapezius	Basketball, football, hockey	No	89
Diagonal flexion: PNF	Deltoids, rotator cuff	Baseball, softball, swimming, tennis, volleyball	Yes	90
Diagonal extension: PNF	Pectorals, rotator cuff	Baseball, softball, swimming, tennis, volleyball	Yes	91
Shoulder external rotation with retraction	Rotator cuff, rhomboids	Baseball, softball, swimming, tennis, volleyball	No	92
Upper body Bruegger	Scapular and upper thoracic muscles	All sports	No	93
Shoulder internal rotation at 90°	Pectoralis major, rotator cuff	Baseball, softball, swimming, tennis, volleyball	Yes	94
Shoulder external rotation at 90°	Rotator cuff, deltoids	Baseball, softball, swimming, tennis, volleyball	Yes	95
Overhead elbow extension	Triceps	Baseball, softball, swimming, tennis, volleyball	No	96
Wall walk (60-90 degrees)	Rotator cuff, scapular stabilizers	Basketball	No	97
CHAPTER 7: LOWER BODY STRENGTH				
Hips and Glutes				
Hip lift	Iliopsoas	Basketball, football, hockey, soccer	No	101
Bridge	Gluteus maximus	Basketball, football, hockey, soccer	No	102
Band loop bridge	Gluteus maximus, gluteus medius	All sports	No	103
Hip extension (donkey kick)	Gluteus maximus	Basketball, football, hockey, soccer	No	104
Side-lying hip lift	Gluteus medius	All sports	No	105
Clam	Glutes, external hip rotators	All sports	No	106
Reverse clam	Internal hip rotators	All sports	No	107
Closed-chain hip rotation	Hip rotators, gluteus maximus, ankle stabilizers	All sports	Yes	108
Stiff-legged deadlift	Hamstrings, glutes, low back	All sports	Yes	109

Title	Primary muscles affected	Primary sport applications	Attachment required	Page number
Thighs				
Lunge	Gluteus maximus, quadriceps	All sports	No	110
Tubing with cuffs lunge	Gluteus maximus, quadriceps	All sports	No	111
Lateral lunge	Gluteus medius, gluteus maximus, quadriceps	All sports	No	112
Mini squat	Gluteus maximus, quadriceps	All sports	No	113
Front squat	Gluteus maximus, quadriceps	All sports	No	114
Barbell squat with loop	Gluteals, quadriceps	Basketball, football, hockey, soccer	No	115
Single-leg squat	Gluteus maximus, quadriceps, ankle stabilizers	All sports	No	116
Monster walk	Gluteus medius, gluteus maximus, quadriceps	All sports	No	117
Squat walk	Gluteus maximus, gluteus medius, quadriceps	All sports	No	118
Leg press	Gluteus maximus, quadriceps	All sports	No	119
Standing leg pull-through	Hamstrings, gluteus maximus	Basketball, football, hockey, soccer	Yes	120
Standing front pull	Quadriceps, hip flexors	All sports	Yes	121
TheraBand quick kick	Gluteus maximus, gluteus medius, iliopsoas, quadriceps, ankle stabilizers	All sports	Yes	122
Hip clock	Gluteus maximus, gluteus medius, iliopsoas, quadriceps, ankle stabilizers	Soccer	No	123
Fire hydrant	Gluteus maximus, gluteus medius, core muscles	All sports	No	124
CHAPTER 8: CORE STABILITY				
Abdominals				
Abdominal crunch	Abdominals	All sports	Yes	126
Oblique curl-up	Oblique abdominals	All sports	Yes	127

> *continued*

> Chapter 8, *continued*

Title	Primary muscles affected	Primary sport applications	Attachment required	Page number
Abdominals (continued)				
Lower abdominal crunch	Lower abdominals	All sports	No	128
Kneeling crunch	Abdominals	All sports	Yes	129
Kneeling overhead raise	Upper and low back	All sports	Yes	130
Trunk rotation	Oblique abdominals	All sports	No	131
Anti-rotation press (Pallof press)	Oblique abdominals	All sports	Yes	132
Low Back				
Side bend	Quadratus lumborum	All sports	No	133
Seated back extension	Back extensors	All sports	No	134
Standing back extension	Back extensors, gluteus maximus	All sports	No	135
Side bridge	Quadratus lumborum	All sports	No	136
Quadruped stabilization	Lumbar stabilizers, gluteal muscles, obliques	All sports	No	137
Supine stabilization	Lumbar stabilizers	All sports	No	138
CHAPTER 9: TOTAL BODY				
Squat with diagonal flexion	Deltoids, lumbar stabilizers, quadriceps, gluteal muscles	All sports	No	140
Mini squat with reverse fly	Deltoids, lumbar stabilizers, quadriceps, gluteal muscles	All sports	No	141
Lunge with diagonal flexion	Deltoids, lumbar stabilizers, quadriceps	All sports	No	142
Lunge with medicine ball rotation	All muscle groups	Tennis	Yes	143
Bilateral chop	Anterior trunk, shoulder	Basketball, football, hockey	Yes	144
Bilateral lift	Posterior trunk, shoulder	Basketball, football, hockey	Yes	145
Unilateral row with side bridge	Rhomboids, quadratus lumborum	Baseball, softball, swimming, tennis, volleyball	Yes	146
Step push	Pectoralis major, triceps	Basketball, football, hockey	No	147
Lift simulation	Gluteus maximus, quadriceps, lumbar stabilizers	Basketball, football, hockey	No	148
Step lift	Gluteus maximus, quadriceps, lumbar stabilizers	Basketball, football, hockey	No	149

Title	Primary muscles affected	Primary sport applications	Attachment required	Page number
Step incline press	Pectoralis major, triceps, deltoids	Basketball, football, hockey	No	150
Reverse step pull	Rhomboids, latissimus dorsi, gluteal muscles	Basketball, football, hockey	Yes	151
Step-up curl-up	Quadriceps, gluteus maximus, biceps	Baseball, golf, softball, swimming, tennis, volleyball	No	152
Shoulder external rotation step	Rotator cuff, rhomboids, trunk rotators	Baseball, golf, softball, swimming, tennis, volleyball	Yes	153
Shoulder internal rotation step	Rotator cuff, pectoralis major, trunk rotators	Baseball, golf, softball, swimming, tennis, volleyball	Yes	154
CHAPTER 10: OLDER ADULTS				
Neck stabilizer	Deep neck flexors, triceps, deltoids	All sports	No	156
Elbow curl	Biceps	All sports	No	157
Elbow extension	Triceps	All sports	No	158
Chest press	Pectorals, anterior deltoid	Basketball, football, hockey	No	159
Front raise	Pectorals, anterior deltoid, low back	Basketball, football, hockey	No	160
Overhead press	Deltoids, triceps	Basketball, football, hockey	No	161
Lateral raise	Deltoids	Basketball, football, hockey	No	162
Seated row	Posterior deltoid, scapular stabilizers, biceps	Baseball, softball, swimming, tennis, volleyball	Yes	163
Overhead pull-down	Latissimus dorsi, scapular stabilizers	All sports	No	164
Back pull	Scapular stabilizers, posterior deltoids	All sports	No	165
Upright row	Upper trapezius, deltoid	Basketball, football, hockey, swimming	No	166
Hip lift	Hip flexors	Basketball, football, hockey, soccer	No	167
Leg press	Gluteus maximus, quadriceps	All sports	No	168
Chair squat	Gluteus maximus, quadriceps	All sports	No	169
Leg extension	Quadriceps	All sports	No	170
Knee flexion	Hamstrings	All sports	No	171
Ankle dorsiflexion	Tibialis anterior, peroneals	All sports	No	172
Ankle plantarflexion	Gastrocnemius, soleus	All sports	No	173

> *continued*

Title	Primary muscles affected	Primary sport applications	Attachment required	Page number
CHAPTER 12: TEAM SPORTS				
Batting simulation	Trunk rotators, gluteals, quadriceps, calves	Baseball, softball	Yes	185
Lateral step lunge with glove	All muscle groups	Baseball, softball	Yes	186
Throwing simulation with ball	All muscle groups	Baseball, softball	Yes	187
Underhand windmill simulation	All muscle groups	Softball	Yes	187
Serve simulation	All muscle groups	Volleyball	No	189
Overhead blocking simulation	All muscle groups	Volleyball	No	189
Monster walk with bumping	All muscle groups	Volleyball	No	190
Explosion out of three-point stance	All muscle groups	Football	Yes	192
Total body extension	All muscle groups	Football	No	192
Rip curl	All muscle groups	Football	Yes	193
Monster walk throwing simulation	All muscle groups	Football, lacrosse	No	194
Skating stride with stick	All leg muscles	Hockey	No	196
Resisted slide and stride with stick	Hip abductors, hip adductors	Hockey	No	196
Resisted slap shot take-back with stick	All muscle groups	Hockey	Yes	197
Resisted slap shot follow-through with stick	All muscle groups	Hockey	Yes	197
Wrist shot with stick	All muscle groups	Hockey	Yes	198
Step-slide with basketball	Core muscles, hip flexors, hip abductors, quadriceps	Basketball	No	200
Step-over with stick and elastic resistance	All muscle groups	Lacrosse	Yes	202
Lacrosse throw simulation	All muscle groups	Football, lacrosse	Yes	203
Hip abduction with soccer ball	Hip abductors, flexors	Soccer	No	206
Hip adduction with soccer ball	Core muscles, hip adductors	Soccer	Yes	206
Diagonal kick with soccer ball	All muscle groups	Soccer	Yes	207

Title	Primary muscles affected	Primary sport applications	Attachment required	Page number
Controlled kick stabilization	Gluteals, hamstrings	Soccer	Yes	207
Throw-in simulation and overhead pass with soccer ball	Shoulder extensors, latissimus dorsi, core muscles, hip flexors	Soccer	Yes	208
CHAPTER 13: INDIVIDUAL SPORTS				
Swim pull-through	Latissimus dorsi, triceps, core muscles	Swimming	Yes	212
Shoulder standing horizontal abduction with external rotation	Rotator cuff, scapular muscles	Swimming	No	213
Bridging with unilateral extension and band loop	Gluteus maximus, hamstrings, abdominals, low back	Running	No	215
Square stance forehand resisted movement with racket	All muscle groups	Tennis	Yes	218
Rotation with racket	Obliques, core	Tennis	Yes	219
Horizontal abduction (high backhand) with racket	Posterior deltoid, rotator cuff, scapular muscles	Tennis	Yes	220
Lateral box step-over plyo with racquet	All lower extremity muscle groups	Tennis	Yes	221
Golf swing acceleration with club	All muscle groups	Golf	Yes	223
Golf swing take-back with resistance with club	All muscle groups	Golf	Yes	224
Trunk rotation with arm rotation twists	Core muscles, shoulder stabilizers	Golf	Yes	225
Tuck squat	Hip extensors, quadriceps, calves	Skiing	No	227
Balance squat with bench	All muscle groups	Skiing	No	228
Double-leg resisted squat	Hip extensors, quadriceps, calves	Skiing	No	229
Romanian deadlift (RDL) with CLX	All lower extremity muscle groups, core muscles	Cycling	No	231
Resisted forward step-over	Quadriceps, gastrocnemius, hip flexors, glutes, core muscles	Cycling	Yes	232

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Strength training is an important component of any well-rounded exercise program. In fact, the American College of Sports Medicine and the U.S. Department of Health and Human Services recommend that all adults perform muscle-strengthening exercises at least two days a week, using all major muscle groups. Elastic resistance bands are an inexpensive, convenient, and effective way of adding resistance exercises to any workout. Research has proven the effectiveness of elastic resistance training (ERT) across ages, from children to older adults, as well as from sedentary people to elite athletes.

Elastic resistance has been used for over 100 years in fitness programs and, more recently, in rehabilitation. It is one of the most common modes of resistance training used by physical therapists for clinical and home programs. Because of its versatility, elastic resistance is ideal for a variety of patients and conditions. Recent research has shown that elastic resistance provides results similar to those of traditional isotonic resistance, making it ideal for anyone to use.

Elastic resistance is a cornerstone of many rehabilitation programs because of its versatility. For patients in the early stages of rehab, physical therapists often prescribe strengthening exercise with elastic resistance because of its lower resistance levels and because it is easy to progressively increase resistance as patients get stronger. In addition, its portability and low cost make it ideal to perform strengthening exercises as part of a home exercise program. These benefits of ERT extend to special populations such as older adults or those with disabilities, who may have difficulty using traditional weights or machines. ERT is also suitable for group-based exercise programs because of the ease of transitions, variations, and progression.

ERT has been extensively researched and found to be an effective strengthening tool. The versatility of ERT is unmatched. No other form of resistance training provides such a variety of options for movement patterns, speeds, and progressions. A comprehensive resistance exercise program can easily be performed with a single band and can be done anywhere, including at home or on the road.

This third edition of *Strength Band Training* has been improved with new photos, more exercises, and sections on performance enhancement. Part I includes chapters on the basics of ERT, including the science and research supporting elastic resistance exercise. Advantages and disadvantages of ERT are discussed, along with comparison with other modes of resistance training such as weights and machines. Specific training parameters and safety precautions are also discussed.

Part II includes chapters on stretching and strengthening exercise with elastic resistance. In chapter 4 readers will learn how to use elastic resistance to assist stretching exercises, including PNF contract-relax techniques. Chapters 5 through 9 include specific exercises to strengthen all major muscle groups and functional activities for the upper body, lower body, core, and total body. For each exercise there are photos, a list of target muscles, instructions and tips for proper movement, and information about research related to the exercise. Chapter 10 includes elastic resistance exercises specific to older adults as part of a well-rounded exercise program.

Part III includes elastic resistance exercise programs for fitness, team sports, individual sports, and rehabilitation. Chapter 11 includes a series of circuit resistance training programs for the whole body that can be performed anywhere, including on the road. The programs in chapters 12 and 13 cover team and individual sports, respectively, and provide sport-specific training programs, including base exercises and sport-simulation exercises. Finally, chapter 14 outlines recommendations for strengthening exercises with elastic resistance for rehabilitation following musculoskeletal injuries in the upper body, lower body, neck, and back.

PART I

**Basics
of Elastic
Resistance
Training**

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Elastic Resistance Explained

The secret to elastic resistance exercise is simple: As you stretch the elastic band, the resistance increases. This resistance provides a progressive stimulus to the muscle to build strength and help increase muscle mass. Elastic resistance training (ERT) allows us to exercise single or multiple joints at one time, making exercises more functional and efficient. Exercise machines and dumbbells use gravity against the weights (isotonic resistance) and often limit you to one particular exercise per machine. Elastic resistance, on the other hand, doesn't rely on gravity; rather, its resistance depends on how much the band or tubing is stretched. In addition, elastic resistance offers innumerable exercise options.

Elastic resistance training provides a full spectrum of resistance training options—from rehabilitation to wellness—for any individual, young to old. Bands and tubing are also used for injury prevention and performance enhancement programs. Many exercises can be performed with a single band or tube, and the resistance can easily be increased (or decreased) by moving to the next color of band or tube. One exercise band can be used to strengthen all the major muscle groups with exercises such as a bench press, seated row, upright row, lat pull-down, leg press, knee extension, or hamstring curl. Elastic bands may also be used to strengthen specific muscles that cannot easily be activated with selectorized (muscle-specific) machines, such as the rotator cuff and peroneus longus (a muscle important to ankle stability). Table 1.1 compares elastic and isotonic resistance.

Outcomes Similar to Those of Traditional Weights

Researchers have shown that ERT provides outcomes similar to those from traditional isotonic resistance training. Biomechanically, elastic resistance provides the same strength curves (resistive torque) as free weights and dumbbells, providing

Table 1.1 Comparison of Isotonic and Elastic Resistance

Characteristic	Isotonic machines	Elastic resistance
Resistance source	Gravity and mass	% stretch
Force profile	Linear and constant	Linear and ascending
Strength curve	Bell shaped	Bell shaped
Movement patterns	Fixed	Variable

adequate stimulus for even elite athletes (Aboodarda et al. 2013). The resultant torque of elastic resistance stimulates muscle throughout the range of motion, similar to isotonic resistance, providing maximal torque at mid-range (Hughes et al. 1999). In addition, ERT may be more forgiving on joints by reducing joint forces compared to isotonic weights (Biscarini 2012).

There is a perception that ERT does not have the capacity to produce substantial gains in muscle strength or hypertrophy. However, when Aboodarda and colleagues (2011) compared physiological responses of ERT and weight machines, they found that elastic resistance is an adequate training stimulus for muscular hypertrophy. Furthermore, Sundstrup and collaborators (2012) showed that full muscle activation can be reached with elastic-resisted shoulder exercises before muscle failure, indicating elastic resistance is an “effective, practical, and easy-to-use alternative to traditional resistance equipment.” (p. 1902)

Since ERT provides a training stimulus similar to isotonic resistance, it is not surprising that muscle activation levels (measured by electromyography, EMG) are similar as well. In a meta-analysis, Aboodarda and colleagues (2016) noted that there was no significant difference in EMG muscle activation levels in 14 studies comparing elastic and isotonic resistance exercises. In addition, they found that ERT enhances the activation of stabilizer muscles during exercises compared to isotonic resistance. In fact, performing a push-up with an elastic band can provide 39 percent more global activation of muscles and as much pectoralis activation as 70 percent of a maximum bench press (Calatayud et al. 2014), further supporting the fact that ERT provides adequate training stimulus.

ERT also provides better muscle activation patterns compared to machines. For example, performing an abdominal curl-up with elastic tubing reduces activation of the hip flexors by 58 percent when compared to an abdominal machine and provides 24 percent more abdominal muscle activation (Sundstrup et al. 2012). Furthermore, performing a lunge with an elastic band significantly increases activation of the posterior chain muscles when compared to a lunge with dumbbells (Jakobsen et al. 2013).

More research demonstrates that ERT provides as much benefit in strength gains as the use of more expensive and bulky weight-training equipment. A study by Colado and Triplett (2008) compared 10 weeks of elastic- and machine-based exercise at the same intensities. The researchers found no significant difference between the groups: both the elastic- and machine-based groups significantly increased their strength and muscle mass. Furthermore, the researchers pointed out that the elastic resistance exercisers benefited from lower cost and less space for training compared to the machine-based exercisers.

Integrating Elastic Resistance Into Your Fitness Program

Elastic resistance can easily be integrated into a fitness program. Whether you prefer free weights or machines, ERT allows you to do the same types of exercises performed on expensive gym equipment, and it allows those exercises to be performed at home or while traveling. The wide range of resistances offered by elastic bands and tubing offer a full spectrum of training intensities for specific goals. Using ERT frees you from the limitations of gravity, allowing you to isolate muscles and perform the same movements in a totally different way, perhaps

becoming more functionally specific as well. In addition, elastic bands can be used to perform flexibility or balance exercises, which expands the range of options for improving overall fitness.

Isolated Training

The vectors of resistance provided by specific bands or tubing allow for elastic resistance to be targeted to specific movements and muscles that may not be easily trained with weight machines. In addition to fixed patterns of movement, weight machines may not offer the lower levels of resistance needed to target smaller muscles such as the rotator cuff. Higher intensities of resistance training often target larger muscles over smaller stabilizing muscles.

The non-reliance on gravity for ERT also enhances the ability of elastic resistance to target specific muscles and joints. Aligning the bands and tubing parallel to muscle fibers will provide resistance vectors to isolated muscles without relying on gravity.

Rehabilitative or Corrective Training

The lower levels of resistance available with ERT have made it a staple for rehabilitation exercises. As one of the most commonly used forms of resistance, ERT is seen in nearly every physical therapy clinic and athletic training room. Its portability makes it ideal for home exercise programs as well. In addition, many people are using elastic resistance after rehabilitation to maintain or prevent further musculoskeletal problems such as shoulder impingement or chronic neck pain.

Corrective exercises have gained popularity as more therapists and trainers prescribe specific exercises aimed at improving posture and movement patterns. As we learn more about the risks associated with poor posture and abnormal movement patterns, elastic resistance can provide lower levels of resistance in specific vectors to target specific muscles and joints.

Functional Training

Elastic resistance is used for retraining functional movement patterns by creating a vector of resistance during sport-specific activities such as a golf swing or baseball pitch. Elastic resistance can also be used for stabilization training by targeting the core muscles through whole-body exercises or by stimulating postural stability and balance. Elastic resistance offers multiple planes of resistance, providing resistance in the *frontal*, *sagittal*, or *transverse planes* (front and back; left and right; and at the midsection, top, and bottom) and resistance to both isolated and integrated functional movements. Elastic resistance is uniquely suited for replicating whole-body, multiple-joint movements of functional activities such as simulated throwing, lifting, or running.

Warm-Up and Cool-Down

In addition to strengthening muscles, elastic resistance can effectively be used for warm-up and cool-down activities. Heavier elastic resistance bands are often used for stretching, either statically or dynamically, as part of a warm-up or cool-down. The elastic nature of bands and tubing makes it ideal for contract-relax stretching techniques.

Athletes often use elastic resistance to warm up muscles by performing low load–high repetitions of isolated muscles. For example, baseball pitchers often use tubing to warm up the rotator cuff muscles. The ability of elastic resistance to mimic functional patterns also makes it ideal to perform sport-specific movements against light resistance for a warm-up or to perform corrective exercises before training.

Augmented Resistance Training

Elastic bands have also been combined with free weight resistance for high-performance training, particularly when paired with a bench press or squat movement. Theoretically, combining elastic and isotonic resistances complements both concentric and eccentric movement phases to provide greater acceleration in the initial movement, potentially enhancing power. However, the literature is somewhat conflicting; some studies report improvements in strength and power with combined elastic and isotonic resistance, while others do not. A recent meta-analysis evaluated the effectiveness of adding elastic resistance to jump training (Aboodarda et al. 2015). They found that studies reported increased loading during the eccentric phase but did not result in increased jump performance. More research is needed to confirm the theory.

Advantages and Disadvantages

As with any mode of strength training, elastic resistance has several advantages and disadvantages. Individuals considering the incorporation of ERT into their training regimen should carefully weigh these issues.

Advantages

The greatest advantages of elastic resistance are the portability, low cost, and versatility. Unlike isotonic resistance (free weights, machines, and pulleys), elastic resistance relies on the tension within the band rather than the pull of gravity. While isotonic resistance exercises are limited to directions of movement in which gravity provides resistance (such as upward movements against gravity), elastic resistance offers many more movements and directions of motion for exercises (such as side-to-side movements). This provides a higher level of neuromuscular control when compared to selectorized machines.

Elastic resistance allows us to exercise multiple joints and planes in a standing position (rather than seated on machines), thus bringing more stabilizer muscle activation into the same machine-based exercise. In addition, it's much harder to cheat with an elastic resistance exercise because you can't use momentum to jerk the weight into position. In contrast to pulley- and machine-based resistance, elastic resistance offers inherent and smoother eccentric resistance during the return phase of the movement, thus stimulating the antigravity function of muscles. Finally, elastic bands also allow for higher-speed movements and plyometric exercises, whereas isotonic resistance and machines do not.

Disadvantages

While elastic resistance training has several advantages, it does have some disadvantages. Unfortunately, elastic bands and tubing do occasionally break. While

they are more subject to wear and tear than isotonic weights, advances in the manufacturing of elastic resistance products has lengthened their useful life. Care must be taken when using bands; inspect them often and avoid sharp objects. Be sure the bands are securely attached so they don't snap and injure you.

It is also difficult to quantify the specific amount of resistance of an elastic band compared to an isotonic weight. For example, we can't say that a particular band is equal to a specific amount of resistance (as you can with a dumbbell); the force produced by each band depends on how much it is stretched.

Most elastic bands and tubing contain natural latex rubber to which some people have an allergy, marked by redness, swelling, and welts where the skin contacts the band or tubing. Anyone sensitive to latex should use latex-free bands and tubing to avoid allergic reactions.

This chapter compared elastic resistance to other types of resistance training, discussed the integration of ERT into various training programs, and listed advantages and disadvantages of elastic resistance. In the next chapters of part 1, we will discuss the basics of elastic resistance and specific training parameters.

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Band Basics

As stated in chapter 1, ERT provides biomechanics, muscle activation, and training outcomes similar to isotonic resistance. The simplicity of elastic resistance often overshadows the multitude of research studies behind its application and outcomes. While the biomechanics behind elastic resistance prescription can be intimidating, focus on the simplicity and convenience of bands and tubing. There are two main biomechanical terms to differentiate when discussing ERT: force and torque.

Elastic Force Production

It's well known that elastic resistance increases as the band or tubing is stretched; however, the force production is also related to the thickness of the band or tubing. The force produced by an elastic band or tube is generally determined by this formula (assuming the material's elastic coefficient remains constant):

$$\text{Elastic resistance force} = \text{cross-section area} \times \text{percent elongation}$$

Thus, elastic resistance is directly proportional to the amount of elastic material and the percent it is stretched. The cross-section area is essentially the total thickness of elastic material (width \times height). Most often, different colors of bands and tubing represent increasing thicknesses of elastic material, which correspond to increasing levels of resistance.

The percent elongation is the percentage of change in length from the resting (no tension) length. For example, a 3-foot length of band with no tension stretched to a final length of 6 feet has elongated 100 percent. Similarly, a 1-foot length of band stretched to 2 feet would be 100 percent elongated. The percent elongation determines the force production, not the resting length of the band or tubing. In this example, a similar color band in either a 3-foot or 1-foot length would produce the same force at 100 percent elongation.

It's important to note that various manufacturers use different color schemes to represent different thicknesses and resistance levels. In addition, the same color between different manufacturers may be totally different. Therefore, these values are specific to the brand of elastic band or tubing. Table 2.1 illustrates the force produced at 100 percent and 200 percent elongation of TheraBand band resistance, for example.

Because the amount of elastic material remains constant as a band or tubing is stretched, the resultant force increases linearly as the percent elongation increases. This is represented by a force-elongation curve (figure 2.1). Clinically, force-elongation curves are relatively linear, which is contrary to popular opinion that believes elastic resistance rises exponentially as the band is stretched.

Table 2.1 Resistive Force of TheraBand CLX at 100 and 200 Percent Elongation

TheraBand Color	100% elongation (pounds)	200% elongation (pounds)
Yellow	2.96 ± 0.11	4.22 ± 0.16
Red	3.60 ± 0.16	5.52 ± 0.33
Green	4.46 ± 0.13	6.32 ± 0.40
Blue	5.56 ± 0.29	8.24 ± 0.38
Black	7.22 ± 0.18	10.12 ± 0.26
Silver	10.36 ± 0.21	14.90 ± 0.16
Gold	14.32 ± 0.16	20.80 ± 0.21

From P. Page, L. Andersen, J.C. Colado, M. Rogers, M. Voight, and D. Behm, "The Science of Elastic Resistance Exercise Dosing," *Journal of Performance Health Research* (in review, 2019). Used with permission of Performance Health.

Exponential increases in elastic resistance occur at higher elongations generally only seen in a laboratory setting.

The force of elastic resistance represents the intensity of the exercise. Both weights and bands provide progressive intensity levels that allow individuals to use appropriate resistance during exercise. As stated previously, weights and bands have different properties that determine their resistance; elastic resistance increases linearly, while isotonic resistance remains constant. Although the force production of each modality is different, their ability to produce appropriate resistance throughout the range of motion is similar. This is known as the strength curve of an exercise, which is represented by the biomechanical torque of an exercise.

Elastic Torque Production

The foundation of ERT is in its ability to produce resistive linear force regardless of gravity, which contrasts with free weights that rely on gravity and mass to produce resistance. This intrinsic linear force is used to create torque around a joint by attaching the resistance to a lever arm, thus resulting in a strength curve. This

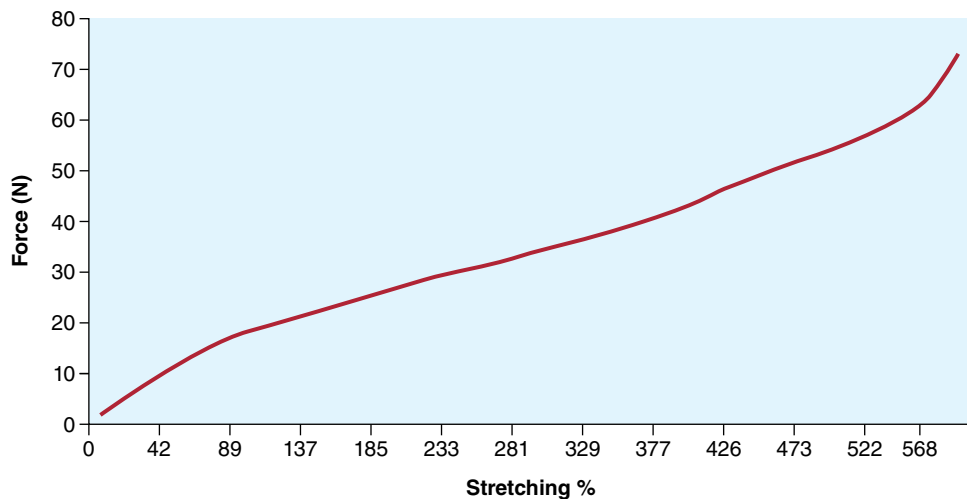


Figure 2.1 Force-elongation curves of elastic resistance.

Reprinted by permission from P. Page, "Dosing of Elastic Resistance Exercise." In *The Scientific and Clinical Application of Elastic Resistance*, edited by P. Page and T. Ellenbecker (Champaign, IL: Human Kinetics, 2003), 28.

strength curve is representative of the resistive torque that stimulates muscle through the range of motion.

Most human strength curves are bell shaped, meaning resistive torque is maximal at the midrange of motion and minimal at the beginning and end of motion. This bell-shaped torque curve is thought to result from insufficiencies of the actin and myosin overlap of the sliding filament theory of muscle function. Depending on the muscle and joint, however, some strength curves may be ascending or descending in nature (see figure 2.2).

In contrast to bell-shaped curves, ascending strength curves represent the increasing torque required near the end of the range of motion, while a decreasing strength curve represents less force required at the end of the motion. These differences are generally because of differences in the muscle length-tension relationship, different degrees of motion around the joint, and the length of the lever arm.

Some have suggested that training with bands is not functional, arguing that the increasing force of the bands is counter to the increasing-decreasing bell-shaped muscular strength curve. Their argument is that the band is at its highest force when the muscle is least able to produce force at the end range. However, research has shown that the strength curve produced by elastic resistance is, in fact, similar to strength curves of isotonic resistance: Both produce a bell-shaped curve (figure 2.3). In addition, elastic resistance exercises are not restricted by a single plane of motion as typical isotonic resistances provide.

While it's not possible to assign a specific amount of resistance to a particular band (i.e. "a yellow band is 3 pounds"), researchers have compared torque curves of elastic resistance and isotonic weights and confirmed that both elastic bands and weights produce similar bell-shaped curves (Page et al. 2017). Most importantly, they identified that the isotonic equivalent of elastic resistance was equivalent to the force produced at approximately 125 percent elongation. Therefore, if an elastic band is stretched over a full arc of motion (200% elongation), its strength curve would be similar to a dumbbell that's equivalent to the resistance produced at 125 percent of the elongation of the band. This information is helpful when limitations are placed on healing injuries and postoperative patients. For example, if a patient is told not to lift any weight beyond 5 pounds, the most he or she should use would be a green band (see figure 2.4).

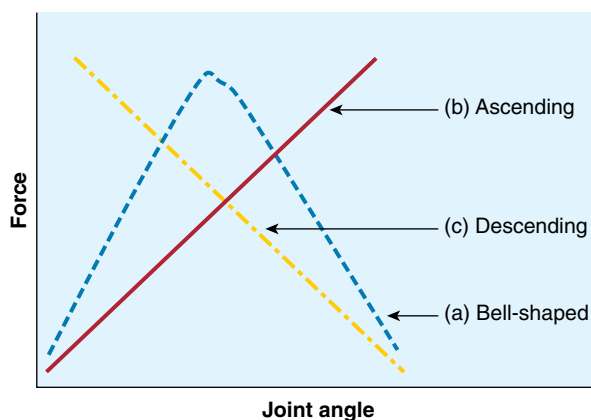


Figure 2.2 Three types of muscular strength curves: (a) bell shaped, (b) ascending, and (c) descending.

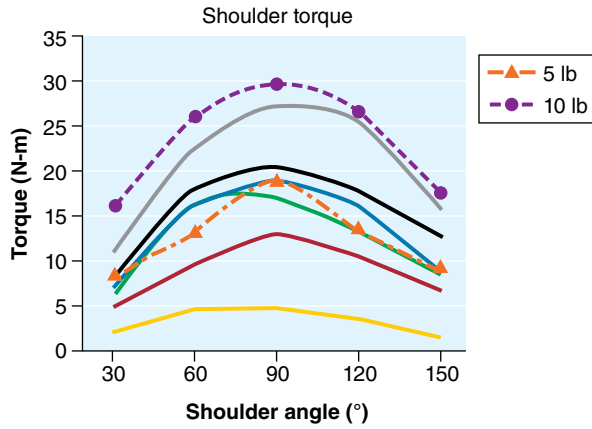


Figure 2.3 Strength curves of isotonic (dumbbells) and elastic resistance (using various colors of TheraBand).

Adapted from C.J. Hughes, K. Hurd, A. Jones, and S. Sprigle, "Resistance Properties of Thera-Band Tubing During Shoulder Abduction Exercise," *Journal of Orthopaedic & Sports Physical Therapy* 29, no. 7 (1999): 413-420. Used with permission of JOSPT.

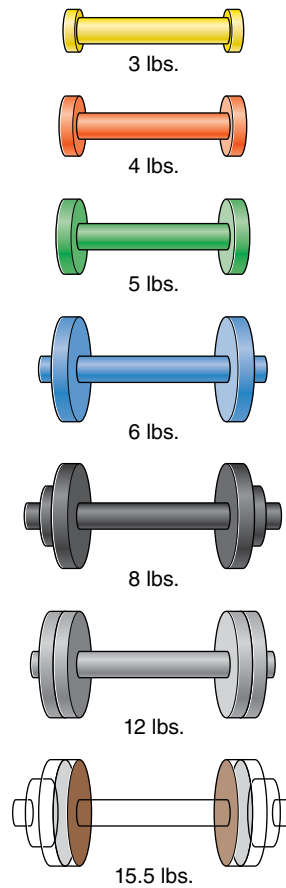


Figure 2.4 Equivalent isotonic resistance to TheraBand CLX over 100 percent elongation.

Used with permission of Performance Health. Data from P. Page, R. Topp, P. Maloney, E. Jaeger, A. Labbe, and G.W. Stewart. "A Comparison of Resistive Torque Generated by Elastic Resistance and Isotonic Resistance (Abstract)." *Journal of Orthopedic & Sports Physical Therapy* 47, no. 1 (2017): A203.

Types of Elastic Resistance Devices

Elastic resistance is available in a variety of devices. Elastic bands are the most popular type, often provided on rolls in widths of 3 to 6 inches. Elastic band loops are also available, which provide a convenient exercise option that doesn't require tying the bands together. These loops come in a variety of thicknesses and lengths and are used for rehabilitation and fitness. Exercise tubing is also available, either with or without attached handles. Tubing with handles is popular in group fitness training. Braided elastic tubing with clips attached to each end of the tubing is also available. Another innovation in elastic resistance is the consecutive loop band from TheraBand, which has loops built into the band itself (figure 2.5).

There is little difference between bands and tubing. In general, the same color bands and tubing from the same manufacturer tend to have the same resistance levels at any given percent of elongation. This is because manufacturers generally match the specific amount of elastic product (cross-section area) between similarly colored bands and tubing. Be aware, however, that resistance levels do vary among manufacturers. Physiologically and biomechanically, there are no differences between bands and tubing in terms of resistance-training stimulus. The choice between bands and tubing is a matter of personal preference: Tubing tends to be preferred for upper extremity exercises, and bands tend to be preferred for lower body exercises. While there is no specific reason that tubing is used more frequently with upper body exercises, it's likely that, historically, elastic tubing was used before bands and shoulder exercises were most easily performed with tubing.

A benefit of exercising with bands is that you can simply wrap the bands around your hands or stabilize the band with your body rather than attaching it to something (see figure 2.6). Some users prefer to attach handles to the band, however. When wrapped around the hand, tubing tends to dig into the skin and roll over bony areas during movement. Exercise tubing with attached handles helps reduce this problem (figure 2.7). Although not essential, accessories and



Figure 2.5 TheraBand CLX consecutive loop band.



Figure 2.6 Elastic band: (a) hand wrapping and (b) ankle wrapping.



Figure 2.7 Exercise tubing with attached handles.

attachments for the bands and tubing (see figure 2.8) can increase the number of exercises you perform. Regardless of the method used to create an attachment point for the elastic, it is vital that you insure the solidity of that connection to prevent injury. In general, however, accessories, such as handles, carabineers, door anchors, and extremity straps are recommended for tubing exercises to avoid hand discomfort. Using door anchors allows exercisers at home to vary the position of the band origin at different locations depending on the exercise.



Figure 2.8 Commonly used TheraBand accessories: (a) door anchor, (b) extremity strap, (c) sports handle, (d) assist strap used in the hand, and (e) assist strap attached to object.

How to Care for Your Band

- Don't store your band in direct sunlight or heat and avoid extreme temperatures.
 - Your band can be washed with gentle soap and water.
 - Dry bands by laying them flat.
 - Use handles if you have trouble gripping the band.
 - Don't overstretch your band beyond normal exercise use.
 - Inspect your band for tears and nicks before use and replace band if needed.
-

This chapter has discussed the basics of elastic resistance, including the resistance and strength curve produced by bands and tubing. Although elastic resistance devices come in many forms, they have similar characteristics. The next chapter will discuss the specific parameters to consider when using ERT, including using the appropriate resistance levels, progression, and precautions.

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Application and Assessment

Elastic bands can be used as part of a well-rounded physical activity program for all ages. Children through older adults can benefit from strength, balance, or flexibility activities using bands.

Simply performing an exercise program for as little as 6 weeks with elastic resistance can increase strength 10 to 30 percent in both younger and older adults. The added benefits of ERT include increasing muscle mass, lowering body fat, and increasing power and endurance. In fact, strength training of the legs with elastic resistance can even help improve your balance, gait, and mobility. In general, elastic resistance provides the same benefits of any resistance exercise. In order to receive these benefits of ERT, follow the recommended parameters of any resistance exercise for appropriate prescription and progression.

Recently, the U.S. Department of Health and Human Services (HHS) issued the second edition of the “Physical Activity Guidelines for Americans” (2018). The HHS recommends 2 or more days per week of moderate- to high-intensity muscle-strengthening activities of all the major muscle groups for all adults (including those with chronic health conditions, disabilities, and older adults). Muscle-strengthening activities are also recommended for children and adolescents 3 times per week.

The American College of Sports Medicine (ACSM) (2018) has made the following evidence-based recommendations regarding muscular fitness:

- Each major muscle group should be trained 2 to 3 times per week using a variety of exercises.
- Allow at least 48 hours of rest between sessions for any single muscle group.
- Use resistance exercise equipment, body weight, or a combination of both.
- Perform 2 to 4 sets for strength and power or 1 to 2 sets for muscular endurance. Rest 2 to 3 minutes between sets. For beginners or older adults, a single set can be effective.
- For most adults, perform 8 to 12 repetitions for strength and power or 15 to 25 repetitions for endurance. Ten to 15 repetitions may be more appropriate for middle-aged and older individuals beginning to train.
- Intensity (the amount of weight lifted) can vary depending on the individual’s goals and fitness level. For example, 60% to 70% of one repetition maximum (1RM) is recommended for beginner and intermediate adults who want to improve strength, but less than 50% 1RM is appropriate to improve endurance. Older people beginning a program may benefit from 40% to

50% 1RM, but experienced strength trainers can increase to 80% 1RM or more to improve strength. Make gradual progress in intensity, repetitions per set, or frequency.

Adapted from American College of Sports Medicine, *ACSM's Guidelines for Exercise Testing and Prescription*, 10th ed. (Philadelphia: Wolters Kluwer, 2018), 168.

Training and Exercise

By simply varying the level of resistance, the number of repetitions, and the speed of the exercise, you can individually tailor a strengthening program to meet your needs of weight loss, body toning, and general strength and conditioning or improve speed, power, and agility for sports. For example, using higher resistance with fewer repetitions will increase muscle size and power, whereas using a lower resistance with more repetitions may help keep you trim. Choose your volume (sets and repetitions) and your intensity (resistance level or color of band) based on your goals.

Because elastic resistance intensity increases linearly, it's difficult to use a specific percent of 1RM when using elastic resistance. You should use a rating of perceived exertion (RPE) scale to monitor your intensity when exercising with elastic bands or tubing. The Borg scale and OMNI-RES scale are two commonly used RPE scales to measure exertion in resistance training (see figure 3.1 for an example of the OMNI-RES scale). For example, you can use these scales to meet the USHHS activity guidelines of maintaining a “moderate intensity,” which is between 12 to 14 on the Borg scale and 5 to 7 on the OMNI-RES scale.

A recent study has shown that the OMNI-RES scale could be used with ERT to produce strength gains similar to isotonic weights (Colado and Triplett 2008). Furthermore, researchers used the OMNI-RES scale to validate a perceived exertion scale specific to elastic resistance intensity called the RISE scale (Resistance Intensity for Strengthening with Elastics) (Colado et al. 2012; Colado et al. 2018).

Safety First

- Inspect the bands or tubing before each use, particularly at the stationary attachment point, and replace if you find any nicks or tears.
 - Ensure the security of your stationary attachment point of the elastic band or tubing; for instance, use a firmly closed door. Be sure you are pulling against the natural swing of the door.
 - Perform motions slowly and with control; don't let the band or tubing snap back.
 - Avoid sharp objects, including jewelry and fingernails, when using bands and tubing.
 - Never pull the band or tubing directly toward your face.
 - Protect your eyes when performing exercises that may cause the band or tubing to snap back toward your face.
 - Don't elongate bands or tubing to more than three times their resting length (for example, never stretch a 2-foot band beyond 6 feet).
 - Anyone with a latex allergy should exercise with latex-free exercise bands and tubing.
-

The RISE scale eliminates the use of numbers to rate exertion and uses descriptive terms and illustrations similar to the OMNI-RES scale (see figure 3.2).

The dosing chart in table 3.1 may be helpful in determining your exercise intensity level. For each goal listed, the second column shows the recommended intensity based on the RISE scale, and the third column shows the number of repetitions that should be performed using a multiple RM intensity. The multiple RM intensity is the amount of resistance that allows for a specific number of repetitions; for example, a 3RM to 6RM load is a resistance that can only be moved three to six times.

Start your program with lighter resistances to emphasize proper form and movements. Perform movements slowly and with control and emphasize the negative (eccentric, or returning) part of the movement. Don't let the band snap quickly back to the resting position. Improper movements often lead to joint injury and pain. Don't forget to balance your exercises by performing exercises for muscles on the front of the body as well as the rear. For example, if you do a

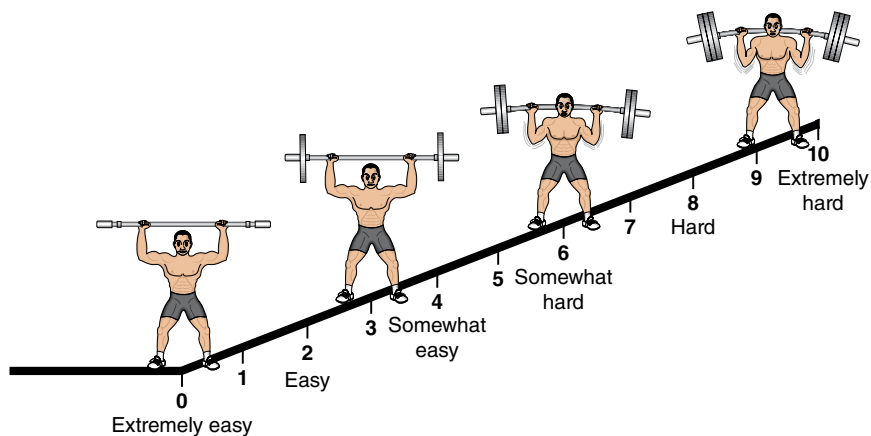


Figure 3.1 OMNI-RES scale.

From R.J. Robertson, *Perceived Exertion for Practitioners: Rating Effort With the OMNI Picture System* (Champaign, IL: Human Kinetics, 2004), 144. Reprinted by permission of the author.

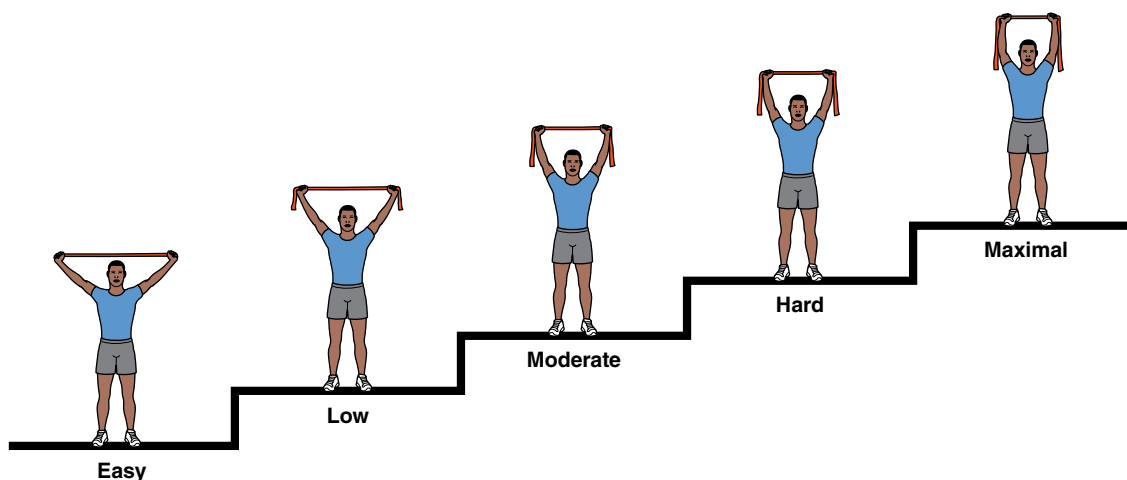


Figure 3.2 The TheraBand RISE scale.

Used with permission of Performance Health.

Table 3.1 ERT Dosing Table

Goal	Intensity (RISE)	Volume (multiple RM)
Strength and power	Maximal	3 to 6
High-intensity endurance and speed	Hard	8 to 12
Low-intensity endurance	Moderate	15 to 20

bench press, you should also do a seated row to balance the shoulder muscles. As with any exercise program, a proper warm-up and cool-down are recommended.

Proper Posture and Breathing

It is important to maintain good overall body posture before, during, and after each movement, emphasizing proper spinal posture. Even when performing shoulder exercises only, you must have good alignment of the low back and hips to maintain a stable base from which the shoulder muscles will work. Most of the exercises in this book are performed while standing to help increase activation of the core stabilizers and to improve balance, but different postures can be used within the same movement for a different effect. For example, you will have lower core activation when performing a bench press while lying on a bench than if you do the same exercise while standing or sitting on an exercise ball. However, performing strength training on an unstable surface may decrease force output (Behm and Anderson 2006).

We prefer to use a well-balanced standing posture with the exercises in this book (see figure 3.3). In general, you should maintain a neutral lumbar and cervical spine; keep the shoulders back and down; slightly contract the abdominals, pulling the navel inward; keep the knees soft, not locked; and keep the wrists in a neutral position. A balanced training posture promotes overall body stability and thus improves activation of the core.

Core stability is associated with proper breathing. The general recommendation to exhale on exertion is associated with avoiding blood pressure elevations during resistance training. However, specifically performing diaphragmatic breathing can increase intra-abdominal pressure, which provides core stability. Diaphragmatic breathing occurs when the abdomen is expanded rather than the chest; on inhalation, the abdomen should expand outward rather than lifting the chest (see figure 3.4). Simply coordinating your diaphragmatic inhalation with the eccentric (relaxation) phase of the exercise will facilitate

**Figure 3.3** Balanced posture.

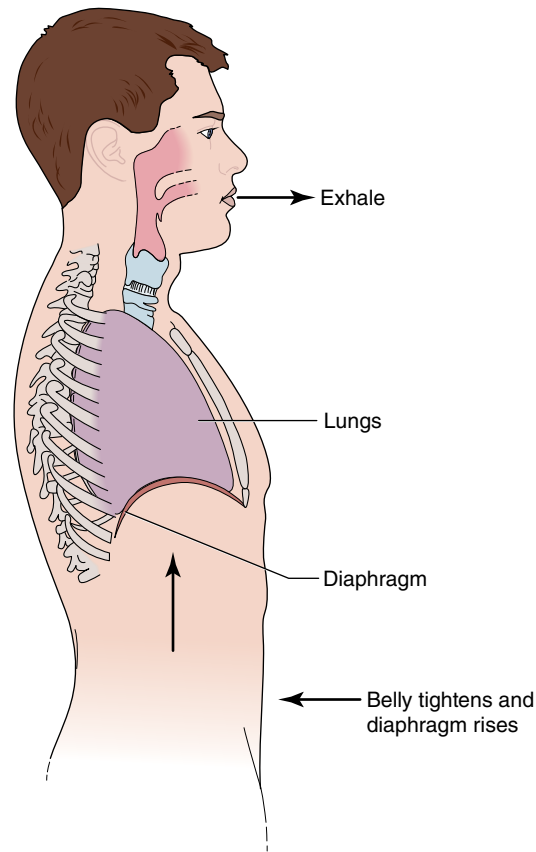


Figure 3.4 Diaphragm during breathing.

proper breathing. For example, while performing a bench press, inhale by expanding your abdomen while lowering the weight and exhale from the abdomen as you lift the weight.

Quality Versus Quantity

Because these exercises can increase the demand on the whole body as well as the joints they isolate, the body may be more prone to fatigue and compensatory movement patterns elsewhere in the body. With that in mind, we advocate exercises performed for quality rather than quantity. Remember that strength training is based not just on building muscle but also on building the motor memory (nervous system messages) for correct movement patterns; therefore, proper posture and movement is much more important than overall volume of training.

While overall posture is key, it is important to remember that the position of the band in relation to the person exercising will have a significant effect on the exercise itself. In particular, the stationary position of the band's attachment point and the subsequent line of pull or the angle of resistance will affect the overall strength curve of the exercise, as well as the stabilization requirements of the exercise. In general, the resistance band should be within the plane of movement and parallel to the muscle fibers performing the movement. During a biceps curl, for example, the exercise band should be within the sagittal plane, parallel to or in line with the fibers of the biceps (see figure 3.5).



Figure 3.5 (a) Correct versus (b) incorrect technique for the biceps curl.

Assessing Your Progress

Quantifying your progress with elastic resistance is relatively easy by using the Strength Index (Topp et al. 1998). The Strength Index establishes an objective measure of strength by having subjects perform a particular exercise with elastic resistance. The total number of repetitions are multiplied by the force of the band or tubing during the exercise movement. Therefore, over the course of training, progression is shown if your repetitions increase at the same resistance level. The Strength Index provides a repeatable measurement of any movement or functional activity involving multiple joints and planes of motion that can be used as an assessment of strength.

Strength indices are specific to the particular brand and type of band being used. For example, table 3.2 provides the TheraBand Strength Index for exercises that elongate the band 100 percent (twice the resting length). If a patient completes an exercise that elongates a red band 10 times, the strength index would be 37. If the patient advances to the green band while performing the same exercise for 10 repetitions, the strength index would increase to 46. According to the manufacturer, all TheraBand brand bands, tubes, and CLX bands have the same resistances within the same colors (both the red tube and band produce 3.7 pounds at 100 percent).

Danish researchers recently assessed the validity and reliability of the TheraBand CLX in assessing shoulder muscle strength (Andersen et al. 2017). The researchers used an isometric force transducer to measure maximal strength of shoulder muscles. They had healthy subjects perform a bilateral standing shoulder abduction to 90° with a progressive combination of CLX bands; they

Table 3.2 TheraBand Strength Index (100 Percent Elongation)

Repetitions	Yellow	Red	Green	Blue	Black	Silver	Gold
1	3	3.7	4.6	5.8	7.3	10.2	14.2
2	6	7.4	9.2	11.6	14.6	20.4	28.4
3	9	11.1	13.8	17.4	21.9	30.6	42.6
4	12	14.8	18.4	23.2	29.2	40.8	56.8
5	15	18.5	23	29	36.5	51	71
6	18	22.2	27.6	34.8	43.8	61.2	85.2
7	21	25.9	32.2	40.6	51.1	71.4	99.4
8	24	29.6	36.8	46.4	58.4	81.6	113.6
9	27	33.3	41.4	52.2	65.7	91.8	127.8
10	30	37	46	58	73	102	142

Used with permission of Performance Health.

reported excellent validity (ICC = 0.96) and reliability (ICC = 0.99). This means that elastic resistance can be an adequate and appropriate way to measure shoulder strength, providing a convenient and inexpensive way to quickly assess initial strength and quantify progression.

Progressing Your Program

Your exercise programs should also advance as you improve your strength, stabilization, and coordination. Your individual program depends on your goals, regardless of your athletic ability or age. Progression is the key to strength training programs. Elastic bands and tubing come in a variety of resistances and can be easily increased as your strength progresses. As you gain strength and control, gradually increase the number of exercises you do and the resistance level you use by progressing to the next color band or tubing. You can also advance from isolated movements (see chapter 5), such as a lateral raise, to more integrated movements, such as sport-specific motions (see chapters 12 and 13), that replicate more functional movements.

Precautions for Beginning an Exercise Program

- Be sure you have your health care provider's approval for resistance exercise if you have any medical conditions or concerns.
 - If you have chronic musculoskeletal pain, you should consider seeing a physical or occupational therapist before beginning a strengthening program.
 - Remember that soreness is to be expected at the beginning of any unaccustomed exercise program and should subside in a few days.
 - You should contact your health care provider if you experience severe soreness for more than 3 days after your workout.
-

The following chapters provide specific exercises to strengthen all major muscle groups and functional activities. The target muscle is listed with each exercise, as well as instructions and tips for proper movements. Be sure you can perform the movement properly before increasing resistance. Most importantly, use a resistance that allows you to complete your target repetitions without excessive fatigue or movement substitution. Choose your repetitions and resistance level (volume and intensity) based on your goals (see the ACSM recommendations in this chapter's introduction and table 3.1). Most of the exercises in this book are performed while standing to help increase activation of the trunk and to improve balance. The level of the exercise reflects the difficulty and amount of muscle activation required.

**Elastic
Resistance
Exercises and
Workouts**

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Flexibility

Warming up before and cooling down after exercise are important components of any training program. Until recently, stretching was generally considered the best form of preexercise warm-up to reduce injury and improve performance. Research, however, has shown that static stretching before exercise does not necessarily reduce injury and may actually hinder performance. Today, an active warm-up involving brisk activity using targeted muscles through their full range of motion is advocated. No definitive research proves that stretching prevents injury, but it remains a popular technique to improve range of motion and functional mobility, particularly if done after exercise as part of the cool-down.

Light elastic resistance can be used as part of a dynamic muscular warm-up by performing quick repetitions through the range of motion prior to activity. For example, baseball pitchers often perform multiple quick repetitions of internal and external shoulder rotation with light elastic tubing as part of their dynamic warm-up. The increased blood flow to muscles may enhance flexibility.

Elastic resistance can be used to assist with many types of stretching programs. Exercises that involve prestretch contraction stretching can be especially beneficial. By performing a contraction of the muscle before you stretch it, you will more effectively stretch the muscle. Research has shown that a prestretch contraction is more effective at increasing muscle length and joint range of motion than a static stretch. Prestretch contraction stretching is easily accomplished through the use of elastic resistance: You contract the muscle against the resistance of the band and follow it with a slow stretch to increase the length of the muscle and increase the range of motion. For example, contracting the hamstrings against elastic resistance prior to stretching will result in more range of motion at the hip. A prestretch contraction helps muscles relax neurologically and also increases the temperature of the muscle, making it more pliable and easier to stretch.

There are several variations of prestretch contraction stretching based on proprioceptive neuromuscular facilitation (PNF) techniques. PNF was developed many years ago by physical therapists as a rehabilitation technique for patients with neurological injuries such as strokes. PNF is a system of exercise that takes advantage of the neurological control of muscles through proprioception (the unconscious awareness of joint position and movement). Using both manual and external resistance, therapists use various PNF techniques to increase muscle strength, improve movement patterns, and restore muscle length. Recently, some PNF muscle-lengthening techniques have been used as part of nonrehabilitation stretching programs. Athletes in particular have been using these techniques as part of their warm-ups.

The most popular type of PNF muscle-lengthening technique, hold-relax stretching, involves taking the joint to the end range of motion, maximally elongating the muscle to be stretched. The muscle is then contracted with no joint

movement, or isometrically, for approximately 5 seconds. The slack at the end range is taken up, and a new stretch position is held for between 10 and 30 seconds. This process is repeated three or four times. Similarly, PNF contract-relax stretching involves moving the joint (contracting the muscle) through its entire range of motion before returning to the end stretch position.

The resistance level of the band is important to consider when performing PNF stretching techniques. Choose a resistance level that gives you a comfortable stretch but allows you to contract the muscle or move the joint. Although there will be some discomfort associated with stretching tight muscles, it should not be painful. Finally, remember to breathe normally while stretching; do not hold your breath while stretching.

The following stretching exercises target various regions of the body and can be used as part of an overall stretching program. Tightness in these muscles is common and may lead to muscle imbalances.

Upper Trapezius Stretch

Begin with one end of the band under your feet. Grasp the other end of the band and stretch the band with the hand on the side to be stretched. With your other hand, grasp the side of your head and bend your neck away from the side to be stretched (*a*). Keeping your elbow straight, shrug your shoulder upward, pulling the band toward the ceiling, and inhale (*b*). Hold for 2 to 6 seconds then slowly allow the band to return the shoulder to the starting position as you exhale. Hold the stretch on the band for an additional 10 to 30 seconds (*c*).



Pectoralis Major Stretch

Begin by wrapping the band across your upper back and grasp both ends of the band with your arms extended out to the side against the band resistance (*a*). Pull both ends of the band toward each other in front of your chest, holding for 2 to 6 seconds (*b*) then slowly let the band pull both arms slightly behind the body as you exhale. Hold the stretch for an additional 10 to 30 seconds (*c*).



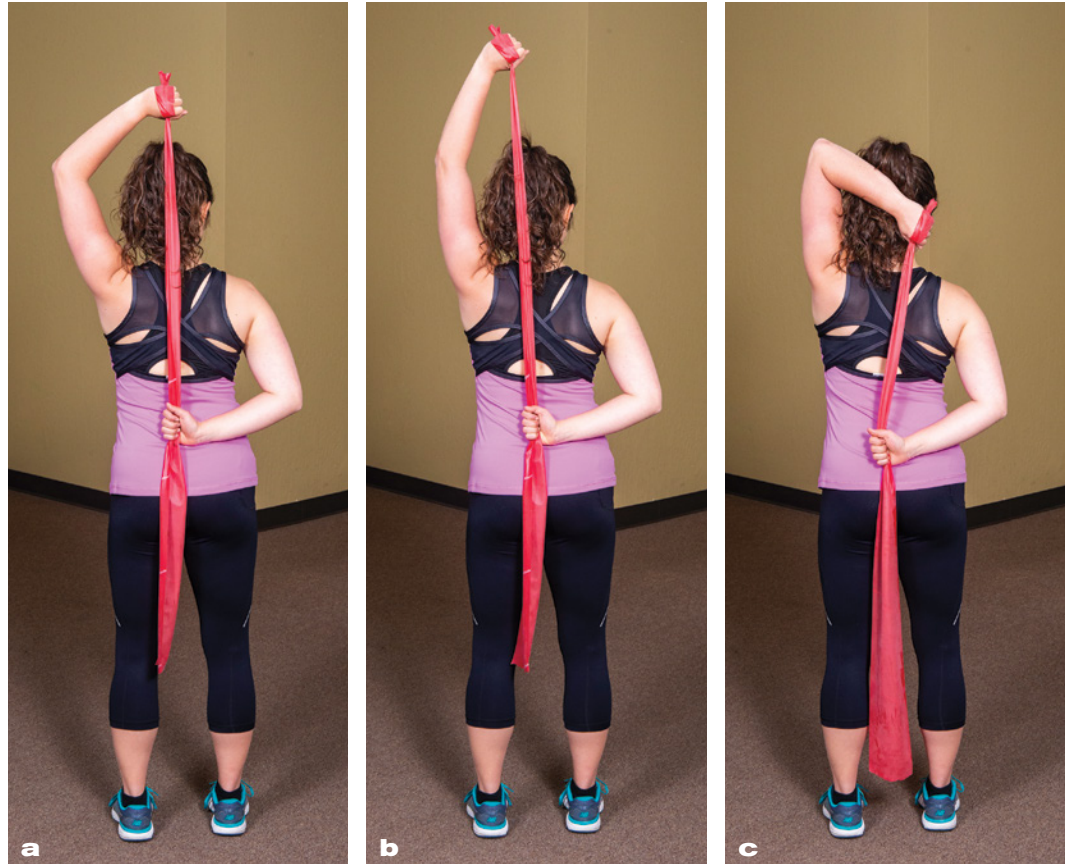
Shoulder External Rotation

Secure one end of the band under a table or bed near your head. Begin by lying on your back with your elbow bent at 90° and at shoulder level in external rotation (*a*). Rotate your arm internally against the band, keeping your elbow bent, and hold for 2 to 6 seconds (*b*) then slowly let the band pull into external rotation, stretching the front of your shoulder as you exhale. Hold the stretch for an additional 10 to 30 seconds (*c*).



Shoulder Internal Rotation/Triceps

While standing, grasp one end of the band overhead with the arm to be stretched and grasp the other end of the band behind your back (a). While maintaining the position of the arm behind your back, pull the band overhead with your top arm to extend your elbow and hold for 2 to 6 seconds (b). Exhale as you pull downward with the arm behind your back, allowing the elbow of your top arm to bend. Hold the stretch for an additional 10 to 30 seconds (c).



Hip Flexor (Iliopsoas) Stretch

Attach the ends of a looped band securely to a sturdy object near the floor. Lie on your back on a bench or table with the leg to be stretched hanging over the edge and pull the knee of the opposite leg into your chest (*a*). Attach the looped band around the knee or thigh and gently lift your leg against the taut band as you inhale (*b*). Hold for 2 to 6 seconds then slowly allow the band to return the leg to the starting position as you exhale (*c*). Hold the stretch on the band for an additional 10 to 30 seconds.



Adductor (Groin) Stretch

Attach the ends of a looped band securely to a sturdy object near the floor. Attach the looped band around the foot on the side to be stretched. Begin sitting with your legs spread apart and knees straight on a slight diagonal from the point of attachment (*a*). Gently pull your leg inward against the taut band as you inhale (*b*). Slowly allow the band to return the leg to the starting position and beyond until you feel a stretch in the groin that can be maintained against the resistance of the band. Hold the stretch on the band for an additional 10 to 30 seconds (*c*).



Piriformis Stretch

Lie with one knee (on the side to be stretched) bent and ankle resting on the opposite knee. Loop the band around the knee to be stretched and grasp the ends of the loop with the hand opposite the side to be stretched (*a*). Keep the band taut while gently pushing the top knee into the band as you inhale (*b*). Hold for 2 to 6 seconds then slowly allow the band to return the leg to the starting position as you exhale. Then pull the band diagonally, moving the knee across the body until you feel a strong stretch in your hip and hold the stretch on the band for an additional 10 to 30 seconds (*c*).



Quadriceps Stretch

Begin by lying prone with the band secured around your ankle and your knee bent 90 degrees. Grasp the other end of the band in your hand over your shoulder or secure the other end of the band to a sturdy object (a). Gently extend your knee against the band as you inhale (b). Hold for 2 to 6 seconds then slowly relax your quadricep, allowing your knee to bend to a position of stretch. Hold the stretch on the band for an additional 10 to 30 seconds (c).



Hamstring Stretch

Lie on your back with the looped band around the foot or ankle on the side to be stretched. Keep your opposite knee flexed. Extend the leg upward and grasp the ends of the band, pulling the leg toward your head (*a*). Gently push your extended leg downward against the band, keeping your knee straight (*b*). Hold for 2 to 6 seconds. Slowly return the band to the starting position and then beyond, stretching the hamstring muscles as you exhale. Hold the stretch on the band for an additional 10 to 30 seconds (*c*).



Iliotibial Band Stretch

Begin lying on your side on the opposite side to be stretched with the lower knee bent. Secure the ends of a long band (or the middle of a looped band) under the table. Place the middle of the loop around your knee on the side to be stretched (*a*). While keeping your top knee straight, pull your thigh and knee upward against the band, maintaining the position for 2 to 6 seconds (*b*). Exhale as you lower your leg and let the band stretch the outside of your hip for an additional 10 to 30 seconds (*c*).



Gastrocnemius and Soleus Stretch

Begin by sitting with your knees extended and loop the middle of the band around the foot of the side to be stretched. Grasp the ends of the band, pulling the foot toward your head (a). Gently push your foot downward against the band, keeping your knee straight (b). Hold for 2 to 6 seconds then slowly allow the band to pull the foot back toward your body as you exhale (c). Hold the stretch on the band for an additional 10 to 30 seconds. To isolate the soleus, perform the same stretch with the knee slightly bent rather than straight.



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Joint and Muscle Isolation

Isolated joint exercises are probably the most popular form of elastic resistance exercise. These exercises generally involve single joints moving in one direction and are used to target specific muscles that provide joint stability and prevent overuse injuries. Most of these exercises are commonly used in rehabilitation.

Individually strong muscles and stable joints often form the base for executing simple movements as well as more compound movements. Any chain is only as strong as its weakest link; this statement applies to kinetic, or movement, chains as well. A chain of movement is limited by the weakest muscle, or sometimes the least stable joint, in the chain.

In the upper body, elastic resistance is particularly effective for shoulder joint exercises. The elbow, hand, and wrist joints can also be exercised with elastic bands and tubing, as can the lower body joints of the hip, knee, foot, and ankle. Resistance exercises for muscles provide stability to joints of the upper body, arms, and hands, and the lower body follows. Note that, in general, it's a good idea to exercise the same joint on both sides of the body. Here, as elsewhere in the book, exercises should be performed with a standard-length band or tubing, except as otherwise noted.

SHOULDERS

Lateral Raise

Middle Deltoid

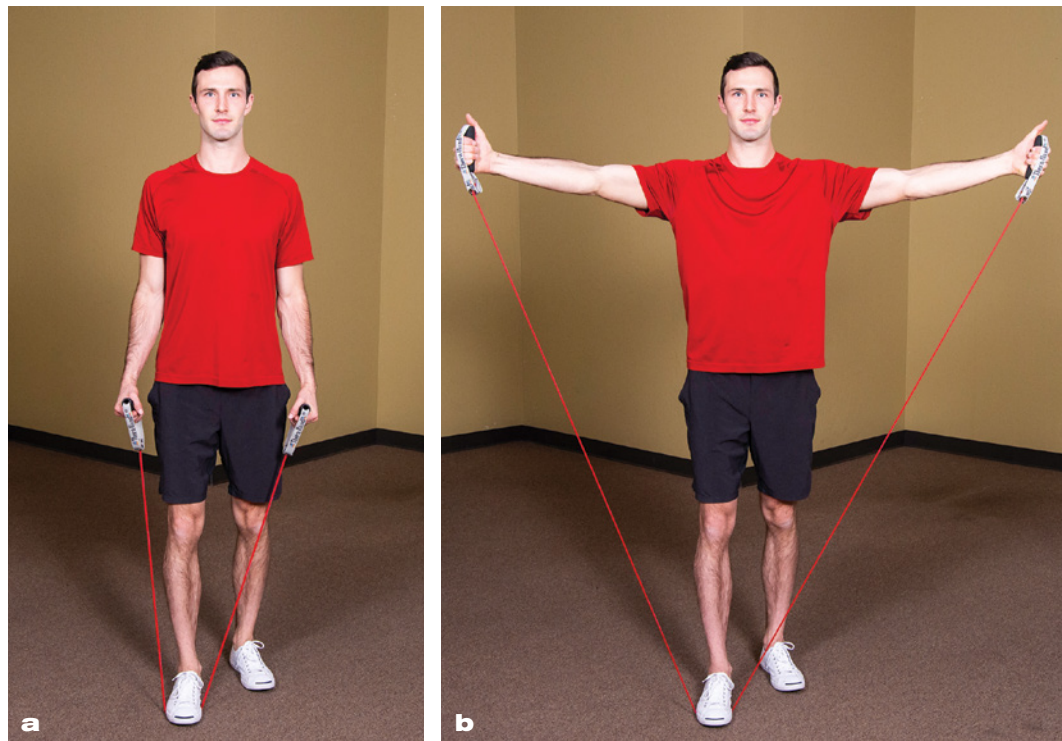
Stand with one foot slightly in front of the other with the middle of the band or tubing under the foot. Grasp the two ends of the band and bring them around the outside of the feet (a). Lift the band out to the side at shoulder level, keeping your elbows straight (b). Slowly return to the starting position.

VARIATION

Alternate lifting right and left arms.

TECHNIQUE TIP

Keep your shoulder blades down; avoid shrugging your shoulders with the movements. Keep your abdominals tight and your wrists straight.



Training Tip

Thumbs Up or Thumbs Down?

This exercise is also known as the full can. Originally, it was performed with the thumbs down and called the empty can. However, researchers suggest this exercise be performed with the thumbs up to reduce the risk of shoulder impingement at similar muscle activation levels (Thigpen et al. 2006).

SHOULDERS

Front Raise

Anterior Deltoid

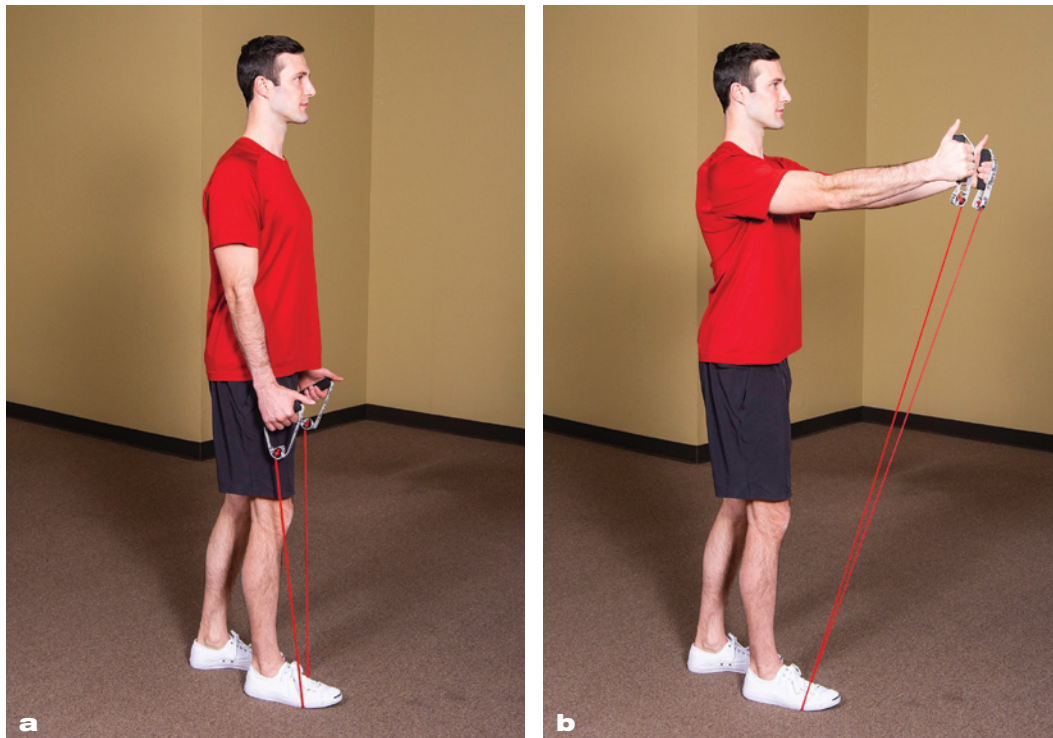
Use a staggered step, with one foot slightly in front of the other, and stand on the middle of the band or tubing with one foot. Grasp the ends of the band (*a*) and lift the band forward to shoulder height, keeping your elbows straight (*b*). Slowly return to the starting position.

VARIATION

Alternate lifting right and left arms. Perform with the palms up for more biceps activation.

TECHNIQUE TIP

Keep your shoulder blades down; avoid shrugging your shoulders with the movements. Avoid arching your back; keep it straight. Keep your abdominals tight and your wrists straight.



SHOULDERS

Scaption

Deltoids, Rotator Cuff, Especially Supraspinatus

Stand with one foot in front of the other and place the middle of the band or tubing under the front foot. Grasp the ends of the band or tubing and bring your arms slightly in front of your body to about 30° (a). Lift the band out to the side to shoulder height (b). Keep your thumbs up and elbows straight. Slowly return to the starting position.

VARIATION

Alternate lifting right and left arms. Be sure to stop at shoulder height.

TECHNIQUE TIP

Keep your shoulder blades down; avoid shrugging your shoulders with the movements. Avoid arching your back; keep it straight. Keep your abdominals tight and your wrists straight.



Training Tip

One Exercise for Shoulder and Neck Pain

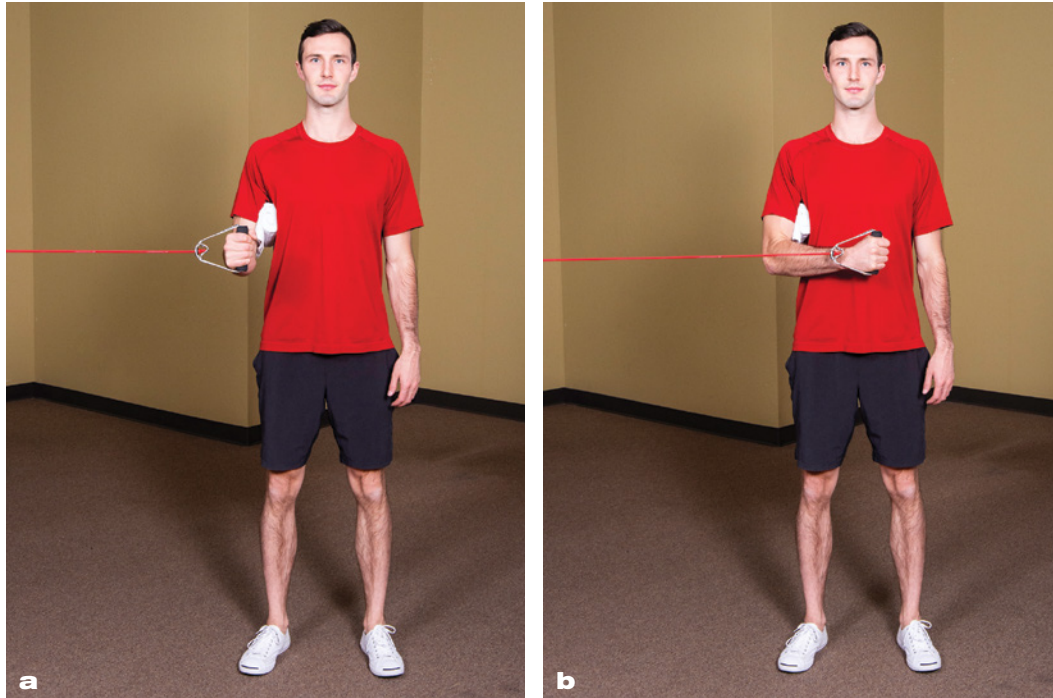
Researchers found that performing this exercise for 2 minutes, 5 days a week for 12 weeks will significantly reduce shoulder and neck pain in office workers (Andersen et al. 2011).

SHOULDERS

Shoulder Internal Rotation at Side

Rotator Cuff, Especially Subscapularis

Securely attach one end of the band to a sturdy object and stand beside it, with your working arm nearest the object. Grasp the free end of the band with your elbow by your side, bent 90°, and your forearm parallel to the floor (*a*). Pull the band away from the attachment point (*b*) and return slowly to the starting position.



VARIATIONS

- Use a looped band to perform this exercise with the hands open.
- Use a towel roll or pillow under the arm.

TECHNIQUE TIP

Don't shrug your shoulder. Keep your wrist straight. Keep your elbow bent at 90°; don't extend your elbow or wrist to complete the motion. Keep your trunk stationary; don't rotate your trunk to complete the motion.



Training Tip

Pillow Talk

Researchers have shown that using a pillow or small towel between the arm and trunk during rotation may help maximize blood flow to the rotator cuff and can increase rotator cuff activation (Reinold et al. 2004).

SHOULDERS

Shoulder External Rotation at Side

Rotator Cuff, Especially Infraspinatus

Securely attach one end of the band to a sturdy object and stand beside it, with your nonworking arm nearest the object. Grasp the end of the band with your elbow by your side, bent 90°, and your forearm parallel to the floor (a). Pull the band away from the attachment (b) and return slowly to the starting position.



VARIATION

- Use a looped band to perform this exercise with the hands open.
- Use a towel roll or pillow under the arm.

TECHNIQUE TIP

Don't shrug your shoulder. Keep your wrist straight. Keep your elbow bent at 90°; don't extend your elbow or wrist to complete the motion. Keep your trunk stationary; don't rotate your trunk to complete the motion.



SHOULDERS

Serratus Punch

Serratus Anterior, Anterior Deltoid

Securely attach one end of the band to a sturdy object behind you. Grasp the end of the band at shoulder height with your elbow extended (a). Keep your trunk steady and shift your shoulder forward to punch the end of the band away from the attachment (b). Slowly return to the starting position.



VARIATION

Perform the exercise by placing the middle of the band around your upper back. Grasp the end of the band at shoulder level and push the band forward as you keep your elbow straight.

TECHNIQUE TIP

Don't shrug your shoulders. Keep your elbow straight throughout the exercise. Don't allow your trunk to rotate during the exercise.



ELBOWS AND WRISTS

Biceps Curl

Biceps

Stand on the middle of the band or tubing with one foot slightly in front of the other. Grasp the ends of the band with your palms up and elbows by your side (a). Bend your elbows, lifting the band upward (b). Slowly return to the starting position.

VARIATION

Alternate with right and left arms.

TECHNIQUE TIP

Don't shrug your shoulders. Keep your shoulders and elbows steady. Keep your back straight and don't lean back. Keep your abdominals tight. Keep your wrists straight; don't bend them to complete the motion.



ELBOWS AND WRISTS

Elbow Extension

Triceps

Securely attach the middle of the band to a stationary object above your head. Facing the attachment point, grasp the end of the band with your elbows bent and by your side (a). Straighten your elbows, keeping them by your side (b). Slowly return to the starting position.

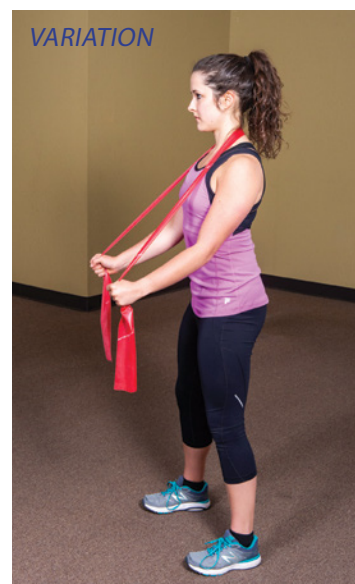


VARIATION

Place the middle of the band around your neck and grasp each end of the band with your elbows bent. Extend your elbows by your side and slowly return to the starting position.

TECHNIQUE TIP

Keep your shoulders and elbows steady. Keep your back straight; don't lean forward to complete the exercise. Keep your abdominals tight and your wrists straight.



ELBOWS AND WRISTS

Wrist Flexion

Wrist Flexors

Sit with your knees flexed and secure the ends of the band under one foot. Use the nonworking hand to stabilize your forearm on your thigh. Grasp the band with the palm up (a). Bend your wrist upward and slowly return to the starting position (b). After several repetitions, switch to the other arm.

VARIATION

Perform while standing with your elbow bent 90° at your side to enhance biceps activation.

TECHNIQUE TIP

Keep your elbow and forearm in one position during the exercise; don't use your elbow to complete the exercise.



ELBOWS AND WRISTS

Wrist Extension

Wrist Extensors

Sit with your knees flexed and secure the ends of the band under one foot. Use the nonworking hand to stabilize your forearm on your thigh. Grasp the band with the palm down (a). Bend your wrist upward and slowly return to the starting position (b). After several repetitions, switch to the other arm.



VARIATION

Hold the ends of the band between your hands, about shoulder-width apart, with your palms facing each other. Extend both your wrists at the same time.

TECHNIQUE TIP

Keep your elbow and forearm in one position during the exercise; don't use your elbow to complete the exercise.

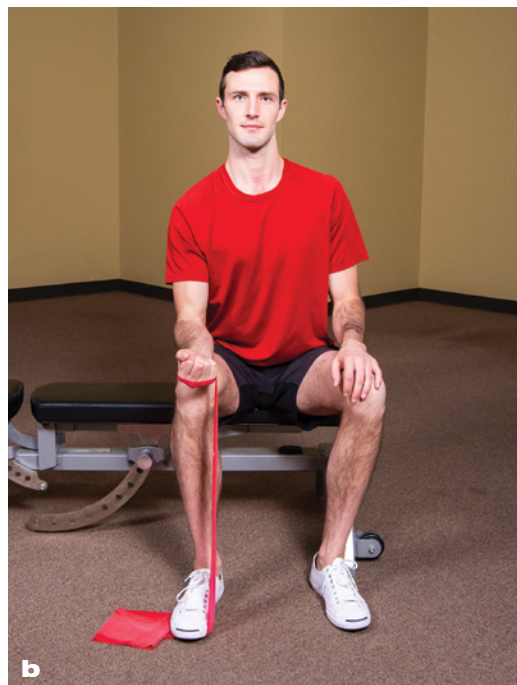
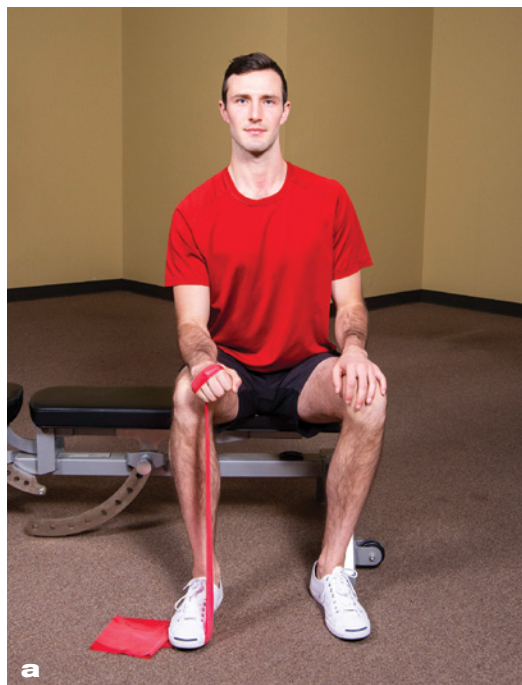


ELBOWS AND WRISTS

Forearm Supination

Supinator, Biceps

While seated, stabilize the end of the band under your foot. Grasp the other end of the band with the palm down (a). Rotate your forearm and turn your palm upward (b). Slowly return to the starting position.



VARIATION

Hold the ends of the band between your hands, about shoulder-width apart, with your palms facing each other. Rotate both your forearms at the same time and turn your palms upward. Sit on an exercise ball for more of a challenge.

TECHNIQUE TIP

Keep your elbow and forearm in one position during the exercise; don't use your elbow to complete the exercise.



ELBOWS AND WRISTS

Forearm Pronation

Pronator Teres

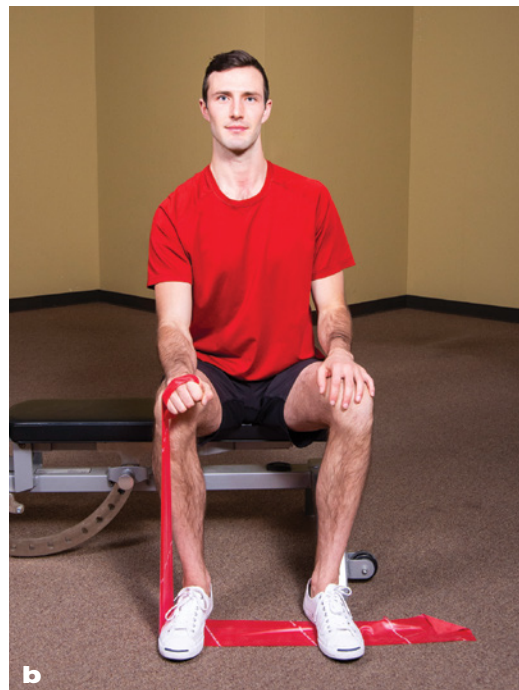
Sit on a bench with your knees flexed and stabilize the end of the band under your foot. Grasp the band with the palm up and the band next to your thumb (*a*). Rotate your forearm and turn your palm downward (*b*). Slowly return to the starting position.

VARIATION

Perform while standing with your elbow bent 90° at your side.

TECHNIQUE TIP

Keep your elbow and forearm in one position during the exercise; don't use your elbow to complete the exercise.



ELBOWS AND WRISTS

Ulnar Deviation

Forearm Flexors and Extensors

Sit on a bench and secure the end of the band under your foot. Grasp the band with the palm facing inward and your elbow by your side with your thumb pointing forward (a). Keeping your elbow steady, move your wrist backward (b). Slowly return.

VARIATION

Perform exercise while standing.

TECHNIQUE TIP

Keep your elbow and forearm in one position during the exercise; don't use your elbow to complete the exercise. Don't extend your shoulder; keep it stationary.



ELBOWS AND WRISTS

Radial Deviation

Forearm Flexors and Extensors

Sit on a bench and secure the end of the band under your foot. With your elbow stabilized on your thigh, grasp the band with the thumb pointing upward (*a*). Keeping your elbow steady, move your wrist upward (*b*). Slowly return to the starting position.

VARIATION

Perform exercise while standing.

TECHNIQUE TIP

Keep your elbow and forearm in one position during the exercise; don't use your elbow to complete the exercise.



Hip Internal Rotation

Hip Rotators

Secure both ends of the band to a stationary object. Sit in a chair or on a bench with the attachment point on the opposite (nonworking) side and loop the band around your ankle (a). Rotate your lower leg outward against the band (b). Slowly return to the starting position.



VARIATION

Secure both ends of the band to a stationary object near the floor. With the attachment point on the opposite side, loop the middle of the band around the ankle. In a standing position with the knee on the working side bent at 90 degrees, rotate your lower leg outward and parallel with the floor, pulling the band away from the attachment. Slowly return to the starting position.

TECHNIQUE TIP

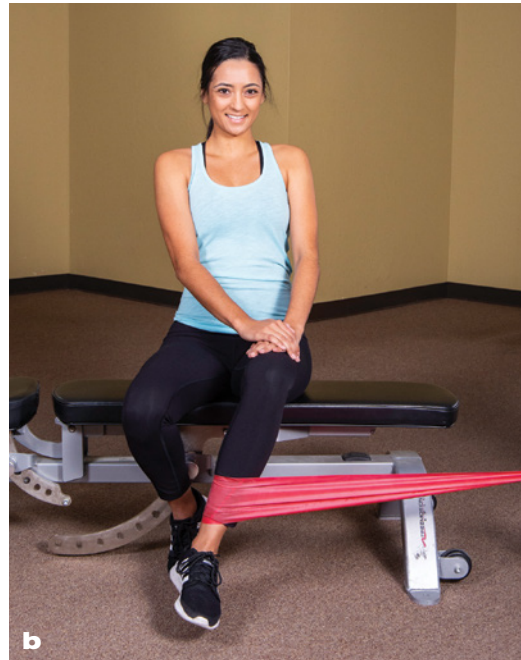
Avoid arching your back; keep it straight. Avoid bending your hip.



Hip External Rotation

Hip Rotators

Secure both ends of the band to a stationary object. Sit in a chair or on a bench with the attachment point on the same (working) side and loop the middle of the band around your ankle (*a*). Rotate your lower leg inward against the band (*b*). Slowly return to the starting position.



VARIATION

Secure both ends of the band to a stationary object near the floor. With attachment on the working side, loop the middle of the band around the ankle. In a standing position with the knee on the working side bent at 90 degrees, rotate your lower leg inward and parallel with the floor, pulling the band away from the attachment point. Slowly return to the starting position.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Avoid bending your hip.



Hip Flexion

Iliopsoas, Rectus Femoris

Loop the middle of the band around the ankle (a). Stand on both ends of the band with the nonworking leg (or secure both ends of the band to a stationary object near the floor). Face away from the attachment point and slowly swing the leg forward, keeping the knee straight (b).

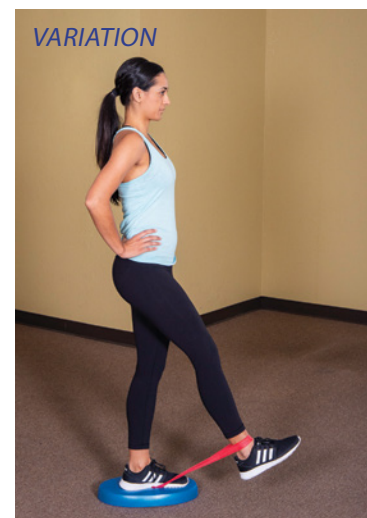


VARIATION

Stand on a foam pad for an increased challenge.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep the abdominals tight.



Training Tip

Opposites Attract

This exercise also activates muscles in the nonworking stance leg on the opposite side. Hip flexion of the right leg activates the hamstring muscles on the left leg (Hopkins et al. 1999).

Hip Extension

Gluteus Maximus

Loop the middle of the band around the ankle (*a*). Stand on the ends of the band with the nonworking leg (or secure both ends of the band to a stationary object near the floor). Face the attachment point and slowly swing the leg backward, keeping the knee straight (*b*). Slowly return to the starting position.

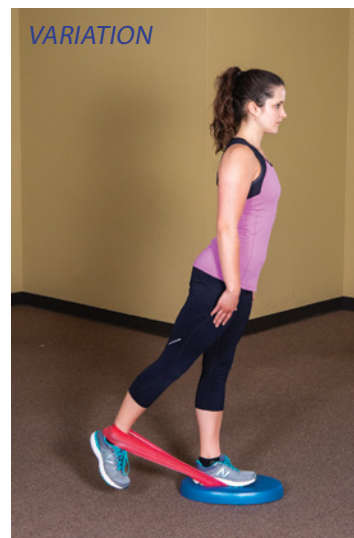


VARIATION

Stand on a foam pad for an increased challenge.

TECHNIQUE TIP

Avoid extending your back; keep it straight. Keep the abdominals tight.



Hip Abduction

Gluteus Medius

Loop the middle of the band around the ankle (*a*). Stand on the ends of the band with the nonworking leg (or secure both ends of the band to a stationary object near the floor). Slowly swing your leg outward, keeping the knee straight (*b*). Slowly return to the starting position.



VARIATION

Stand on a foam pad for increased challenge.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep the abdominals tight.



Training Tip

Better Than Machines

Researchers found that this elastic resistance exercise produces more activation of the hip abductors than using a weight machine (Brandt et al. 2013).

Hip Adduction

Hip Adductors

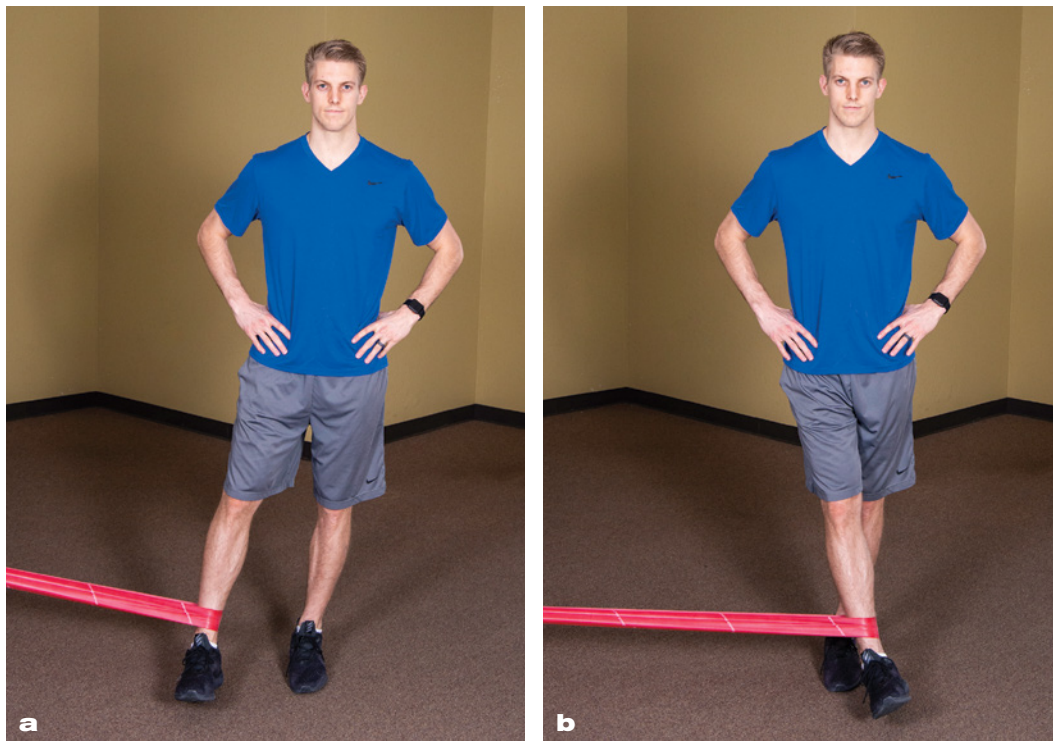
Secure both ends of the band to a stationary object near the floor. Loop the middle of the band around the ankle (*a*). Slowly swing your leg across your body, keeping the knee straight (*b*). Slowly return to the starting position.

VARIATIONS

- Keeping your knee straight, swing your leg behind the other (nonworking) leg.
- Stand on a foam pad for an increased challenge.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep the abdominals tight.



Training Tip

A Kick in the Groin

Researchers found that this exercise produces high activation of the groin muscles, which might help reduce injuries in soccer players (Serner et al. 2014).

Knee Flexion

Hamstrings

Secure both ends of the band to a stationary object. Sit on a bench facing the attachment point. Loop the middle of the band around the ankle (a). Flex your knee toward your buttocks (b) and slowly return to the starting position.



VARIATION

Secure both ends of the band to a stationary object about knee height. Lie on your stomach with your head away from the attachment point. Loop the middle of the band around one ankle. Begin with your knee bent and flex your knee against the band, pulling it toward your buttocks. Slowly return to the starting position.



TECHNIQUE TIP

Keep your back straight and your abdominals tight. Avoid arching your back.

Training Tip

Same as It Ever Was

Researchers reported that performing this exercise with elastic resistance had as much muscle activation as using a weight machine (Jakobsen et al. 2014).

Knee Extension

Quadriceps

Secure both ends of the band to a stationary object. With your back to the attachment point, sit on a bench and loop the middle of the band around the ankle (a). Extend your knee (b) and slowly return to the starting position.



VARIATION

Secure both ends of the band to a stationary object about knee height. Lie on your stomach with your head closest to the attachment point. Loop the middle of the band around one ankle. Place a towel roll or pillow under the knee. Begin with your knee bent and extend your knee against the band until it reaches the floor. Slowly return to the starting position.



TECHNIQUE TIP

Keep your back straight and your abdominals tight. Avoid arching your back.

Training Tip

Same as It Ever Was...Again

Researchers reported that performing this exercise with elastic resistance had as much muscle activation as using a weight machine (Jakobsen et al. 2012).

Terminal Knee Extension

Quadriceps, Vastus Medialis

Make a loop with your band and securely attach both ends to a sturdy object at knee height. Facing the attachment point, place your bent knee inside the loop and take up the slack (a). Slowly straighten and bend your knee, stretching the band as you extend your knee (b).

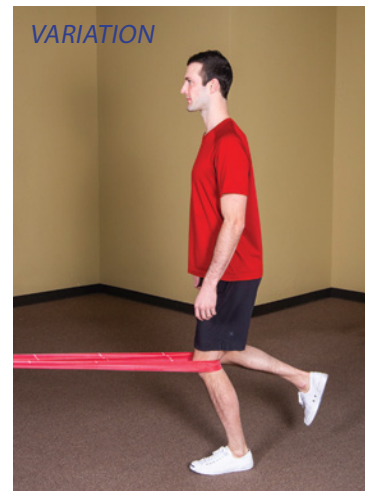


VARIATIONS

- Perform the exercise while standing on only one leg.
- Stand on a foam pad for an increased challenge.

TECHNIQUE TIP

Be sure the band is wrapped just above your knee joint. Don't hyperextend your knee.



Training Tip

Not Exclusive to the VMO

The VMO is the vastus medialis muscle that is just above your inside knee joint, connected to the patella. Performing this mini-squat exercise with elastic resistance increases VMO activation but doesn't selectively activate it when compared to the vastus lateralis (Willett et al. 1998).

ANKLES

Ankle Dorsiflexion

Tibialis Anterior

Sit on the floor with both knees extended. Loop the band around one foot and grasp the ends of the band. Press your other (nonworking) foot down onto the band to stabilize the band (*a*). Lift the foot of the working ankle toward your head against the resistance of the band (*b*). Slowly return to the starting position.



VARIATION

Perform the exercise while sitting with your knees bent. Loop the band around one foot and stabilize the band under your other foot. Lift the ankle to be exercised upward. Slowly return to the starting position.

TECHNIQUE TIP

Keep your knee from moving excessively to complete the exercise.



Ankle Plantarflexion

Gastrocnemius, Soleus

Sit on the floor with one knee extended. Loop the band around one foot and grasp the ends of the band (a). Push the foot down against the resistance of the band (b). Slowly return to the starting position.

VARIATION

Bend the knees slightly to exercise the soleus muscle.

TECHNIQUE TIP

Keep your knees from moving excessively to complete the exercise.



Ankle Inversion

Tibialis Posterior

Sit on the floor with one knee extended. Loop the band around the foot on the extended leg; cross the other (nonworking) leg over the extended leg. Wrap the ends of the band around the top foot and grasp the ends of the band (a). Turn your foot inward away from the band (b). Slowly return to the starting position.

VARIATION

Sit with the foot to be exercised over the opposite knee. Loop the band around the foot and stabilize the ends of band under the foot on the floor. Lift the foot only upward toward your head. Slowly return to the starting position.

TECHNIQUE TIP

Keep your knee and hip stable; don't rotate your leg to complete the exercise.



Ankle Eversion

Peroneals

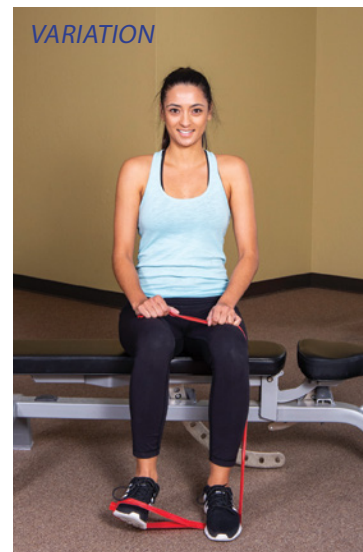
Sit on the floor with both knees extended. Loop the band around the foot, wrap the ends of the band around your nonworking foot, and grasp the ends of the band (a). Turn your foot outward away from the band (b). Slowly return to the starting position.

**VARIATION**

Sit with knees bent and the band looped around the foot to be exercised. Stabilize the ends of the band under the opposite foot. Turn the foot outward away from the band. Slowly return to the starting position.

TECHNIQUE TIP

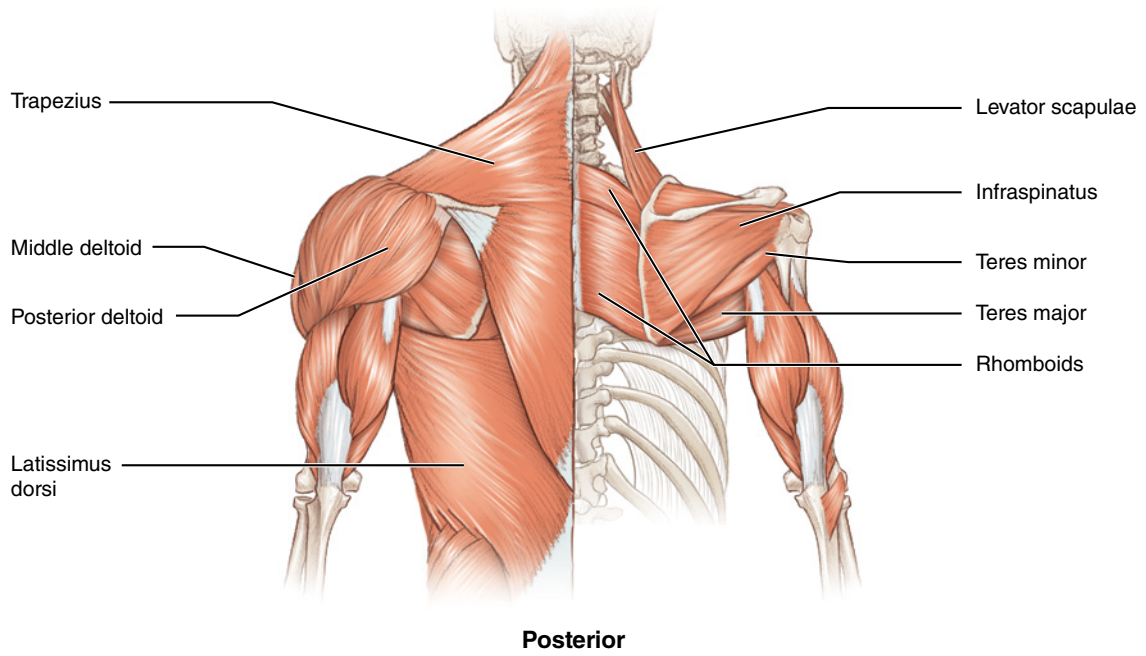
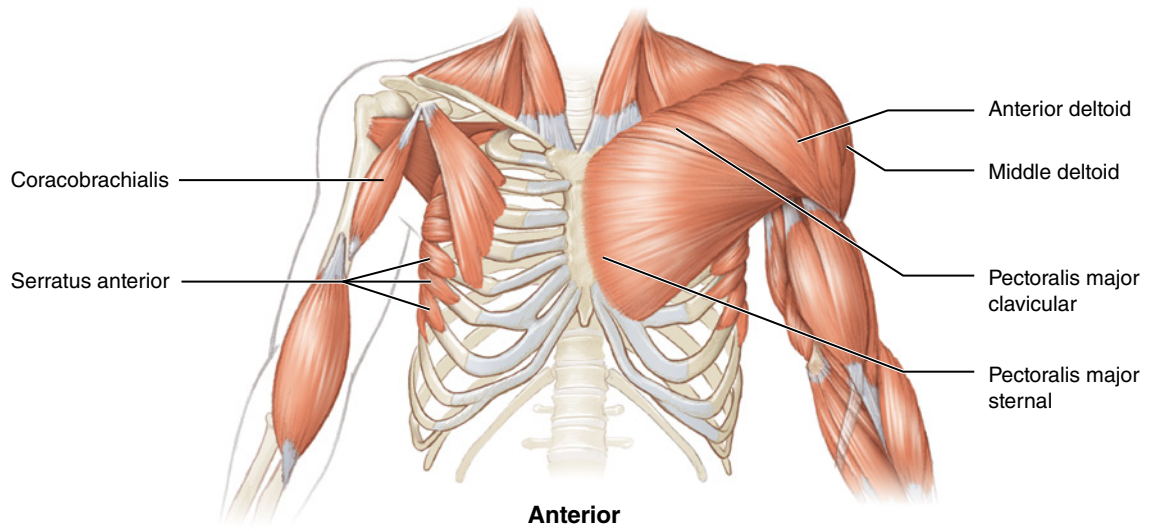
Keep your knee and hip stable; don't rotate your leg to complete the exercise.



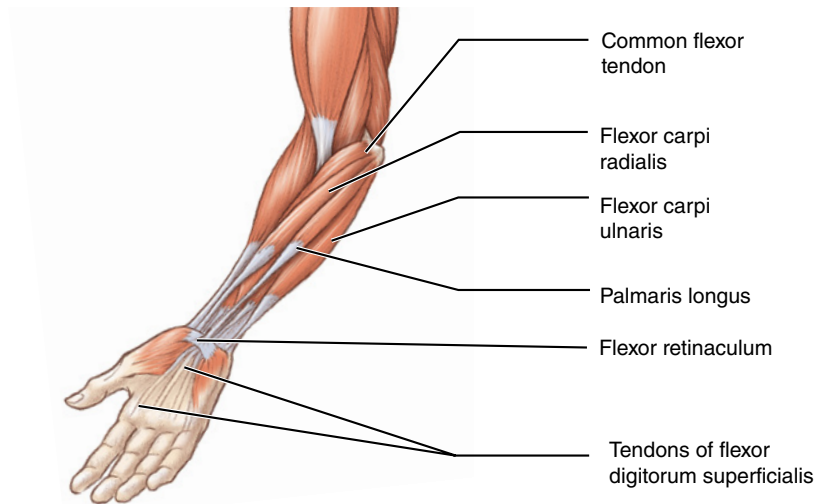
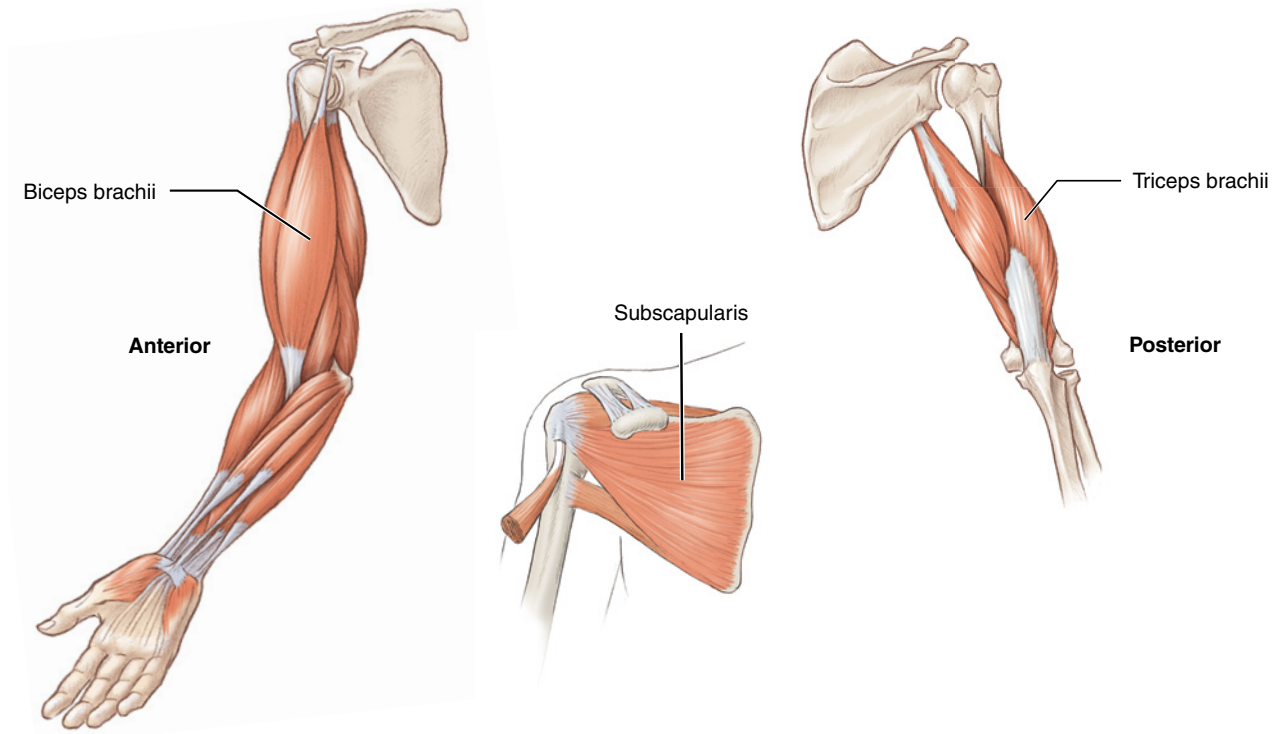


Upper Body Strength

One of the most overworked areas of the body in strength training is the chest, principally for aesthetic reasons. Unfortunately, few athletes spend time to balance the overworked chest muscles with the upper back muscles. This imbalance can contribute to poor posture as well as shoulder and neck problems. Elastic resistance easily replicates the common exercises performed with traditional strengthening equipment and allows you to perform these exercises while standing, thus making your workouts even more challenging. Strengthening of the chest and upper back may help prevent or rehabilitate shoulder and neck injuries. In addition, sport-specific training of the chest and upper back is important in overhead and throwing sports such as baseball, softball, tennis, and volleyball. Strengthening the chest and upper back has functional implications for carrying objects and for pushing and pulling movements. It's important to strengthen opposing muscle groups for muscle balance; for example, be sure to balance chest exercises with upper back exercises.



Muscles of the chest and upper back, anterior and posterior views.



Muscles of the shoulder and arm.

Chest Press

Pectoralis Major, Anterior Deltoid

Secure the middle of the band to a stationary object at or slightly above shoulder height. Face away from the attachment point. Use a staggered step with one leg slightly in front of the other for a good base of support. Grasp the ends of the band at shoulder height with your elbows bent (*a*). Extend your elbows, pushing the band forward (*b*). Slowly return to the starting position.



VARIATIONS

- Vary the height of the attachment of the band for an incline (lower attachment height) or decline (higher attachment height) press.
- Perform the exercise while lying supine on a bench. Wrap the band around your upper back and grasp the ends of the band in each hand, pushing the band upward.

TECHNIQUE TIP

Keep your shoulder blades down; avoid shrugging your shoulders with the movements. Avoid arching your back; keep it straight. Keep your abdominals tight. Keep your wrists straight.



Chest Fly

Pectoralis Major, Anterior Deltoid

Secure the middle of the band to a stationary object at shoulder height. Face away from the attachment point. Use a staggered step with one leg slightly in front of the other for a good base of support. Grasp the ends of the band at shoulder height with your elbows straight or nearly straight (*a*). Pull the band inward with your palms facing each other (*b*). Slowly return to the starting position.

VARIATION

Vary the height of the attachment of the band for an incline (lower attachment point) or decline (higher attachment point) fly.

TECHNIQUE TIP

Keep your back straight and abdominals tight. Avoid arching your back or rounding your shoulders. Keep your wrists straight.



Push-Up

Pectoralis, Triceps

Assume the push-up position on the floor. Stabilize the ends of the band under each hand and stretch the middle around the shoulder blades (a). Perform a push-up against the resistance of the band (b).

VARIATION

Perform the push-up on your toes (more difficult) or knees (less difficult).

TECHNIQUE TIP

Avoid arching your back; keep it straight. Avoid letting your hips sag.



Training Tip

As Effective as a Bench Press

Performing a push-up with an elastic band is as effective at activating the pectoralis muscle as a 70-percent 1RM barbell bench press (Calatayud et al. 2014).

Shoulder Push-Up Plus Band

Serratus Anterior

Loop the band around your hands. Get on your hands and knees with your hands slightly outside your shoulders so your forearms stretch the band (*a*). While keeping your elbows straight, press your upper back toward the ceiling (*b*). Keeping your elbows straight, relax your trunk toward the floor, keeping your back and hips straight.



VARIATION

Perform the push-up on your toes (more difficult) or knees (less difficult).

TECHNIQUE TIP

Avoid arching your back; keep it straight. Avoid letting your hips sag.



Training Tip

Balance Scapular Winging

Adding isometric shoulder horizontal abduction during push-ups using an elastic band looped around the forearms reduces pectoralis minor activation and improves scapular muscle balance in subjects with scapular winging (Choi et al. 2017).

Forward Punch

Anterior Deltoid, Serratus Anterior

Secure the middle of the band to a stationary object at shoulder height. Face away from the attachment point. Use a staggered step with one leg slightly in front of the other. Grasp the ends of the band with your elbows bent by your side (a). Push the band forward, extending your elbows (b). Slowly return to the starting position.

VARIATION

Alternate right and left arms.

TECHNIQUE TIP

Keep your back straight and abdominals tight. Avoid arching your back or rounding your shoulders. Keep your wrists straight.



Training Tip

An Efficient Exercise

According to researchers, the forward punch exercise is effective at activating scapular muscles and the rotator cuff (Hintermeister et al. 1998).

Supine Pullover

Pectoralis, Latissimus Dorsi

Securely attach the middle of the band to a stationary object near the floor. Lie on your back with your knees bent. Extend your arms overhead with your elbows straight and grasp the ends of the band (*a*). Keep the elbows straight and pull the band down to the hips (*b*). Slowly return to the starting position.

VARIATION

Alternate left and right arms.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep your elbows and wrists straight.



Dynamic Hug

Serratus Anterior

While standing, securely attach the middle of the band to a stationary object near shoulder height, and grasp the handles at or slightly below chest height. Slightly abduct your shoulders and bend your elbows (*a*). Bring both hands together across the front of your body as if you were hugging someone (*b*). Slowly return to the starting position.

TECHNIQUE TIP

Be sure to keep your elbows flexed and separate your shoulder blades at the end of the exercise. Keep your neck in a neutral position; don't allow your head to move forward.



Training Tip

More Effective Than a Punch

According to researchers, the dynamic hug is more effective than a serratus punch exercise at activating the serratus anterior (Decker et al. 1999).

Seated Row

Rhomboids, Middle Trapezius

Sit on a chair or bench and secure the middle of the band to a stationary object in front of you. Grasp the ends of the band with your elbows extended in front (*a*) and pull the band toward your lower ribs, bending your elbows (*b*). Slowly return to the starting position.

VARIATIONS

- Vary the height to which you pull the band, such as hip height.
- Perform exercise while standing with a staggered stance.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep the abdominals tight. Keep your wrists straight.



Reverse Fly

Rhomboids, Middle Trapezius

Secure the middle of the band to a stationary object at shoulder height. Face the attachment point. Using a staggered step with one leg slightly in front of the other, grasp the ends of the band at shoulder height with your elbows straight (*a*). Keep your elbows straight and pull the ends of the band outward (*b*). Slowly return to the starting position.

VARIATION

Vary the height of the attachment of the band for an incline (lower attachment point) or decline (higher attachment point) fly.

TECHNIQUE TIP

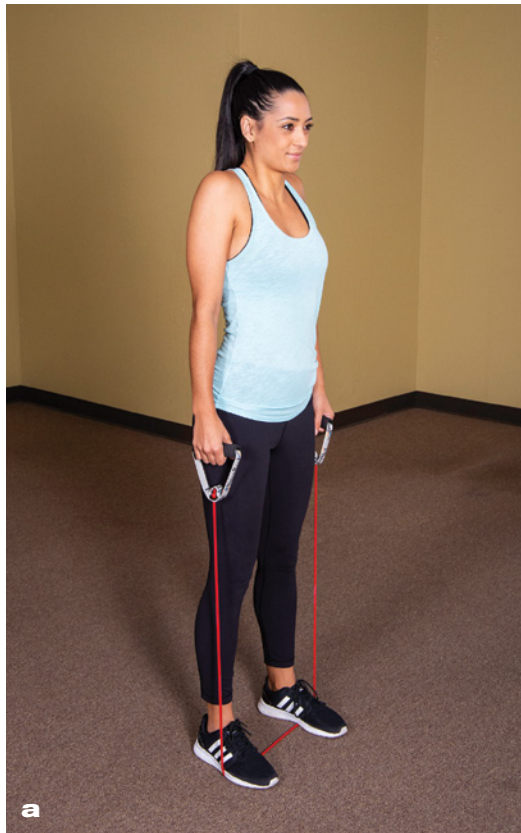
Keep your back straight and abdominals tight. Avoid arching your back or rounding your shoulders. Keep your wrists straight.



Shrug

Trapezius, Rhomboids

Stand with the end of a band in each hand and secure the middle of the band under the feet. The arms should be comfortably held down to the side. Keeping the arms at the sides, shrug the shoulders upward against the resistance in the band (*a*). When the shoulders have achieved the fully shrugged position, roll the shoulders backward by squeezing the shoulder blades together (*b*). Slowly lower the shoulders back down to the starting rest position.



Lat Pull-Down

Latissimus Dorsi

Secure the middle of the band to a stationary object above shoulder height. Face the attachment point. Using a staggered step with one leg slightly in front of the other, grasp the ends of the band above shoulder height with your elbows extended in front (a). Bend your elbows and bring your hands to your chest, pulling the band down and back (b). Slowly return to the starting position.

VARIATION

Begin with your elbows straight above shoulder height. Keep your elbows straight while extending your arms downward.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep the abdominals tight and your wrists straight.



Training Tip

As Effective as Machines

Researchers found that the lat pull-down performed with elastic resistance is as effective as using the cable pulley machine for muscle activation (Iversen et al. 2017).

Bent-Over Row

Rhomboids, Middle Trapezius, Latissimus Dorsi

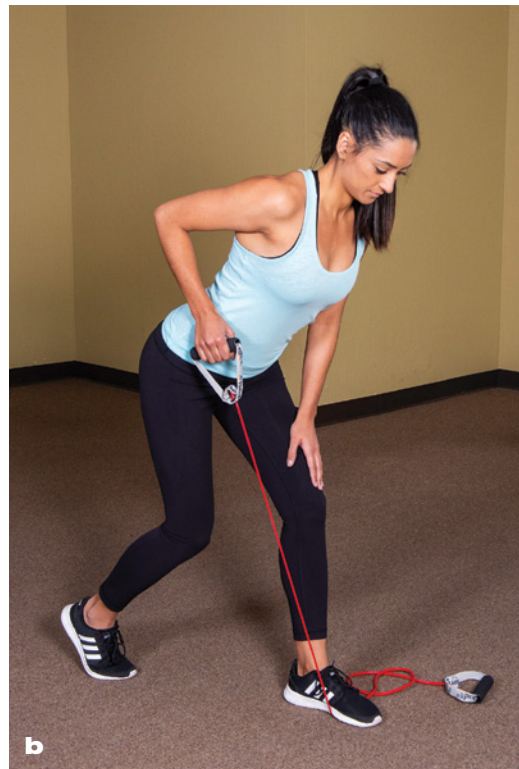
Use a staggered step with one leg in front of the other. Stand on the middle of the band or tubing with the front foot. Bend forward at the hips, keeping your back straight. Grasp the end of the band with your elbow straight (*a*). Pull one end of the band upward by bending the elbow, bringing your hand to your trunk (*b*). Slowly return to the starting position.

VARIATION

Perform exercise keeping your elbow straight.

TECHNIQUE TIP

Keep your back straight and avoid arching your back or neck. Keep your wrists straight.



Linton External Rotation

Rotator Cuff, Scapular Stabilizers

Begin by kneeling with the band or tubing secured under one hand and maintaining tension with the other hand with your forearm on your abdomen. Start the exercise by externally rotating the shoulder (*a*) then abduct and extend the arm simultaneously, pointing your thumb toward the ceiling (*b*). Hold; then slowly return to the starting position, first bringing your elbow into your side.

VARIATION

Squeeze your shoulder blades at the top of the movement for more scapular muscle activation.

TECHNIQUE TIP

Keep your back and neck straight throughout the exercise. Slowly return the band to the starting position.



Bilateral Extension With Retraction

Rhomboids, Posterior Deltoid, Latissimus Dorsi

Securely attach the middle of the band to a sturdy object in front of you. Grasp the ends of the band at hip height with your elbows straight and palms forward (*a*). Extend your arms backward and pinch your shoulder blades together against the band (*b*). Slowly return to the starting position.

VARIATION

Vary the height of the attachment of the band for an incline (higher attachment point) or decline (lower attachment point) retraction.

TECHNIQUE TIP

Keep your back and neck straight; don't lean back to complete the exercise. Keep your elbows straight and palms forward throughout the exercise.



High Row

Rhomboids, Middle Trapezius

Use a staggered step with one foot in front of the other for a good base of support. Secure the middle of the band to a stationary object in front of you at shoulder height. Grasp the ends of the band with your elbows extended (*a*) and pull the band toward your chest, bending your elbows (*b*). Slowly return to the starting position.

VARIATION

Alternate right and left arms.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep your abdominals tight. Keep your wrists straight.



Training Tip

High Row for High Activation

A wide high row is a progression of a seated row, producing more rotator cuff activation than a low row exercise (Hintermeister et al. 1998).

SHOULDERS AND ARMS

Biceps Curl at Shoulder Level

Biceps, Anterior Deltoid

Secure the middle of the band to a stationary object in front of you at shoulder height. Use a staggered step with one foot in front of the other for a good base of support. Grasp the end of the band with your elbow extended. Support your elbow with your nonworking hand (*a*) and pull the band toward your head, bending your elbows (*b*). Slowly return to the starting position.

VARIATION

Alternate right and left arms.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep your abdominals tight. Keep your wrists straight and elbows at shoulder level.



Upright Row

Upper Trapezius, Deltoid

Stand with both feet on the middle of a long band or tubing. Grasp the ends of the band at hip height (*a*) and pull upward toward your chin, bending your elbows (*b*). Slowly return to the starting position.

VARIATION

Use a staggered step, with one foot in front of the other, and stabilize the middle of the band under your front foot as you pull the band upward.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep your abdominals tight.



SHOULDERS AND ARMS

Overhead Press

Deltoids, Upper Trapezius

Use a staggered step, with one foot in front of the other, and stabilize the middle of the band or tubing under your back foot. Grasp the ends of the band with your palms forward and your elbows at shoulder height (*a*) and lift the band overhead (*b*). Slowly return to the starting position.

VARIATION

Alternate right and left arm raises overhead.

TECHNIQUE TIP

Avoid shrugging your shoulders with the movements. Avoid arching your back; keep it straight. Keep your abdominals tight.



Diagonal Flexion: PNF

Deltoids, Rotator Cuff

Securely attach one end of the band to a sturdy object near the floor. Stand with your nonworking side next to the attachment point (*a*). Grasp the other end of the band and pull the band up and away from the attachment point, crossing your body as if you were drawing a sword (*b*). Keep your elbow straight. Slowly return to the starting position.

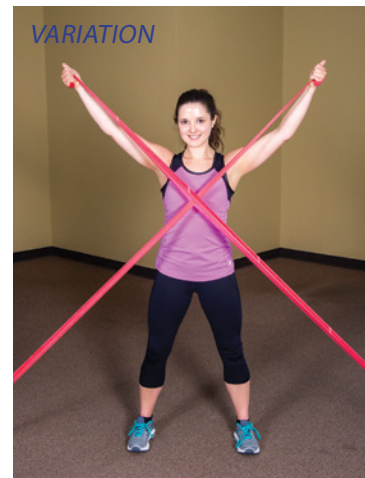


VARIATION

Use two bands and perform the motions with both arms at the same time.

TECHNIQUE TIP

Keep your back straight and don't rotate your trunk to complete the motion. Keep your abdominals tight.



Training Tip

Reach for Weights or Bands

Researchers found that diagonal flexion with elastic resistance was as effective as using weights to activate scapular stabilizer muscles (Witt et al. 2011).

SHOULDERS AND ARMS

Diagonal Extension: PNF

Pectorals, Rotator Cuff

Securely attach one end of the band to a sturdy object above your head. Stand with your working arm next to the attachment point and grasp the other end of the band (a). Pull the band down and away from the attachment point, keeping your elbow straight and crossing the body as if you were throwing a ball (b). Slowly return to the starting position.

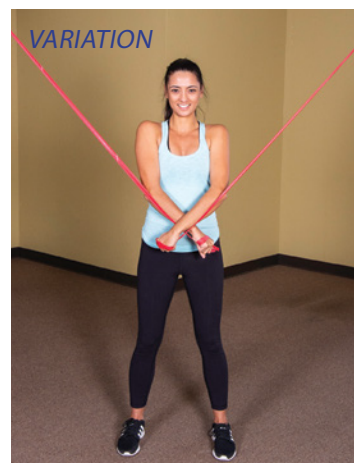


VARIATION

Use two bands and perform the exercise with both arms at the same time.

TECHNIQUE TIP

Keep your back straight and don't rotate your trunk to complete the motion. Keep your abdominals tight.



Training Tip

Better Activation Patterns

Researchers found that diagonal extension with elastic resistance produced more favorable activation ratios for scapular stabilizer muscles than weights (Witt et al. 2011).

SHOULDERS AND ARMS

Shoulder External Rotation With Retraction

Rotator Cuff, Rhomboids

Use a looped band, or grasp the band with both hands near the middle of the band. Begin with your elbows by your sides and your forearms parallel to the ground (a). Slowly move your forearms outward, lifting your chest, and squeeze your shoulder blades together (b). Slowly return to the starting position.

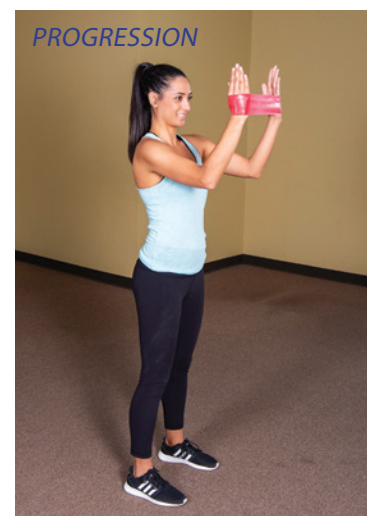


PROGRESSION

While maintaining your forearms externally rotated, lift your arms to shoulder level. Hold and slowly return your elbows to your side, keeping the forearms externally rotated. Slowly return to the starting position.

TECHNIQUE TIP

Keep your elbows by your sides and your forearms parallel to the ground. Keep your wrists and your back straight.



SHOULDERS AND ARMS

Upper Body Bruegger

Scapular and Upper Thoracic Muscles

Begin with a looped band or wrap the ends of a band around each hand. Perform the following movements against the resistance of the band with both hands:

1. Thumb and finger abduction and extension, wrist extension (*a*)
2. Forearm supination, shoulder external rotation (*b*)
3. Elbow extension, shoulder abduction, extension, scapular retraction (*c*)
4. Slowly return in exactly the reverse order

TECHNIQUE TIP

Maintain an upright posture with a neutral neck and back.



Shoulder Internal Rotation at 90°

Pectoralis Major, Rotator Cuff

Securely attach one end of the band to a sturdy object and stand in front of it, facing away from it. Grasp the end of the band with your palm forward. Lift your arm so that your shoulder is at a 90° angle, keeping your elbow at shoulder height (*a*). Pull the band down and away from the attachment (*b*). Slowly return to the starting position.

TECHNIQUE TIP

Keep your elbow at shoulder height. Keep your wrists and your back straight.



SHOULDERS AND ARMS

Shoulder External Rotation at 90°

Rotator Cuff, Deltoids

Securely attach one end of the band to a sturdy object and stand facing it. Grasp the end of the band with your palm down. Lift your arm in front of you until your shoulder is at a 90° angle, keeping your elbow at shoulder height (*a*). Pull the band up and away from the attachment point (*b*). Slowly return to the starting position.

TECHNIQUE TIP

Keep your elbow at shoulder height. Keep your wrists and your back straight.



Overhead Elbow Extension

Triceps

Stand with a staggered step and stabilize one end of the band under your back foot. Grasp the other end of the band behind your head with your elbow bent overhead and support the elbow with your other hand (*a*). Straighten your elbow, lifting your hand upward (*b*). Slowly return to the starting position.

TECHNIQUE TIP

Keep your shoulders and elbows steady. Keep your back straight and don't lean forward to complete the exercise. Keep your abdominals tight. Keep your wrists straight.



SHOULDERS AND ARMS

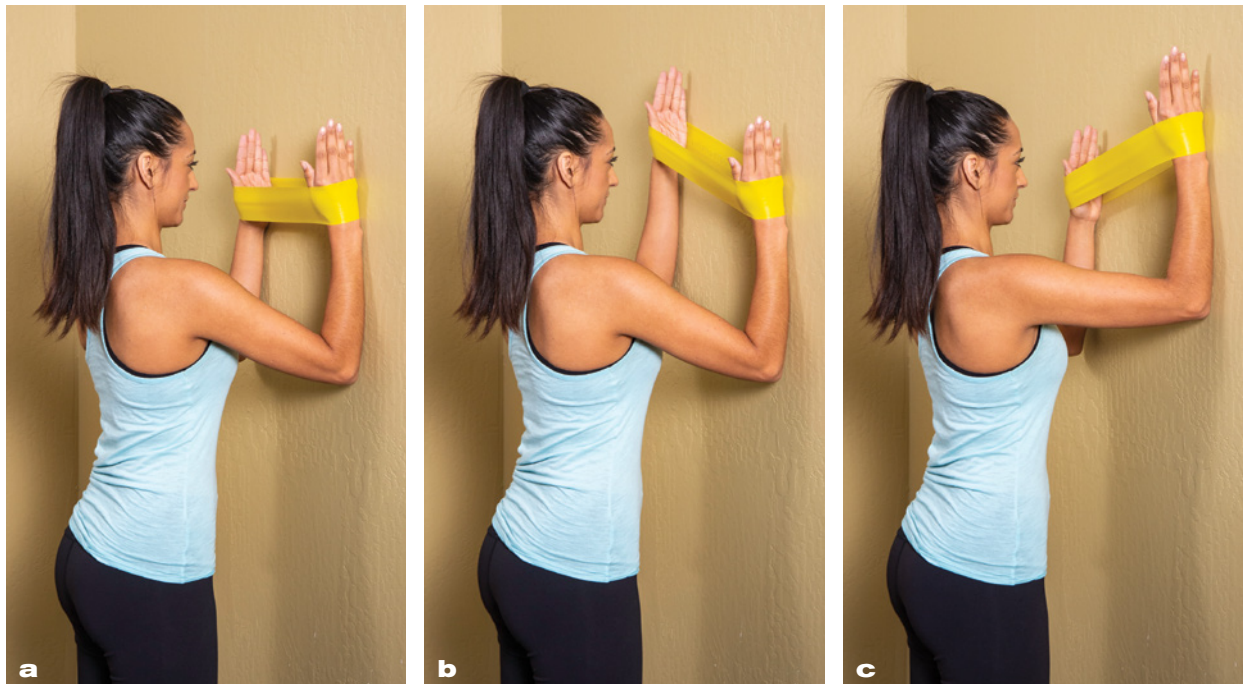
Wall Walk (60-90 degrees)

Scapular Stabilizers, Rotator Cuff Musculature

Stand approximately 1 to 2 feet from a wall and loop a band around the wrists (*a*). Your shoulders should be elevated 60 degrees at the start. Place your hands shoulder width apart, with light tension in the band. Keeping them shoulder width apart, slowly walk the hands using small steps until your shoulders are elevated to a 90-degree angle (*b*, *c*). Slowly walk the hands down using small steps until the shoulders are back to the starting position, elevated 60 degrees. Perform multiple sets of 10 to 15 repetitions.

VARIATION

Instead of progressing upward and downward using small steps, gently slide the forearms against the wall to achieve the desired movement, keeping light tension in the band.



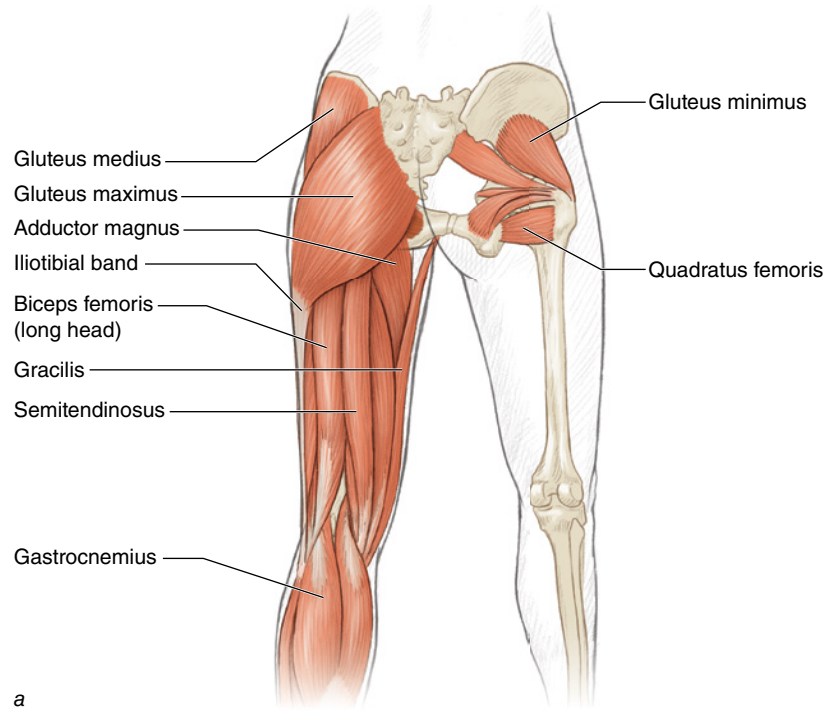
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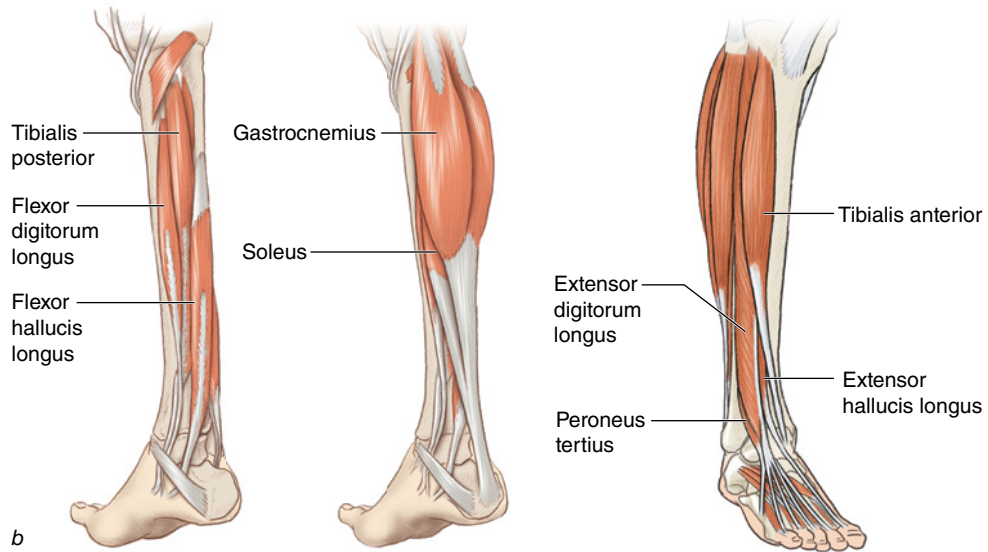
Lower Body Strength

One of the most important areas of the body to strengthen is the hip and thigh region. As the main link between the lower extremities and the trunk, the hips serve as a stable base for the core (the abdominals and low back region). The hips perform the main role in locomotion, propelling our centers of gravity for walking or running. The gluteal muscles (gluteus maximus and gluteus medius) are also important pelvic stabilizers. Therefore, the hips and the core are linked in a kinetic chain to transmit and produce force throughout the body. Strong hip muscles are vital to daily activities, particularly during walking or running. In fact, weakness of the gluteal muscles has been linked to chronic back pain and even repetitive ankle sprains. Another vital role of the hip and thigh musculature is to decelerate or change the direction of motion. This specialized muscle activity (which often goes untrained) may be a cause for repetitive hip flexor, groin, and hamstring strains in sports. Finally, an imbalance of strength and flexibility between the quadriceps and hamstrings muscles has been linked to knee pain and injury.

Although they are often overlooked, the muscles of the lower leg are also important for balance and agility. In particular, the peroneus longus and tibialis posterior muscles of the ankle provide the stabilization necessary for balance and gait, while the tibialis anterior, gastrocnemius, and soleus provide power and agility during movement.



a



b

Muscles of the (a) hip, thigh, and (b) lower extremities.

HIPS AND GLUTES

Hip Lift

Iliopsoas

Sit on an exercise ball or bench. Loop the middle of the band around the mid-thigh and secure both ends of the band under the other foot (a). Lift the upper leg by flexing your hip (b) and slowly return to the starting position.

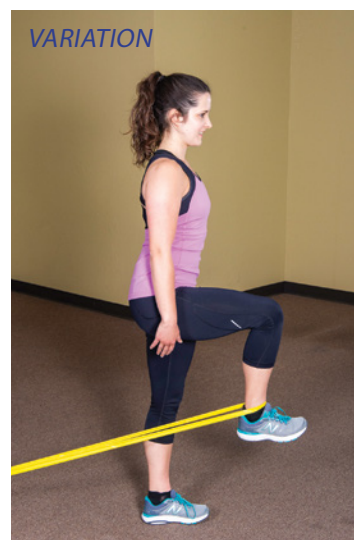


VARIATION

Secure both ends of the band to a stationary object near the floor. Loop the middle of the band around your ankle. Face away from the attachment point and lift the leg upward, keeping the knee bent.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep the abdominals tight.



HIPS AND GLUTES

Bridge

Gluteus Maximus

Place the middle of the band on the front of your hips and wrap the ends around your buttocks. Lie on your back with the band crossed underneath your buttocks. Stabilize each end of the band with your hands on the floor (*a*). Lift your buttocks off the floor with your knees bent, stretching the band against the front of your hips (*b*). Slowly return to the starting position.

VARIATION

While in the bridge position with the band stretched, march by alternately lifting your knees.

TECHNIQUE TIP

Keep your hips level at the top of the bridge; don't let your hips or back sag.



HIPS AND GLUTES

Band Loop Bridge

Gluteus Maximus, Gluteus Medius

Loop a band around your knees. Lie on your back with your feet flat and knees bent. Lift your buttocks off the floor, pushing your knees outward against the band and slowly return to the starting position.

VARIATION

While in the bridge position with the band stretched, alternately lift your knees.

TECHNIQUE TIP

Keep your knees in line with your shoulders throughout the movement.



Hip Extension (Donkey Kick)

Gluteus Maximus

Assume a quadruped position (on hands and knees) and rest on your elbows, keeping your back straight. Secure both ends of the band under your forearms and securely wrap the middle of the band around one foot (*a*). Keep your knee bent and extend your hip upward against the band (*b*). Slowly return to the starting position.

VARIATION

Secure both ends of the band to a stationary object near the floor. Loop the middle of the band around one ankle. Face the attachment and kick your leg backward, keeping your knee bent.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep the abdominals tight.



HIPS AND GLUTES

Side-Lying Hip Lift

Gluteus Medius

Lie on your side with your legs extended and loop the band around both ankles (*a*). Lift the top leg upward, keeping the knee straight (*b*). Slowly return to the starting position.

VARIATION

Loop the band around the knees instead of the ankles to decrease the intensity of the exercise.

TECHNIQUE TIP

Keep your back straight. Keep your abdominals tight.



HIPS AND GLUTES

Clam

Glutes, External Hip Rotators

Lie on your side with a band looped around your knees and bend your hips and knees approximately 30° (a). Push the bottom knee into the floor while lifting the top knee against the band (b). Hold and slowly return to the starting position.



VARIATION

Perform the exercise while lying on your back. Loop the band around your knees and spread your knees apart against the band.

TECHNIQUE TIP

Be sure there is enough tension on the band to provide resistance throughout the exercise. Don't rotate your trunk or lift your ankle to complete the movement.



Training Tip

Better for IT Band Syndrome?

Researchers suggest that the clam is the best exercise to maximize the activation of the gluteal muscles while minimizing the activation of the muscle of the IT band (Selkowitz et al. 2013).

HIPS AND GLUTES

Reverse Clam

Internal Hip Rotators

Lie on your side with the band looped around your ankles and your knees bent together (a). Keeping your knees together, rotate your hip inward while lifting your ankle upward against the band (b). Hold and slowly return to the starting position.

TECHNIQUE TIP

Be sure there is enough tension on the band to provide resistance throughout the exercise. Don't rotate your trunk to complete the movement.



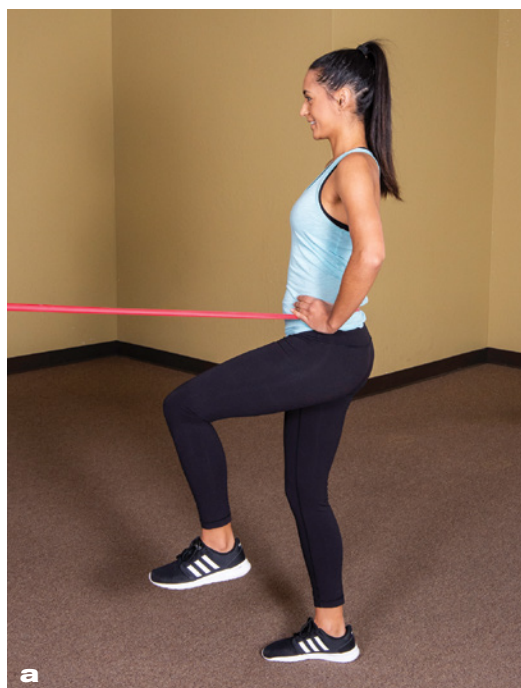
Closed-Chain Hip Rotation

Hip Rotators, Gluteus Maximus, Ankle Stabilizers

Wrap the middle of the band around your hips, and secure the ends of the band to a sturdy object in front of you. Stand on the leg of the hip to be exercised and lift the opposite knee (a). Twist your hips over your weight-bearing leg, pushing the hip of the opposite leg backward into the band (b). Slowly return.

TECHNIQUE TIP

Don't extend your back or rotate your trunk to complete the movement. Keep your elbow extended.



HIPS AND GLUTES

Stiff-Legged Deadlift

Hamstrings, Glutes, Low Back

Begin with one end of the band securely attached to a sturdy object behind you. With legs shoulder width apart, bring the other end of the band between your legs, holding it close to the chest. Keeping your knees slightly bent and back straight, push the hips back and lower your body down as deep as possible while maintaining a straight spine (a). Return to the starting position, extending your knees, hips, and back (b).

VARIATION

Perform this exercise with straight knees to perform a straight-legged deadlift.

TECHNIQUE TIP

Keep your shoulders square throughout the movement; don't rotate the trunk or extend your back or neck.



Training Tip

Stand Up for Elastic Resistance

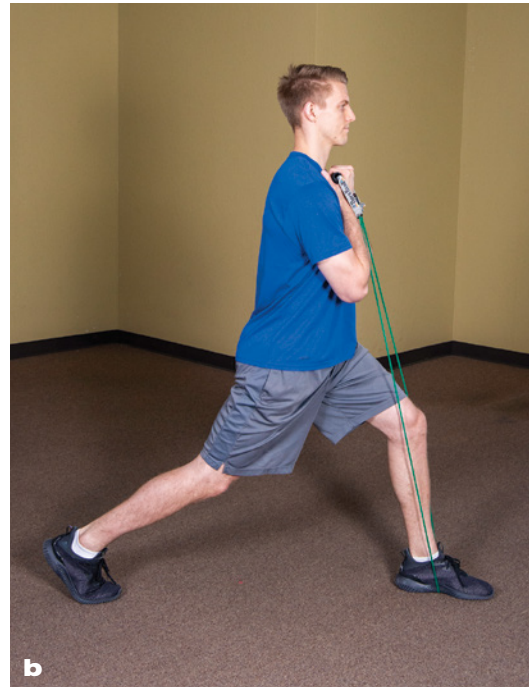
Researchers found that the stiff-legged deadlift exercise was a feasible alternative to traditional resistance training based on muscle activation levels (Iversen et al. 2017).

THIGHS

Lunge

Gluteus Maximus, Quadriceps

Stand with one foot on the middle of the band or tubing. Place the other leg behind it with your knee bent. Grasp the ends of the band at chest height with both elbows bent. Keeping your trunk upright, bend your front knee and lower your body by flexing your hips and knees (a). Return to the upright position against the resistance of the band (b).

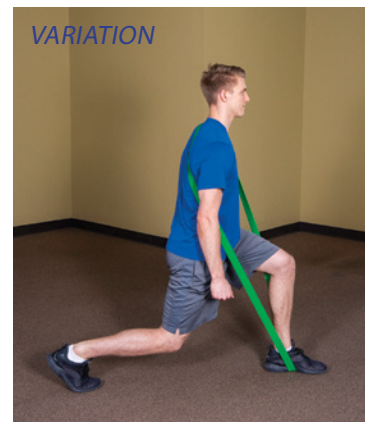


VARIATION

Stand upright with one foot in front of the body and the other behind the body. Using a large looped band, place the middle of the band under the front foot and pull the loop up and over the contralateral shoulder. Lower your body until the back knee touches the floor.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep your abdominals tight. Keep your trunk upright at all times.



Training Tip

More Efficient for Lower Extremity Muscles

Researchers found an elastic band lunge produces high levels of activation of the hip, knee, and back, making it a more efficient choice than dumbbells (Sundstrup et al. 2014).

THIGHS

Tubing With Cuffs Lunge

Gluteus Maximus, Quadriceps

Begin with the tubing with cuffs attached above each ankle. Step backward with one leg, keeping your trunk upright, and lower your body by flexing your hips and knees (*a*). Return to the upright position (*b*).

VARIATION

Alternate forward and reverse lunges by stepping backward then forward as you perform a lunge.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep your abdominals tight. Keep your trunk upright at all times.



Lateral Lunge

Gluteus Medius, Gluteus Maximus, Quadriceps

Begin with tubing cuffs or a band looped around your lower legs, just above the ankles. Slightly bend your hips and knees into an athletic position (*a*). Take a step to the side against the resistance of the band as you bend your knees (*b*). Slowly return to the starting position.

VARIATION

Change the angle of your side step, either slightly forward or backward from your opposite leg.

TECHNIQUE TIP

Keep your back straight; don't bend or twist at your low back.



THIGHS

Mini Squat

Gluteus Maximus, Quadriceps

Stand on the middle of a long band with both feet. Bring the ends of the band around the outside of the feet. Grasp the ends of the band, keeping them at your hips (a). Lower your body into a mini squat (<math><45^\circ</math> knee bend), keeping your back straight (b). Slowly return to the starting position.

VARIATION

Perform the squat while holding the ends of the band at shoulder height.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep your abdominals tight.



Front Squat

Gluteus Maximus, Quadriceps

Stand on the ends of a long band with both feet. Bring the middle of the band around the outside of your elbows, bent at shoulder level (a). Lower your body into a squat with your knees behind your toes, keeping your back straight (b). Slowly return to standing.



VARIATION

Extend your arms in front or overhead for more low back and glute activation.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep your abdominals tight.



Training Tip

Blast Those Buns

Researchers found that performing a squat with elastic resistance combined with shoulder flexion significantly increased activation of the rectus femoris (Hoogenboom et al. 2018) and gluteus medius and gluteus maximus muscles (Kang et al. 2014).

THIGHS

Barbell Squat With Loop

Gluteals, Quadriceps

Place two large looped bands on the barbell and secure the other ends of the bands under your feet. Place the barbell behind your neck and across your shoulders. Stand with feet shoulder width apart or wider to stretch the band (*a*). Lower your body into a squat position to 90° knee flexion and slowly return (*b*) to standing while maintaining your knees in proper alignment.

TECHNIQUE TIP

Keep your back straight throughout the movement and don't let your knees bend inward.



Training Tip

More Glutes!

Researchers reported that performing the barbell squat with a loop around the knees increases activation of the gluteal muscles (Spracklin et al. 2018).

Single-Leg Squat

Gluteus Maximus, Quadriceps, Ankle Stabilizers

Stand on one leg with the middle of the band secured under your foot. Grasp the ends of the band at your hip (a). Perform a single-leg squat, bending your knee 45° to 60° (b). Slowly return to the starting position. Use external support as needed.

VARIATION

Grasp the end of the band at shoulder height for more resistance.

TECHNIQUE TIP

Bend your knee straight ahead and align the kneecap with the second toe. Don't let your knee rotate inward or outward. Keep the back and neck straight during the exercise.



Training Tip

One Is Better Than Two

Researchers showed that a single-leg squat with elastic resistance produces significantly more muscle activation of the quadriceps muscle than a double-legged squat (Hintermeister et al. 1998).

THIGHS

Monster Walk

Gluteus Medius, Gluteus Maximus, Quadriceps

Loop the band around your thighs, just above your knees. Stand with a slight bend in your hips and knees (about 30°), assuming a ready position (*a*). Take a step to one side with one leg against the resistance of the band (*b*). Continue moving in one direction by taking multiple steps in a shuffling-type motion.

VARIATION

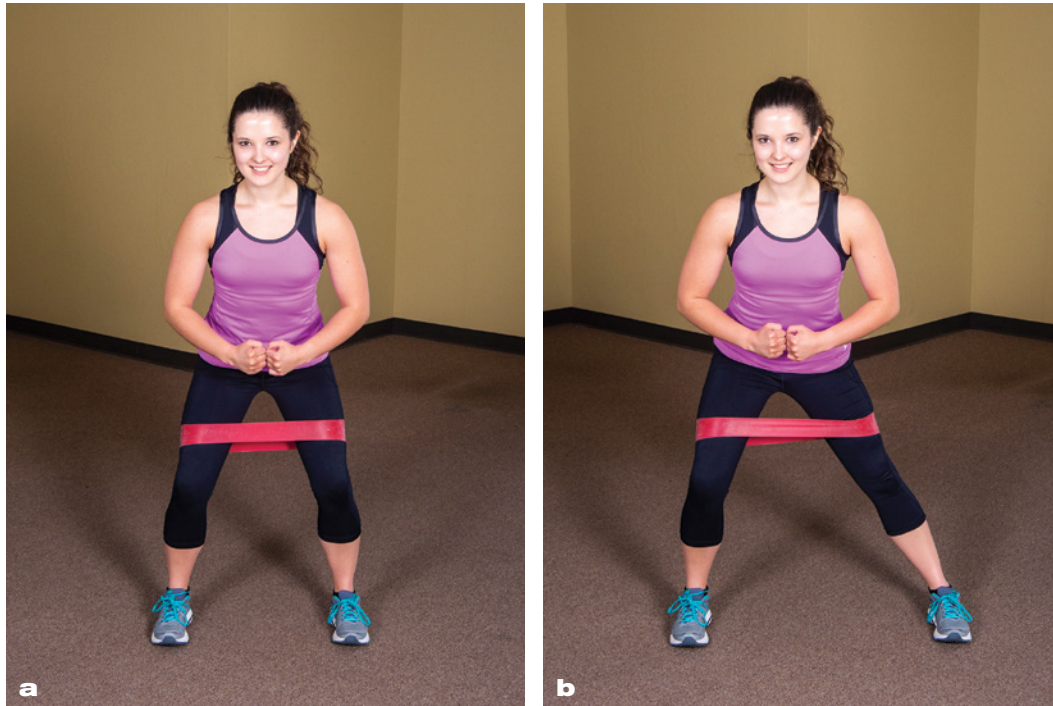
Step in multiple directions including sideways, diagonally, forward, and backward. Lower the position of the loop to around the ankles for more resistance.

PROGRESSION

Place the loop around your ankles or use tubing with cuffs to increase muscle activation.

TECHNIQUE TIP

Keep your back and neck straight throughout the exercise. Don't rotate your trunk or hips to complete the exercise.



Training Tip

Step Away!

Step away from the hip you want to strengthen; the stance leg has greater activation of the gluteus medius muscle than the moving leg (Berry et al. 2015).

Squat Walk

Gluteus Medius, Gluteus Maximus, Quadriceps

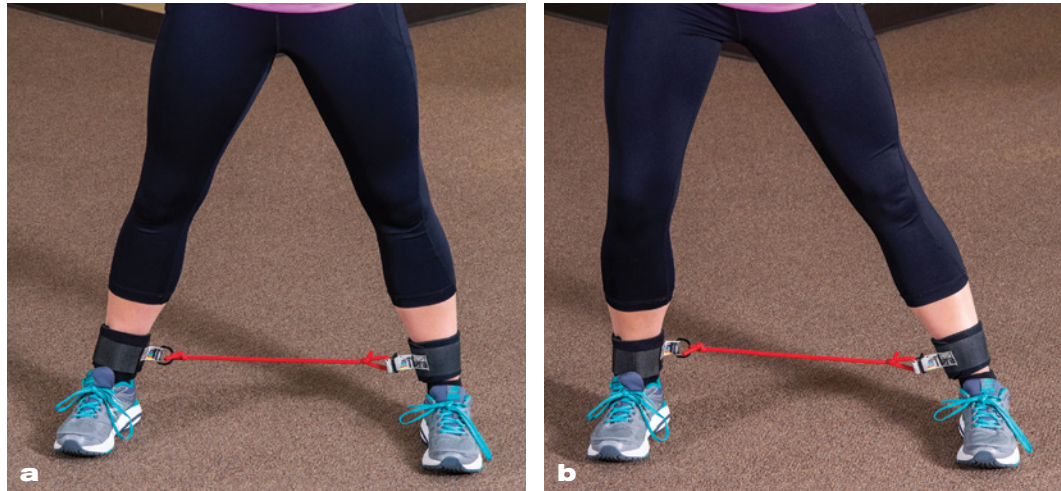
Attach an exercise tubing band with extremity straps around the ankles (*a*). Walk in a lateral direction, maintaining a flexed position of your trunk and lower body (*b*). Alternatively, you can also use a loop band around the lower leg, placed just above the ankles.

VARIATION

Walk in multiple directions, including diagonally, forward, and backward.

TRAINING TIPS

Keep your head up to avoid too much trunk bend. Maintain an athletic posture.



THIGHS

Leg Press

Gluteus Maximus, Quadriceps

Lie on your back. Grasp both ends of the band in your hands and securely wrap the middle of the band around one foot (*a*). Extend your hip and knee simultaneously against the band until the leg is straight and level with your trunk (*b*). Slowly return to the starting position.

VARIATION

Sit with your knees bent and the middle of a band securely wrapped around the bottom of one foot. Grasp the ends of the band in your hands. Extend your hip and knee against the band until straight. Slowly return to the starting position.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep your abdominals tight.



Standing Leg Pull-Through

Hamstrings, Gluteus Maximus

Securely attach one end of the band to a sturdy object in front of you near the floor. Attach the other end around your lower leg above your ankle. Use external support for balance as needed. Begin with your hip and knee flexed in front of you (*a*). Pull your leg back against the band, simultaneously extending your knee and hip (*b*). Slowly return to the starting position.

VARIATION

Don't touch the floor with your exercising leg; continuously move it.

TECHNIQUE TIP

Keep your back and neck straight throughout the exercise. Don't bend your trunk to complete the exercise.



Training Tip

Pulling Together

Researchers found that this exercise had high co-contraction (quadriceps and hamstrings together) on the stance leg, suggesting it might be a good exercise for ACL rehabilitation (Hopkins et al. 1999).

THIGHS

Standing Front Pull

Quadriceps, Hip Flexors

Securely attach one end of the band to a sturdy object behind you near the floor. Attach the other end around your lower leg above your ankle. Use external support for balance as needed. Begin with your hip and knee straight and in back of you (*a*). Pull your leg forward against the band, simultaneously bending your knee and hip (*b*). Slowly return to the starting position.

VARIATION

Don't touch the floor with your exercising leg; continuously move it.

TECHNIQUE TIP

Keep your back and neck straight throughout the exercise. Don't bend your trunk to complete the exercise.



Training Tip

The Thighs Have It

Researchers found that this exercise had higher activation of the vastus medialis muscle in the stance leg than other common closed-chain exercises, suggesting its benefit for rehabilitation of anterior knee pain (Hopkins et al. 1999).

TheraBand Quick Kick

Gluteus Maximus, Gluteus Medius, Iliopsoas, Quadriceps, Ankle Stabilizers

Loop the band around your lower legs, just above the ankles. Use external support for balance if needed. Repeatedly kick your leg forward against the band while keeping your knee straight (*a*). Return to the starting position and continuously kick the working leg laterally (outward) for up to 30 seconds (*b*). Don't place your foot on the ground between repetitions.

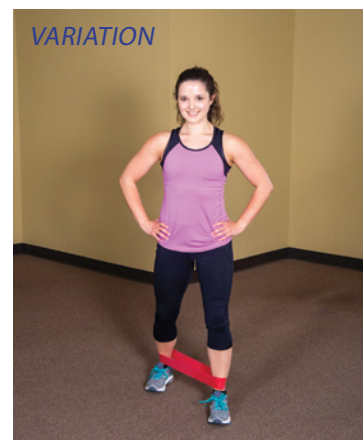


VARIATIONS

- Stand on an unstable surface such as a foam pad to add more challenge (as pictured in the main exercise photos).
- Kick your leg backward.

TECHNIQUE TIP

Keep your back and neck straight. Don't lean your trunk to perform the exercise. Be sure there is adequate tension in the band throughout the exercise.



Training Tip

Stealthy Strengthening

In addition to strengthening the hip muscles, researchers reported that this exercise produces high activation of the ankle muscle of the stance leg as well (Cordova et al. 1999).

THIGHS

Hip Clock

Gluteus Maximus, Gluteus Medius, Iliopsoas, Quadriceps,
Ankle Stabilizers

Stand with the feet approximately shoulder width apart. Place the loop of band just above the ankles, with light tension. Keeping one foot stationary, move the other foot out to the side and place it in either the 3 o'clock or the 9 o'clock position (a), based on whether the left or right foot is moved. As you achieve the end position, creating tension in the band, touch the toe down to the floor and slowly return to the starting position. Repeat in all directions (b), hitting all major positions on a clock (6, 5, 4, 3, 2, 1, and 12 for the right leg movements and 6, 7, 8, 9, 10, 11, and 12 for the left leg movements). Perform multiple sets with each side.

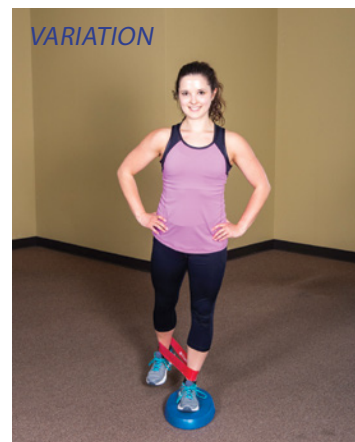


VARIATION

To make the exercise more difficult, use a balance pad or stability platform under the stationary foot to activate additional musculature and challenge your balance.

TECHNIQUE TIP

Keep your back and neck straight. Don't lean your trunk to perform the exercise. Be sure there is adequate tension in the band throughout the exercise.



Fire Hydrant

Gluteus Medius, Gluteus Maximus, Core Muscles

Assume a quadruped (hands and knees) position with a band looped just above the knees (*a*). While keeping a neutral spine position, raise one leg out to the side, similar to a dog lifting its leg up toward a fire hydrant (*b*). Slowly return the leg to the starting position. Perform multiple sets of 10 to 15 repetitions on each side.

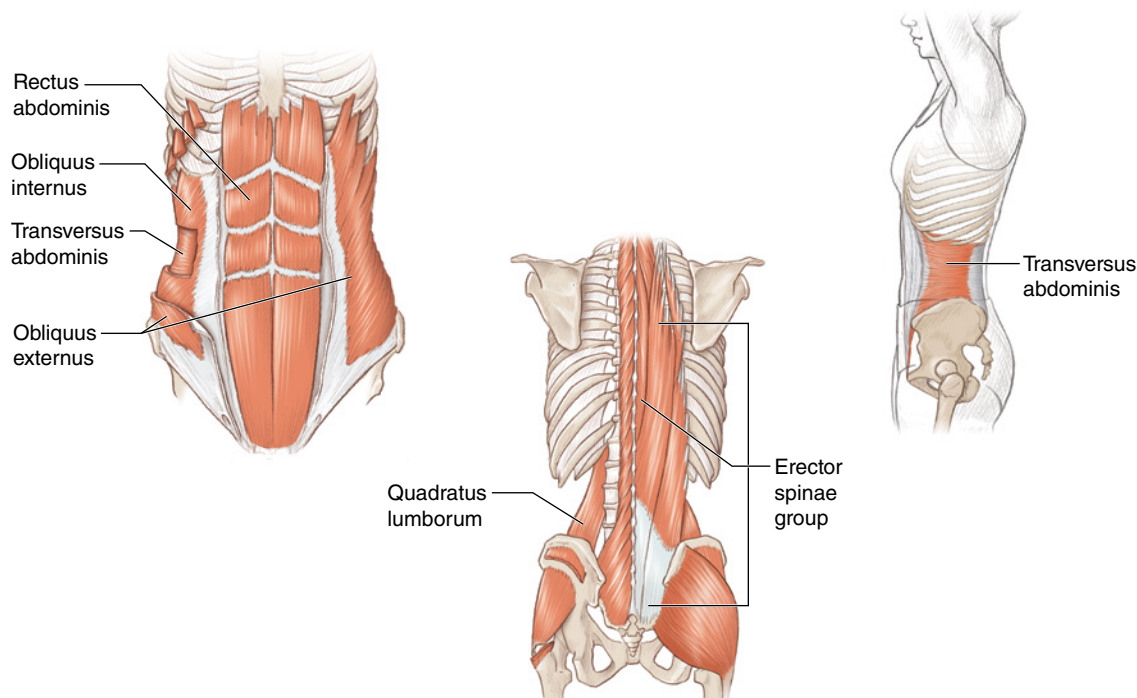
TECHNIQUE TIP

To increase activation of your core musculature be sure to draw in the abdomen and squeeze (tense) the gluteal muscles during the performance of this exercise.



Core Stability

Body-weight resistance is the most common mode of strengthening the abdominals and low back, also called the *core*. Adding external resistance such as an elastic band may increase the training stimulus to these areas, particularly in programs whose progress has stalled. Elastic resistance training may improve the muscle activation ratio of exercises limited by gravity resistance. The abdominal and low back regions are key areas for whole-body stabilization and sports performance, most likely because of their ability to generate or transmit forces between the lower and upper extremities. All functional activities of the extremities have some contribution of the core in terms of force production or stabilization. Therefore, core strengthening is vital to performance enhancement in all sport and functional activities. In addition, the abdominal and low back regions are important areas for prevention and rehabilitation of low back pain.



Muscles of the abdomen and low back.

Abdominal Crunch

Abdominals

Securely attach the middle of the band to a stationary object near the floor. Lie on your back with your knees bent. Grasp the ends of the band with your hands close together and extend your arms (a). Keeping your elbows straight, curl your trunk upward (b). Be sure to lift your shoulder blades off the floor. Slowly return to the starting position.



VARIATION

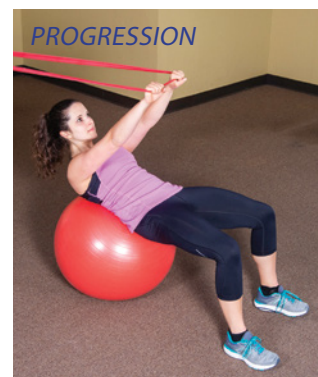
Begin the movement with your arms extended overhead. Pull your arms down while simultaneously performing the curl-up.

PROGRESSION

Perform while bridging on an exercise ball.

TECHNIQUE TIP

Keep your neck straight; avoid protracting your head. Keep your elbows straight.



Training Tip

Better Than Machines

Researchers found that performing this exercise on an exercise ball produced levels of activation similar to an abdominal exercise machine while reducing the activation of hip flexors during the exercise (Vinstrup et al. 2015).

Oblique Curl-Up

Oblique Abdominals

Securely attach the middle of the band to a stationary object near the floor. Lie on your back with your knees bent. Grasp the ends of the band with your hands close together and extend your arms (a). Keeping the elbows straight, curl your trunk upward while you rotate one of your shoulders toward the opposite knee (b). Lift one shoulder blade off the floor. Slowly return.



VARIATION

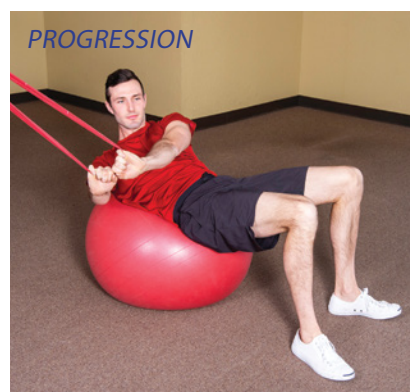
Begin the movement with your arms extended overhead. Pull one arm down over the head toward the opposite knee while simultaneously performing the oblique curl-up.

PROGRESSION

Perform while bridging on an exercise ball.

TECHNIQUE TIP

Keep your neck straight; avoid protracting your head. Keep your elbows straight.



Lower Abdominal Crunch

Lower Abdominals

Lie on your back with your hips and knees flexed. Stretch the band over your knees and cross it underneath you. Secure each end of the band under your hands on the floor (a). Lift your knees upward, lifting your hips off the floor (b). Slowly return.

VARIATION

Perform the lower abdominal crunch with knees straight. Stretch the band around your feet and push your legs upward, lifting your hips off the floor.

TECHNIQUE TIP

Avoid arching your back or flexing your hips.



Kneeling Crunch

Abdominals

Securely attach the middle of the band to a sturdy object above and in front of you. Assume a half-kneeling position with one knee up. Grasp the ends of the band in front of you (*a*). Curl your trunk downward, rounding your back against the resistance of the band (*b*). Slowly return to the starting position.

VARIATION

Rotate your trunk to one side as you curl downward against the band.

TECHNIQUE TIP

Keep your neck in a neutral position.



Kneeling Overhead Raise

Upper and Low Back

Securely attach the middle of the band to a sturdy object below and in front of you. Assume a half-kneeling position with one knee up. Grasp the ends of the band in front of you (*a*). Keeping your elbows straight, lift your arms overhead against the resistance of the band (*b*). Slowly return to the starting position.

VARIATION

Lift one arm at a time for additional stabilization.

TECHNIQUE TIP

Keep your neck and back in a neutral position. Don't arch your back to complete the exercise.



Trunk Rotation

Oblique Abdominals

Sit with your legs extended at least shoulder width apart. Securely wrap the middle of the band around both feet. Grasp both ends of the band with your arms extended forward (a). Rotate the trunk to one side (b) and return slowly to the other.



VARIATION

Perform the exercise while standing in an athletic stance. Securely attach one end of the band to a sturdy object, then rotate your trunk over your hips to one side and repeat on the other side. Keep your neck and shoulders aligned.

PROGRESSION

Perform while sitting on an exercise ball. Securely attach one end of the band to a sturdy object, then rotate your trunk to one side and repeat on the other side.

TECHNIQUE TIP

Keep your back straight and avoid leaning to one side.



Training Tip

Effective Alternative to Machines

Performing a standing trunk rotation is as effective for muscle activation as using a seated machine. However, the elastic resistance exercise activates more erector spinae muscles, while the machine activates more external obliques (Vinstrup et al. 2015).

Anti-Rotation Press (Pallof Press)

Oblique Abdominals

Stand with your feet shoulder width apart. Secure one end of the band to a sturdy object to your side at waist level and grasp the other end with your hands in front of your abs (*a*). Extend your elbows and lift to shoulder height while keeping your hips, trunk, and shoulders in alignment (*b*). Keep your back and neck straight and slowly return to the starting position.

VARIATION

Perform this exercise in a full-kneeling or half-kneeling position.

PROGRESSION

While maintaining your arms in an extended position at shoulder level, step away from the band while maintaining trunk alignment.

TECHNIQUE TIP

Keep your back and neck straight in a neutral position. Don't arch your back or rotate your trunk.



Side Bend

Quadratus Lumborum

Stand with your feet shoulder width apart and your back straight. Secure one end of the band under one foot and grasp the other end of the band by your side with your elbow straight and overhead (a). Lean your trunk away from the band, stretching the band (b). Slowly return to the starting position.



VARIATION

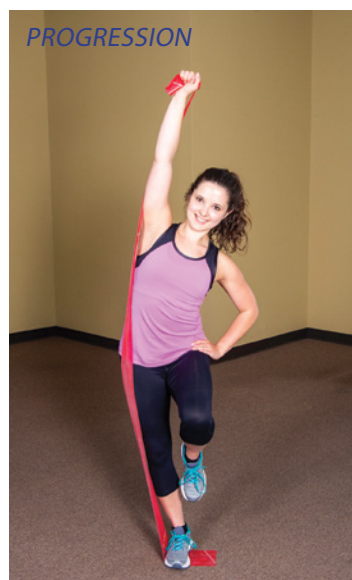
Begin the exercise with your elbow at your side, rather than overhead. Lift the band overhead first, then lean your trunk away.

PROGRESSION

Perform this exercise standing on only one leg.

TECHNIQUE TIP

Keep your trunk aligned; don't rotate the trunk. Avoid shifting your hips.



Seated Back Extension

Back Extensors

Sit with your legs extended. Secure the middle of the band or tubing around both feet. Grasp both ends of the band with your hands at your chest and take up the slack (*a*). Lean back, stretching the band as you keep your lumbar spine straight (*b*). Slowly return to the starting position.



VARIATION

Perform the exercise while sitting on an exercise ball with your knees extended.

TECHNIQUE TIP

Keep your lumbar spine in a neutral position (not too rounded or hyperextended).



Standing Back Extension

Back Extensors, Gluteus Maximus

Stand in a lunge position with the middle of the band or tubing secured under your front foot. Grasp the ends of the band, keeping your elbows bent and your hands in front of your chest (*a*). Keep your elbows and hands steady while you extend your back and hips (*b*). Slowly return to the starting position.

TECHNIQUE TIP

Keep your lumbar spine in a neutral position (not too rounded or hyperextended). Be sure the movement occurs in your hips.



Side Bridge

Quadratus Lumborum

Lie on your side with your knees and hips straight with the band looped around your knees. Bend your elbow and place it under the shoulder closest to the floor. Keep your back straight and feet on the floor and lift your hips off the floor until your shoulders and hips are off the floor (*a*). Simultaneously lift your top leg against the band while stabilizing with the opposite arm (*b*). Slowly return to the starting position.

VARIATION

Start with your knees and hips bent. Lift your hips off the floor until your shoulders and hips are parallel, keeping your knees on the ground.

TECHNIQUE TIP

Keep your hips and spine aligned; don't let your hips drop or your trunk rotate.



Quadruped Stabilization

Lumbar Stabilizers, Glutes, Obliques

Begin with your knees and hands on the floor. Wrap the middle of the band around the bottom of one foot and stabilize the ends of the band in your hands (a). Keeping your back and neck straight, extend your leg backward against the band, straightening your hip and your knee until they are parallel with the floor (b). Simultaneously extend your opposite arm in front of you. Slowly return to the starting position.



VARIATION

Perform a leg extension only, keeping your hands on the floor.

TECHNIQUE TIP

Keep your back and neck straight and in a neutral position. Don't arch your back or over-extend your hips. Don't extend your neck or rotate your back.



Training Tip

Better for Core Activation

Researchers found that this integrated exercise of upper and lower extremities was more effective for lumbar and abdominal activation than isolated body weight exercises (Gottschall et al. 2013).

Supine Stabilization

Lumbar Stabilizers

Lie on your back with one leg straight and the other flexed. Wrap the middle of the band around the bottom of the foot of the straight leg and stabilize the ends of the band in your hands with one arm extended upward (*a*). Alternate flexing your arms while keeping your elbows straight (*b*). Keep your back straight and slowly return to the starting position.



VARIATION

Perform hip flexion and extension (knee straight) against the band simultaneously with the arm flexion.

TECHNIQUE TIP

Keep your back and neck straight and in a neutral position. Don't arch your back.





Total Body

Athletic and functional movements require a strong core consisting of the muscles surrounding the trunk and pelvis: the abdominals and the low back. These muscles must function as movers, stabilizers, and force transducers. Functional strength of the upper extremities (used in actions such as throwing a baseball) is often built initially by the lower body and transferred through the core. While it's important to strengthen these areas individually, it's just as important to integrate these areas into functional strength through total body exercises.

Functional training programs should always include total body exercises that facilitate core stabilization and force transmission between the upper and lower extremities. Elastic resistance exercises can create different vectors of resistance that challenge core stabilization muscles through extremity movement combined with movements such as squats or lunges. In addition, elastic resistance exercises can challenge the muscles involved in whole-body functional movements such as a lift or a push with a step.

Squat With Diagonal Flexion

Deltoids, Lumbar Stabilizers, Quadriceps, Gluteal Muscles

With your feet about shoulder width apart, stand on the middle of a long (9 foot) band. Bring the ends around the outside of the feet and cross them in front of your thighs. Grasp both ends of the band near your hips (*a*). Lower your body into a squat position. At the same time, perform a diagonal flexion by lifting both arms up and out (*b*) at the same time. Slowly return to the starting position.



VARIATION

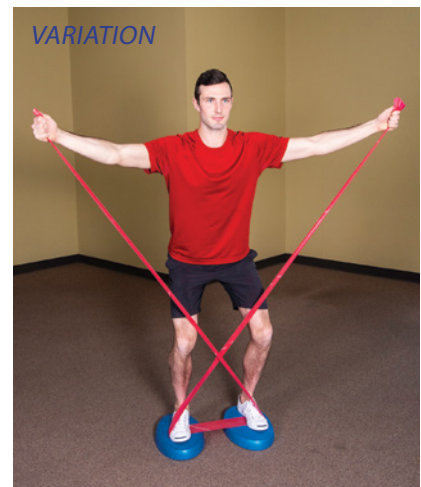
Alternate the left and right arm diagonal flexion. Stand on a foam surface for a greater challenge.

PROGRESSION

Continue to lift your arms overhead at the bottom of the squat.

TECHNIQUE TIP

Avoid arching your back; keep the back straight. Keep your abdominals tight.



Mini Squat With Reverse Fly

Deltoids, Lumbar Stabilizers, Quadriceps, Gluteal Muscles

With your feet about shoulder width apart, stand on the middle of a long band. Bring the ends around the front of your body and cross them. Grasp both ends of the band near the chest with your elbows bent (a). Lower your body into a mini-squat position (approximately 30° of knee and hip flexion) as you simultaneously lift your arms outward and upward with your elbows bent to shoulder level (b). Slowly return to the starting position. *Note:* These photos specifically demonstrate the reverse fly motion, but do not show the model in the squat position.



VARIATION

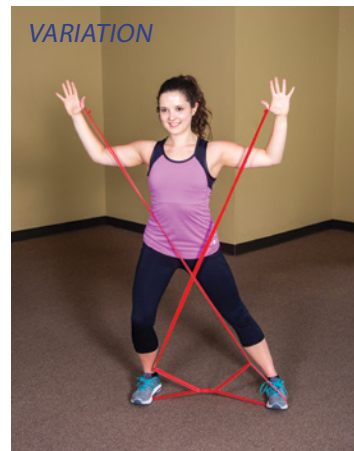
Step to the side as you lift your arms.

PROGRESSION

Lift arms overhead as you step laterally.

TECHNIQUE TIP

Avoid arching your back; keep your back straight. Keep your abdominals tight.



Lunge With Diagonal Flexion

Deltoids, Lumbar Stabilizers, Quadriceps

Stand with the middle of the band securely wrapped under one foot. Place the other leg behind it with your knee bent and grasp the ends of the band at hip height. Perform the diagonal flexion exercise with both shoulders by lifting both arms up and out to shoulder level (a). Keeping your trunk upright, bend your front knee and lower your body (b).



VARIATION

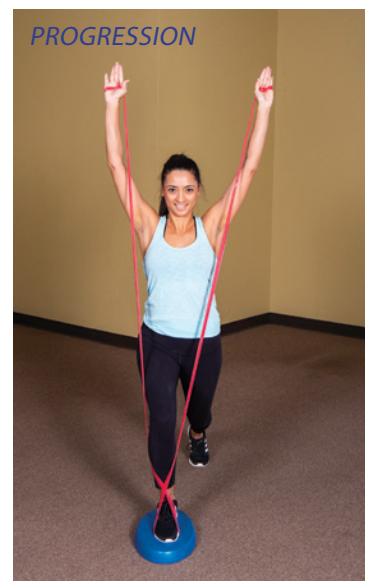
Alternate diagonal flexion of the right and left arms during the lunge.

PROGRESSION

Stand on a foam surface for a greater challenge.

TECHNIQUE TIP

Avoid arching your back; keep it straight. Keep your abdominals tight. Keep your trunk upright at all times.



Lunge With Medicine Ball Rotation

All Muscle Groups

Stand with a band secured behind you and looped around you at waist height. Holding a 4- to 6-pound medicine ball, perform a forward lunge with a controlled knee bend, bending to approximately 45-60 degrees (*a*). While in the lunge position, rotate the arms and medicine ball to the left, back to center, and then to the right; be sure to keep a controlled upright posture during the rotations (*b*). Take another step forward with the opposite leg into a lunge and repeat the torso rotation pattern. Perform multiple sets of lunges with rotations, alternating which leg steps forward during the lunge.

TECHNIQUE TIP

Be sure to maintain an upright torso posture during the lunge. A common error is to bend the torso as the leg lunges forward.



Bilateral Chop

Anterior Trunk, Shoulder

Securely attach one end of the band to a stationary object above your head. Standing beside the attachment point, assume an athletic stance with your hips and knees slightly bent. Grasp the band with both hands over the shoulder closest to the attachment point. Rotate your trunk slightly toward the band (*a*). Pull the band down to the outside hip with both hands, turning your trunk away from the attachment point (*b*). Slowly return to the starting position.



VARIATION

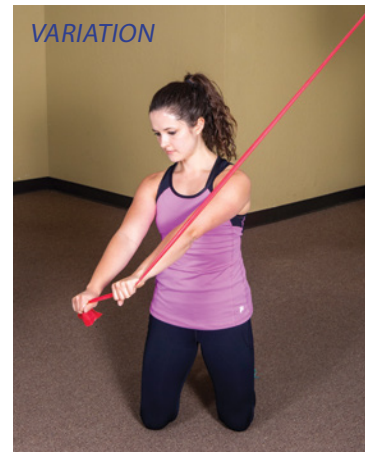
Perform the exercise in a kneeling position.

PROGRESSION

Add more rotation, side bending, or flexion of the trunk to the pulling movement.

TECHNIQUE TIP

Keep your back in neutral at the top of the movement; avoid rounding your back.



Bilateral Lift

Posterior Trunk, Shoulder

Securely attach one end of the band to a stationary object near the floor. Begin in an athletic stance with your hips and knees slightly bent. With your trunk slightly rotated toward the band, stand to the side of the attachment point and grasp the band with both hands (*a*). Lift the band over your outside shoulder with both hands, turning your trunk away from the attachment point (*b*). Slowly return to the starting position.



VARIATION

Perform the exercise in a kneeling position.

PROGRESSION

Add more rotation, side bending, or flexion of the trunk to the lifting movement.

TECHNIQUE TIP

Keep your back in neutral at the top of the movement; avoid arching your back.



Unilateral Row With Side Bridge

Rhomboids, Quadratus Lumborum

Secure one end of the band to a sturdy object near the floor. Lie on your side with your elbow directly under your shoulder. Use your other hand to grasp the band (*a*) and perform a single-arm rowing exercise (*b*) while lifting your hips off the floor and stabilizing the side bridge position. Slowly return to the starting position.



VARIATION

Start with your knees and hips bent, lifting your hips while keeping your knees and ankles on the floor to perform the side bridge.

PROGRESSION

Perform the side bridge while lifting your arm upward toward the ceiling with your elbow straight until the arm is vertical.

TECHNIQUE TIP

Keep your body in alignment, tensing abdominal muscles and gluteal muscles.



Step Push

Pectoralis Major, Triceps

Begin in a staggered stance and wrap the middle of the band around your upper back; bring the ends under your arms. Grasp both ends of the band at your chest (*a*). Step forward with your back leg while you push the ends of the band forward (*b*). Slowly return to the starting position.



VARIATIONS

- Vary the angle of the pushing movement.
- Attach the middle of a band around a secure object to perform exercise.

PROGRESSION

Step onto a foam surface for a greater challenge.

TECHNIQUE TIP

Tighten your abdominals before and during the exercise. Be sure to keep your back and neck straight as you complete the movement.



Lift Simulation

Gluteus Maximus, Quadriceps, Lumbar Stabilizers

Begin in a semi-lunge position. Securely wrap the middle of the band under the front foot. Bend your knees and grasp the ends of the band near your knees, keeping your back and neck straight (*a*). Extend your knees and hips to stand up against the band, as if you were lifting a box, until your knees are straight and your hands are near your hips (*b*). Slowly return to the starting position.



PROGRESSION

Stand on a foam surface for a greater challenge.

TECHNIQUE TIP

Use your legs and keep your arms stationary. Tighten your abdominals before and during the exercise. Be sure to keep your back and neck straight as you complete the movement. Don't round your back.



Step Lift

Gluteus Maximus, Quadriceps, Lumbar Stabilizers

Place the middle of the band under one foot and place the other foot behind you. Bend your knees and grasp the ends of the band near your knees, keeping your back and neck straight (*a*). Keep the foot on the band stationary as you extend your knees and hips and step forward with the other foot. Simultaneously lift the ends of the band to your hips as if you were lifting a box (*b*). Slowly return to the starting position.



VARIATION

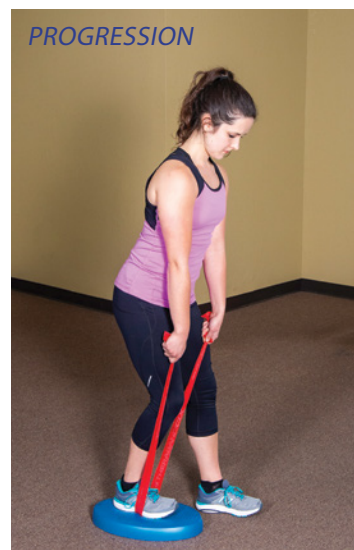
Vary the height to which you raise the ends of the band.

PROGRESSIONS

- Stand on a foam surface for a greater challenge.
- Lift your arms overhead as you step forward.

TECHNIQUE TIP

Tighten your abdominals before and during the exercise. Be sure to keep your back and neck straight as you complete the movement. Don't round your back.



Step Incline Press

Pectoralis Major, Triceps, Deltoids

Begin in a staggered stance and wrap the middle of the band around your upper back; bring the ends under your arms. Grasp both ends of the band at your chest (a). Step forward with your back leg as you push the ends of the band forward and upward (b). Slowly return to the starting position.



VARIATION

Vary the height to which you raise the ends of the band.

PROGRESSION

Step onto a foam surface for a greater challenge.

TECHNIQUE TIP

Tighten your abdominals before and during the exercise. Be sure to keep your back and neck straight as you complete the movement. Don't round your back.



Reverse Step Pull

Rhomboids, Latissimus Dorsi, Gluteal Muscles

Securely attach the middle of the band to a sturdy object in front of you at waist height. Grasp both ends of the band with your arms extended in front. Place one foot in front of the other (a). Step backward with your front foot as you simultaneously pull the band toward your hips (b). Slowly return to the starting position.



VARIATION

Vary the angle of the origin of the band.

PROGRESSIONS

- Step onto a foam surface for a greater challenge.
- Continue stepping backward against the tension in the band while keeping your elbows bent.

TECHNIQUE TIP

Tighten your abdominals before and during the exercise. Keep your back and neck straight as you complete the exercise.



Step-Up Curl-Up

Quadriceps, Gluteus Maximus, Biceps

Place the middle of the band under one foot on an exercise platform and grasp both ends of the band (a). Step onto the platform with your other foot as you bend your elbows upward against the band (b). Slowly return to the starting position.

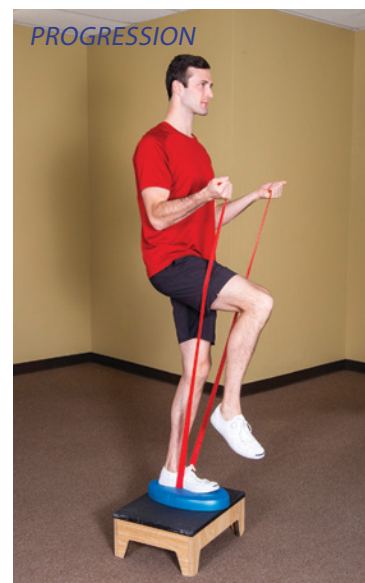


PROGRESSIONS

- Add a foam surface to the platform for a greater challenge.
- Lift arms overhead as you step up.

TECHNIQUE TIP

Tighten your abdominals before and during the exercise. Keep your back and neck straight during the exercise. Don't round your back.



Shoulder External Rotation Step

Rotator Cuff, Rhomboids, Trunk Rotators

Secure one end of the band to a sturdy object at or slightly above waist height, opposite the side you are exercising. Grasp the other end of the band with your elbow bent at your waist and place a rolled-up towel under your working arm to keep your elbow positioned close to your side (a). Externally rotate your shoulder, keeping your forearm parallel to the floor and your elbow at your side. Simultaneously step out to the side away from the attachment, rotating your hips and trunk as you point your foot to the side (b). Slowly return to the starting position.



PROGRESSIONS

- Step onto a foam surface for a greater challenge.
- Extend your elbow against band resistance, extending the arm.

TECHNIQUE TIP

Be sure your hips and trunk rotate together as you step out to the side.



Shoulder Internal Rotation Step

Rotator Cuff, Pectoralis Major, Trunk Rotators

Secure one end of the band to a sturdy object at or slightly above waist height on the same side you are exercising. Grasp the other end of the band with your elbow bent and your forearm externally rotated. Place a rolled-up towel under your working arm to keep your elbow positioned close to your side (a). Keep your forearm parallel to the floor and your elbow at your side as you internally rotate your shoulder. Simultaneously take a step to the side away from the attachment point, rotating your hips and trunk as you point your foot to the side (b). Slowly return to the starting position.



PROGRESSIONS

- Step onto a foam surface for a greater challenge.
- Extend your elbow against band resistance, extending the arm.

TECHNIQUE TIP

Be sure your hips and trunk rotate together as you step to the side.



Older Adults

Much of the disability associated with aging is really due to inactivity. One of the largest factors in disability in older adults is sarcopenia, which is the age-related loss of muscle mass. Fortunately, sarcopenia is reversible with strength training exercise. However, older adults are less likely to perform strengthening exercises for fear of injury or poor access to equipment and facilities. Elastic resistance training makes it easy for older adults to perform strengthening exercises from the comfort of their own chair. In fact, one band can be used to effectively replicate any isotonic or machine-based exercise.

In addition to gaining strength and muscle mass, older adults can benefit from strength training to reduce pain and disability, as well as improve function and even decrease the risk for falls. The key to success in older adult strengthening is proper intensity. Older adults may have a larger capacity to increase strength, particularly those who have been inactive for long periods; however, without adequate intensity, strength gains may be minimized. Therefore, it's important to properly prescribe resistance exercise for older adults following the ACSM guidelines for strength training (Garber et al. 2011):

- Exercise each major muscle group 2 to 3 days per week.
- Use very light to light intensity (40 to 50 percent 1RM) for older adults beginning exercise to improve strength; use 20 to 50 percent 1RM to improve power.
- Perform at least one set of 10 to 15 repetitions.
- Gradually advance resistance or repetitions per set.

Apparently healthy older adults do not require physician clearance for initiating moderate physical activity; however, older adults with any medical condition should see a physician before beginning an exercise program.

Elastic resistance training in older adults is safe and effective. As with any other resistance training, remind older adults not to hold their breath and to relax between repetitions. The exercises listed here are for older adults starting resistance exercise; they can begin in a sitting position and ideally should progress to a standing position to integrate balance and strength. Older adults can also progress to other exercises and programs in previous chapters when appropriate.

A Note About Technique

The following tips should be followed for each exercise in this chapter:

- Maintain a stable posture. Keep your back straight; don't slouch or lean forward.
- Avoid any exercise that causes pain.
- Breathe naturally and relax between each repetition.
- Use a secure grip and attachment.

Neck Stabilizer

Deep Neck Flexors, Triceps, Deltoids

Stand in an upright posture with a band looped around the back of the head. With the shoulders elevated 90 degrees (shoulder level) and the elbows bent 90 degrees, hold both ends of the band in your hands (*a*). Keeping the head and neck in neutral alignment, gently straighten (extend) the elbows (*b*). Return slowly to the starting position; do not allow movement of the head or neck.



Elbow Curl

Biceps

Wrap the middle of the band around both feet and grasp each end of the band. Keep elbows at your side (*a*). Keeping wrists straight, bend your elbows, bringing your hands to your shoulders (*b*). Slowly return to the starting position.

VARIATION

Alternate right and left arms.

PROGRESSION

Perform the exercise while standing with a staggered stance.



Elbow Extension

Triceps

Place the middle of the band around the back of your neck and grasp the ends of the band in each hand with your elbows bent (*a*). Keeping your wrists straight, extend your elbows against the resistance of the band until they are straight (*b*). Slowly return to the starting position.



VARIATION

Alternate right and left arms.

PROGRESSION

Perform the exercise while standing with a staggered stance.

TECHNIQUE TIP

Keep your neck straight to avoid protracting your head.



Chest Press

Pectorals, Anterior Deltoid

Begin with the band wrapped around your upper back. Grasp both ends of the band with your elbows bent and palms facing inward (*a*). Push the band forward, extending your elbows to shoulder level (*b*). Slowly return to the starting position.



VARIATIONS

- Alternate right and left arms.
- Change the angle of your arms to press above or below shoulder level.

PROGRESSION

Perform the exercise while standing with a staggered stance.



Front Raise

Pectorals, Anterior Deltoid, Low Back

Place one foot over the middle of the band, securing the band under the foot (wrap the band around your foot for extra security). Grasp both ends of the band (a). Keeping elbows straight in front of you, lift the band to shoulder level (b). Keep your thumbs pointing upward. Slowly return to the starting position.



VARIATION

Alternate right and left arms.

PROGRESSION

Perform the exercise while standing with a staggered stance.



Overhead Press

Deltoids, Triceps

Place the center of the band securely under one foot and grasp each end of the band with your palms facing forward (a). Lift arms forward and upward, extending your elbows with the palms facing forward (b). Slowly return to the starting position.



VARIATION

Alternate right and left arms.

PROGRESSION

Perform the exercise while standing.

TECHNIQUE TIP

If you feel any pain when lifting the elbows above the shoulders, lift until the elbows are just below the shoulders.



Lateral Raise

Deltoids

Place the center of the band under both feet and grasp each end with your palms facing forward (*a*). Keep your elbows straight and pull the band up and to the sides of your body (*b*). Slowly return to the starting position.



VARIATION

Alternate right and left arms.

PROGRESSION

Perform the exercise while standing.

TECHNIQUE TIP

If you feel any pain when lifting the elbows above the shoulders, lift until the elbows are just below the shoulders.



Seated Row

Posterior Deltoid, Scapular Stabilizers, Biceps

Securely attach the middle of the band to a sturdy object in front of you. Securely grasp both ends of the band with your elbows straight (*a*). Pull the band upward and back, bending your elbows (*b*). Keep your wrists straight. Slowly return to the starting position.

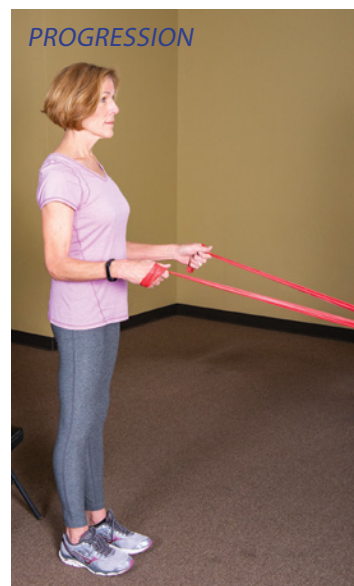


VARIATION

Alternate right and left arms.

PROGRESSION

Securely attach the middle of the band to a sturdy object or door and perform the exercise while standing.



Overhead Pull-Down

Latissimus Dorsi, Scapular Stabilizers

Grasp the ends of the band above shoulder height with your elbows extended (a). Keep your elbows straight and bring your hands to shoulder level, pulling the band down (b). Keep. Hold and slowly return to the starting position.



VARIATION

Alternate right and left arms.

TECHNIQUE TIP

Keep your elbows straight and don't round your shoulders.



Back Pull

Scapular Stabilizers, Posterior Deltoids

Grasp the ends of the band in front of you at shoulder height and take up the slack (*a*). Pull the band outward, keeping your elbows straight, and pinch your shoulder blades together until your arms are out to your sides (*b*). Keep your arms at shoulder level and parallel to the ground. Slowly return to the starting position.



VARIATION

Alternate right and left arms.

PROGRESSION

Perform the exercise while standing.

TECHNIQUE TIP

Keep your elbows straight and don't round your shoulders.



Upright Row

Upper Trapezius, Deltoid

Place the middle of the band under one foot and grasp each end of the band with your palms facing down (a). Pull the ends of the band upward toward your chin, lifting your elbows upward (b). Hold and slowly return to the starting position.



VARIATION

Increase the distance between your hands.

PROGRESSION

Perform the exercise while standing with a staggered stance.



Hip Lift

Hip Flexors

Begin by looping the center of the band around the top of the knee of your exercising leg. Bring the ends of the band underneath the foot of the opposite leg to stabilize and grasp the ends by your knee (a). Slowly flex your hip against the band, pulling upward (b). Hold and slowly return to the starting position.



VARIATION

Loop the band around the foot rather than the thigh.

PROGRESSION

Lift your knee up and outward to exercise the lateral hip as well.

TECHNIQUE TIP

Stay upright; don't lean forward or round your back.



Leg Press

Gluteus Maximus, Quadriceps

Begin by wrapping the middle of the band around your foot. Grasp the ends of the band at your chest, taking up the slack while you bend your hip and knee (*a*). Press your foot downward into the band, extending your hip and knee (*b*). Hold and slowly return to the starting position.



VARIATION

Increase the amount of hip or knee flexion.

PROGRESSION

Perform the exercise while standing. Be sure a sturdy object is nearby for balance if needed.

TECHNIQUE TIP

Stay upright; don't lean forward.



Chair Squat

Gluteus Maximus, Quadriceps

Begin standing in front of a chair with the center of the band under your feet. Grasp the ends of the band with your hands by your side (*a*). Slowly bend your knees while leaning forward slightly at the hips without touching the chair. Slowly return to the starting position.

VARIATION

Vary the depth of the squat, progressing from a mini squat to touching the chair (*b*).

PROGRESSION

Change the position of your hands; for example, hold the ends of the band at the chest or in front of your body.

TECHNIQUE TIP

Don't arch your back.



Leg Extension

Quadriceps

Begin by looping the center of the band around the ankle of your exercising leg. Bring the ends of the band underneath the foot of the opposite leg to stabilize and grasp the ends by your knee (a). Slowly extend your leg so your knee is straight against the band (b). Hold and slowly return to the starting position.



VARIATION

Perform smaller arcs of motion.

PROGRESSION

Add a leg raise while keeping the knee extended.

TECHNIQUE TIP

Don't arch your back.



Knee Flexion

Hamstrings

Begin by looping the center of the band around the ankle of your exercising leg. Bring the ends of the band underneath the foot of the opposite leg to stabilize and grasp the ends by your knee (a). Slowly bend your knee against the band, pulling backward (b). Hold and slowly return to the starting position.



VARIATION

Perform smaller arcs of motion.

PROGRESSION

Perform the exercise while standing.

TECHNIQUE TIP

Don't arch your back.



Ankle Dorsiflexion

Tibialis Anterior, Peroneals

Begin by wrapping the middle of the band around the foot of the ankle you are exercising. Place the ends of the band under the opposite foot to stabilize the band. Grasp the ends of the band at your opposite knee (a). Lift your foot upward against the band, keeping your heel on the ground (b). Hold and slowly return to the starting position.



VARIATION

Slightly lift your foot up and outward at the same time to increase lateral ankle activation; don't twist your shin.

PROGRESSION

Perform the exercise while standing.

TECHNIQUE TIP

Don't arch your back.



Ankle Plantarflexion

Gastrocnemius, Soleus

Begin by wrapping the middle of the band around the foot of the ankle you are exercising. Grasp the ends of the band near your chest with the working leg stretched out straight (*a*). Push your foot downward against the band (*b*). Hold and slowly return to the starting position.



VARIATION

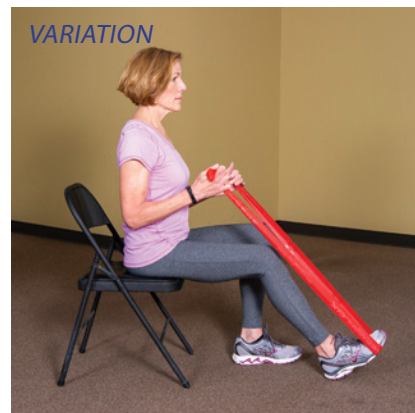
Keep the knee slightly bent while pressing down against the band.

PROGRESSION

Perform the exercise while standing.

TECHNIQUE TIP

Don't arch your back.



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Elastic Resistance Programs

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Optimal Fitness

Resistance training is a key part of the success of any fitness training program. One key variable that must be addressed in a resistance training program is the ability for users to alter or advance the program. This type of flexibility allows users to stay with the program despite temporary or permanent changes in location, schedule, and circumstances. For many people today, including athletes, travel occurs frequently, and working out at a set time and place is not always possible. Additionally, having a portable exercise device like ERT that can follow people while traveling and when away from their favorite gym is critically important. For many individuals, adhering to a resistance training program allows them to maintain fitness levels; it is not about training for a particular sport or activity but rather to improve overall strength and endurance of their musculature and develop optimal fitness. The purpose of this particular chapter is to provide a comprehensive and performable resistance training program that will allow individuals to maintain and improve whole-body strength and muscular endurance for fitness. The inherent benefits of ERT make these exercise modules or circuits constantly challenging simply by elongating the elastic resistance or by progressing from one band density to the next. Therefore, having a program that is both portable and progressive allows individuals to continually challenge themselves and elevate their level of optimal fitness.

Almost all of the exercises presented in this book can be performed in just about any location—a gym, a posh resort hotel, a tennis club, or at home—and at any time. Additionally, the ability of the elastic resistance to provide a consistently reliable resistance for so many types of movements allows for the training and development of the entire body. This chapter offers a series of circuit resistance training programs for optimal fitness. The sections are broken into segments that target the upper and lower body as well as the core. One important advantage of an elastic resistance and circuit-based program is the ability to shift the focus from session to session. The circuits can be varied to emphasize different parts of the body on different days by, for instance, alternating days for upper and lower body circuits or creating a whole-body circuit that encompasses all three main areas—upper body, lower body, and trunk—by selecting key exercises from the lists below and combining them into one repeatable circuit. Finally, these exercises can be performed independently using safe, solid attachment points for the elastic bands or tubing or with a partner who can stabilize the elastic material. Individuals can change the focus of their program throughout the year based on identified needs (see assessment chapter 3). Many individuals need extensive core work to improve their overall fitness; by applying the circuit method, you can increase the number of core-based workouts being done to improve that section of the body.

Training on the Road

Exercises contained in this chapter are designed to be performed virtually anywhere, making them the perfect choice for individuals who want to stay fit and get a workout while on the road. While all of the exercises use elastic bands, loops, and tubing, some variations of the exercises can be made more challenging by using a pillow, blanket, or rolled towel in lieu of a balance pad or platform that may not be feasible to pack. Because there is often less time to do a workout while traveling, we offer both 15- and 30-minute circuits of exercise training. These include plenty of multiple-joint training exercises, which provide co-contraction of multiple muscle groups and target multiple muscles, creating a very efficient workout. Multiple-joint exercises are very functional and form the key part of any rehabilitation or exercise training program. These exercises also allow for time-efficient exercise programming and are very functional since most functional activities performed by humans do not involve solely isolated muscle contraction but rather sequences of muscle activation and co-contraction to initiate movement and stabilize and decelerate the body.

Some additional points should be considered when performing fitness training programs on the road or in alternative locations. The exercises in the following programs are designed to be performed in a fairly tight space and use very simple and basic attachment points for the elastic resistance. It is important, however, to be sure the attachment sites for the elastic tubing or bands are secure; hotel furniture and doors may not be as strong and sturdy as objects you use in your regular workout environment. Finally, remember that these programs can be very easily individualized by simply adding a few exercises. You may wish to further emphasize the quadriceps by including exercises from earlier chapters if you have a history of knee injury, for example, or to add a few rotator cuff and scapular exercises if you are a tennis player or golfer. The programs supplied throughout this book can allow you to build or customize the optimal fitness program based on YOUR needs and specifications.

Circuit Training for Fitness

We chose the circuit training format for the programming in this chapter because of the particular benefits of circuit training. Performing circuit training involves the use of a series of exercises in succession with very short rest periods in order to stress the cardiovascular system. In addition to producing the traditional strength improvements of a training program that uses weights or elastic resistance, performing exercises in a circuit format can also produce gains in cardiovascular fitness. Therefore, circuit training works the cardiovascular system as it activates isolated muscle groups and stresses larger portions of the body through multiple-joint exercises.

There are many variations with circuit training and also many variables that can be manipulated or changed to affect training and, more specifically, the response to training. In general terms, however, performing multiple sets of the exercises in these series and separating them by very short rest periods of only 15 to 20 seconds is recommended. This not only makes the exercise program time efficient; it also increases the loads on the cardiovascular system. Using a fairly high volume of exercise during the sets (such as 12 to 15 repetitions) will

help to promote local muscular endurance; coupling that high volume with short rest periods allows for a cardiovascular response from the circuit.

In addition to using a repetition-based system of training, the circuit format lends itself very well to time-based training. Instead of using repetitions to establish the workload, individuals train for a specified period of time. For example, work periods of 15 to 30 seconds, coupled with rest periods ranging from 15 to 30 seconds, are frequently recommended for circuit training. From a physiology standpoint, individuals performing a 30-second work period with only 15 seconds of rest will stress their cardiovascular system more than an individual who works with the elastic resistance for 15 seconds and takes 30 seconds of rest. Changing the work-rest cycle is a common practice in exercise training. For a tennis player, a work-rest cycle of 15 seconds of work followed by 30 seconds of rest mimics the challenge to the muscular system that is encountered when playing tennis. This is an example of the specificity concept, an important factor to consider when determining what amounts of work and rest to use during circuit training.

Another variation within the circuit is the order of exercises. During the circuit format, muscle groups are often exercised in alternating order. For example, an exercise for the biceps might be followed by an exercise for the hamstrings, allowing the first muscle group to rest not only during the short rest period following the first exercise but also during the performance of the second exercise, which does not involve that muscle group. If, however, the individual wishes to further promote muscular endurance and a greater fatigue response, two or more exercises within a muscle group can be performed back to back, minimizing the rest and further challenging the muscle group or groups in question. For example, performing the biceps curl and then proceeding to the rowing exercise will provide stress to the biceps exercise during both exercises and provide an overload to gain a training effect. Both of these applications are recommended and can be applied to achieve different goals. Simply changing the order of the exercises within a circuit can change the load or demand on the muscle or muscle group in question.

With the types of adjustments detailed here, the following exercise circuits are a great way to achieve many fitness goals. Before performing them in a new location, take a moment to be sure that your anchoring objects and methods are sound, secure, and suited for the workout you are about to do.

Upper Body Circuit 15

Suggested volume: Perform 2 or 3 sets of 12 to 15 repetitions with 15 to 20 seconds of rest between sets and exercises.

Chest press	page 72
Lat pull-down	page 82
Elbow extension*	page 49
Biceps curl	page 48
Seated row	page 79
Scaption	page 44
Shoulder internal rotation at side	page 45
Shoulder external rotation at side	page 46

*Uses same top anchor as lat pull-down

Upper Body Circuit 30

Suggested volume: Perform 2 or 3 sets of 12 to 15 repetitions with 15 to 20 seconds of rest between sets and exercises.

Chest press	page 72
Reverse fly	page 80
Serratus punch	page 47
Bent-over row	page 83
Lat pull-down	page 82
Elbow extension*	page 49
Biceps curl	page 48
Seated row	page 79
Wrist flexion	page 50
Wrist extension	page 51
Scaption	page 44
Shoulder internal rotation at side	page 45
Shoulder external rotation at side	page 46

*Uses same top anchor as lat pull-down

Lower Body Circuit 15

Suggested volume: Perform 2 or 3 sets of 12 to 15 repetitions with 15 to 20 seconds of rest between sets and exercises.

Front squat	page 114
Single-leg squat	page 116
Leg press	page 119
Knee flexion	page 62
Ankle plantarflexion	page 66
Lateral lunge	page 112
Romanian deadlift (RDL) with CLX	page 231
Lunge	page 110

Lower Body Circuit 30

Suggested volume: Perform 2 or 3 sets of 12 to 15 repetitions with 15 to 20 seconds of rest between sets and exercises.

Front squat	page 114
Single-leg squat	page 116
Hip abduction	page 60
Leg press	page 119

Hip extension	page 59
Clam	page 106
Reverse clam	page 107
Knee flexion	page 62
Ankle plantarflexion	page 66
Ankle dorsiflexion	page 65
Lateral lunge	page 112
Romanian deadlift (RDL) with CLX	page 231
Squat with diagonal flexion	page 140
Fire hydrant	page 124
Squat walk	page 118

Core Circuit 15

Suggested volume: Perform 3 sets of 30 seconds with 15 to 20 seconds of rest between sets and exercises.

Abdominal crunch	page 126
Seated back extension	page 134
Oblique curl-up	page 127
Band loop bridge	page 103
Trunk rotation**	page 131
Unilateral row with side bridge	page 146
Quadruped stabilization	page 137

**Two sets to each side

Core Circuit 30

Suggested volume: Perform 3 sets of 30 seconds with 15 to 20 seconds of rest between sets and exercises.

Abdominal crunch	page 126
Clam	page 106
Seated back extension	page 134
Oblique curl-Up	page 127
Band loop bridge	page 103
Trunk rotation**	page 131
Side bridge	page 136
Quadruped stabilization	page 137
Unilateral row with side bridge	page 146

**Two sets to each side

Power Sport Athletes

ERT can provide key injury prevention programming for athletes in power sports such as CrossFit who push their bodies to the limit during their whole-body training maneuvers for both fitness and competition. One of the main applications beyond the obvious simulation of CrossFit-specific movements with ERT is that supplemental exercises can provide a valuable training adjunct for CrossFit athletes to protect and provide valuable muscle balancing. These exercises are outlined below in the base exercise list. These base exercises are key for these athletes to provide joint stabilization and assist the body in absorbing and controlling the extensive loading that is inherent in this type of high-level training.

Note: Because these exercises target key stabilization musculature for power athletes, low resistance and high repetitions are recommended. Multiple sets of each exercise are important to provide an endurance base for these muscles.

Suggested volume: Perform 3 sets of 12 to 15 repetitions, or 30-second sets for timed exercises, with 15 to 20 seconds of rest between sets and exercises.

Shoulder external rotation at side	page 46
Shoulder external rotation at 90°	page 95
Seated row	page 79
Bilateral extension with retraction	page 85
TheraBand quick kick	page 122
Monster walk	page 117
Clam	page 106
Abdominal crunch	page 126
Lower abdominal crunch	page 128
Quadruped stabilization	page 137
Seated back extension	page 134

Team Sports

This chapter will highlight specific training programs for team sports. This grouping includes many sports with multidirectional movement characteristics as well as sports requiring both upper and lower body sport-specific movement patterns. The use of elastic resistance exercise in a team sport environment can be part of the preparation and recovery of practices and competition as well as form the basis for independent training to improve performance and prevent injury.

Baseball and Softball

Baseball and softball players perform very repetitive movements, especially during throwing. While the lower body movement patterns are similar to those of many sports, there are some applications of specific movements that can be adapted for these two sports. Injuries from overuse of the shoulder and elbow are particularly prevalent in baseball and softball players, and an emphasis on the development of the muscles in the upper back and shoulder area (rotator cuff and scapular muscles) is extremely important to maintain proper muscle balance and prevent injury. Performing the base exercises for the shoulder and elbow listed here is a key part of an injury prevention program for baseball and softball players. In light of the important role the upper body muscles play in deceleration of the arm during throwing, care should be taken, as with all ERT, to perform exercises that emphasize both the shortening and lengthening phases of the throwing motion. Additionally, the lower body exercises listed below in the sport-specific program are important not only for throwing and hitting to form the platform or base over which all upper extremity work occurs but also to better position and allow the players to have explosive movement ability. Additional lower body exercises can be integrated to improve this aspect of performance in baseball and softball players.

One specific movement for softball players only would be the underhand throwing simulation for pitchers contained in this chapter. This exercise provides an overload to the muscles that accelerate the arm forward during the windmill-type pitching motion. However, this exercise should be coupled with the rotator cuff base exercises to ensure that a complete training approach is undertaken to protect and optimize function in the throwing arm.

Base Exercises

Shoulder external rotation at 90°	page 95
Shoulder external rotation at side	page 46
Wrist flexion	page 50
Wrist extension	page 51
Forearm pronation	page 53
Forearm supination	page 52
Seated row	page 79
Front squat	page 114
Lunge	page 110
Bilateral extension with retraction	page 85
Shoulder external rotation with retraction	page 92
Linton external rotation	page 84

Sport Simulation Exercises

Batting simulation	page 185
Lateral step lunge with glove	page 186
Throwing simulation with ball	page 187
Underhand windmill simulation	page 187

Batting Simulation

Trunk Rotators, Gluteals, Quadriceps, Calves

Secure one end of the band to a stationary object at chest height and wrap the other end around your hand as you grasp the bat (*a*). You can also perform this exercise without the bat by simulating your hand positioning. Assume your batting stance and simulate a swing to a point just beyond normal contact with the ball (*b-c*).



Lateral Step Lunge With Glove

All Muscle Groups

Secure the ends of the band to a stationary object about waist height and wrap the middle of the band around your waist. Take a large, controlled step away from the attachment and bend and reach to simulate fielding a ball. Slowly return to the starting position.



Throwing Simulation With Ball

All Muscle Groups

Secure one end of the band to a stationary object at shoulder level and wrap the other end of the band around your throwing hand. Face away from the attachment point and, with a ball in hand, perform a throwing motion, including follow-through, using the resistance from the band to gently overload the muscles used in throwing. Slowly return to the starting position.



Underhand Windmill Simulation

All Muscle Groups

With a ball in hand, grasp one end of the band or tubing and secure the other end at waist level to a secure object. Assume a throwing stance with your arm reaching back just below shoulder level. Take a step, using the normal pitching mechanics, and bring the arm forward until it is slightly out in front of the body (just past the normal release point). Slowly return to the starting position.



Volleyball

Volleyball has extremely repetitive and demanding lower body movements, such as lunging and jumping, coupled with specialized upper body movements, including the block, set, spike, and bump. Great control of shoulder rotation is required, especially for the serve and spike actions that occur with the shoulder in an overhead (90°) position. Muscular balance is a key issue for volleyball players, and increased development of the muscles in the upper back and shoulder region helps provide balance and stabilization.

One critical injury often reported in volleyball players is patellar tendinitis. This injury occurs from the repeated jumping movements inherent in volleyball play. Exercises for the prevention and treatment of this injury include quadriceps work focusing on the lengthening, or eccentric, action of the involved muscles as well as very strong hips and core. Movements such as the squat and lunge that emphasize the slow descent or lengthening phase are key components of the lower body training program for the volleyball player.

Base Exercises

Single-leg squat	page 116
Clam	page 106
Reverse clam	page 107
Lateral lunge	page 112
Shoulder external rotation at 90°	page 95
Shoulder external rotation at side	page 46
Shoulder external rotation with retraction	page 92
Bilateral extension with retraction	page 85
Scaption	page 44
Lat pull-down	page 82
Bridge	page 102
Trunk rotation	page 131

Sport Simulation Exercises

Serve simulation	page 189
Overhead blocking simulation	page 189
Monster walk with bumping	page 190

Serve Simulation

All Muscle Groups

Secure one end of the tubing under your foot and grasp the other end of the band in your service hand with the attachment point behind you. Position yourself so that there is light tension in the band when your arm is in the starting position of your serving motion. Step forward and perform the serve against the resistance of the band then control your return to the starting position.



Overhead Blocking Simulation

All Muscle Groups

Place a looped band around your wrists. With your arms in an overhead position and your hands a few inches apart, move the hands sideways and back and diagonally and back for 15 to 20 seconds. Keep a slight bend in the elbows. Repeat several sets of this exercise.



Monster Walk With Bumping

All Muscle Groups

Secure a looped band around your ankles. Bump a ball repeatedly and follow it, making small adjustments with the legs to move against the resistance of the band. As a variation, do this drill with a partner and bump the ball to one another.



Football

As a collision sport, football can produce a wide variety of potential injuries ranging from concussions and fractures to injuries of overuse, such as tendinitis and muscle strains. Additionally, the position played can have a dramatic effect on an athlete's training and exercise needs. For example, a quarterback must move in multiple directions, absorb hits, and perform significant rotational movements while enduring the stress of repetitive throwing movements similar to those of a baseball or tennis player. These wide-ranging demands make designing a training program for a football player very challenging.

Two needs among virtually all football players, regardless of position, are multidirectional explosiveness and great upper body strength. Specific exercises, like the rip for the upper body, apply to many positions, as do the lateral and reverse movement overloads, which can be accommodated by elastic resistance at variable intensities. Many of the exercises in our football program work multiple muscle groups, particularly in the lower body, rather than attend to single muscles or groups.

However, football athletes who play certain positions should do some selective isolated muscle group work. A quarterback should include some rotator cuff and scapular exercises in his training program, and players who carry or handle the ball should include some wrist and forearm exercises in their programs. One specific exercise tailored for the quarterback position is the monster walk throwing simulation exercise that can be performed while holding a football. This requires a bit of intricate work with the loops of a band but can work the lower and upper body as well as the core at a very high level.

Base Exercises

Chest press	page 72
Front squat	page 114
Lunge	page 110
Scaption	page 44
Lat pull-down	page 82
Romanian deadlift (RDL) with CLX	page 231

Sport Simulation Exercises

Explosion out of three-point stance	page 192
Total body extension	page 192
Rip curl	page 193
Monster walk throwing simulation	page 194

Explosion Out of Three-Point Stance

All Muscle Groups

Start in a three-point stance with the middle of the band secured around your waist and the ends attached to a stationary object near the floor. Explode out of the stance and take one step forward.



Total Body Extension

All Muscle Groups

Loop the band around the backs of your thighs. Grasp the ends at shoulder height. Bend your hips and knees and assume a crouched starting position. Extend your arms forward and move out of the crouch with the lower body.



Rip Curl

All Muscle Groups

Secure one end of the band at waist height to a stationary object behind you and grasp the other end. Step forward with the leg opposite the arm being worked and move your arm up and across the body in a rip-type motion such as a defensive lineman would use. Alternate arms. This diagonal exercise mimics the movement upward and across the body and develops anterior shoulder strength.



Monster Walk Throwing Simulation

All Muscle Groups

Begin by looping the band around your feet and then cross the band above and below your knees, ultimately placing the other ends of the band in each hand (a). While walking forward and backward in a sideways posture, simulate the throwing motion with the football in the quarterback's dominant hand (b-c).



Hockey

The challenges hockey places on the human muscular system include the need for explosive power and endurance, as well as the key components of balance and agility. The fact that hockey is played on a hard, slippery surface makes it a unique challenge for the design of both base and sport-specific exercise programs. Injuries in hockey, as in football, vary greatly, a consequence of contact with other players, the ice, and the barriers surrounding the playing area. Upper body injuries, such as shoulder separations, are common, as are groin strains and ligament injuries in the lower body. Because whole-body power and explosive muscular strength are needed, many of the base exercises for hockey, like those for football, emphasize multiple-joint movement patterns that encourage strength development in large muscle groups. The sport simulation exercises, however, are very specific and are appropriate only for hockey players.

Hockey players must have balanced strength in the abductor and adductor musculature of the groin and outside hip to minimize and prevent groin injuries. Sport-specific adaptations of strength in the groin must be offset by additional training of the muscles on the outside of the hip to decrease injury risk and optimize performance. Hockey also requires great control over the muscle-lengthening movements used in skating. This means that eccentric, or muscle lengthening, contractions should be emphasized in training, particularly in skating-specific drills and exercises with elastic resistance. The need for players to skate and move in all directions means that elastic resistance training must occur in directions other than simply straight ahead.

All players carry and use a stick during play, making wrist and forearm strength essential for optimal performance and requiring a series of wrist and forearm exercises similar to those needed by a tennis player or golfer.

Base Exercises

Monster walk	page 117
Squat walk	page 118
Lunge	page 110
Romanian deadlift (RDL) with CLX	page 231
TheraBand quick kick	page 122
Trunk rotation	page 131
Lat pull-down	page 82
Wrist flexion	page 50
Wrist extension	page 51
Forearm pronation	page 53
Forearm supination	page 52

Sport Simulation Exercises

Skating stride with stick	page 196
Resisted slide and stride with stick	page 196
Resisted slap shot take-back with stick	page 197
Resisted slap shot follow-through with stick	page 197
Wrist shot with stick	page 198

Skating Stride With Stick

All Leg Muscles

Loop the band around the lower legs or use an extremity strap to secure tubing to both ankles. Stride forward and diagonally, keeping your feet low and swinging your arms to simulate the stride used during skating.



Resisted Slide and Stride With Stick

Hip Abductors, Hip Adductors

Stand on a smooth surface. Loop the band around the lower legs or use an extremity strap to secure ankles. Slide one leg to the side while holding the stick and maintaining an upright posture.



Resisted Slap Shot Take-Back With Stick

All Muscle Groups

Secure one end of the band around a hockey stick and the other end to a stationary object. Bring the stick up and away from the floor against the resistance of the band.



Resisted Slap Shot Follow-Through With Stick

All Muscle Groups

Secure one end of the band around a hockey stick and the other to a stationary object 3 to 6 inches from the floor. Move the stick forward to simulate the contact and end position of a slap shot.



Wrist Shot With Stick

All Muscle Groups

Secure one end of the band around a hockey stick and the other to a stationary object at about hip height. Move the stick forward to simulate the contact and end position of a wrist shot.



Basketball

The sport of basketball requires very high levels of cardiovascular and muscular fitness. It also is characterized by repeated, multidirectional movements requiring combinations of great strength and power as well as muscular endurance. Upper extremity strength while rebounding is essential; however, strength training for basketball often focuses on the lower body and core work to optimize powerful movement and cutting.

One of the most common injuries in basketball is the ankle sprain. Elastic resistance training is an optimal means of strengthening the muscles that protect and stabilize the ankle joint and should be a key part of every basketball player's strength and conditioning program. Because most ankle injuries involve inversion, or rolling inward, of the ankle, exercises to strengthen the muscles on the outside of the ankle using eversion (outward rotation) are important.

Another focus of injury prevention for basketball players is the knee. Extensive research has shown the importance of core and lower body strength and balance for preventing knee injuries. Injuries to the anterior cruciate ligament are common. Preventative conditioning programs emphasizing lower body and core strength as well as balance training are recommended to address and minimize injury risk. The base exercises in this program are geared toward increasing quadriceps, hamstring, and hip abductor strength to stabilize the lower extremities and provide muscular support during landing and cutting actions. Screening basketball players for proper single-leg squatting ability can be used to determine the amount of extra conditioning needed. The upper extremity exercises include a focus on improving strength with the shoulders in positions of 90° to 120° or more of elevation needed for rebounding and for passing from elevated shoulder positions.

Base Exercises

Front squat	page 114
Single-leg squat	page 116
Lunge	page 110
TheraBand quick kick	page 122
Clam	page 106
Knee flexion	page 62
Resisted forward step-over	page 232
Ankle inversion	page 67
Ankle eversion	page 68
Ankle dorsiflexion	page 65
Scaption	page 44
Lat pull-down	page 82
Overhead press	page 89
Wall walk (60-90 degrees)	page 97

Sport Simulation Exercise

Step-slide with basketball	page 200
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Step-Slide With Basketball

Core Muscles, Hip Flexors, Hip Abductors, Quadriceps

Start with the band looped around your ankles. Hold a basketball in both hands in a chest pass position and step laterally, placing more tension in the band. Repeat the lateral step in several directions against the resistance of the band while keeping slight tension in the elastic. If you have a partner or a wall, repeatedly pass the basketball back and forth to simulate the moving and passing movements performed in basketball.



Lacrosse

Lacrosse athletes must perform endurance-oriented movements combined with explosive bursts of energy in a very demanding multidirectional movement sport. To train for lacrosse with elastic resistance combines multidirectional lower body movements with upper extremity sport-specific movements and resistance applied through the lacrosse stick, or crosse. Since players must run and move with the lacrosse stick, incorporating the stick into the sport-specific sections of training for these athletes is essential. Due to the length of the stick, care must be taken to not overload the resistance level applied to the stick due to the lever arm created. A small load goes a long way when steering athletes in this sport-specific training series.

Base Exercises

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Single-leg squat	page 116
Lunge	page 110
Romanian deadlift (RDL) with CLX	page 231
TheraBand quick kick	page 122
Clam	page 106
Scaption	page 44
Lat pull-down	page 82
Shoulder internal rotation at 90°	page 94
Shoulder external rotation at 90°	page 95
Hip abduction	page 60
Bilateral extension with retraction	page 85
Wrist flexion	page 50
Wrist extension	page 51

Sport Simulation Exercises

Step-over with stick and elastic resistance	page 202
Lacrosse throw simulation	page 203

Step-Over With Stick and Elastic Resistance

All Muscle Groups

Secure the band around the top of the stick and secure the ends of the band to a stable object or held by a partner. Stand beside a 6 to 8 inch stable platform. Place one leg onto the platform and prepare to move laterally away from the point of attachment of the elastic band. In an explosive manner, bound across the step and place the opposite foot on top of the platform while decelerating the body with the other limb on the ground. Alternately jump across and back over the platform. The stick should be held by the athlete to simulate more closely the lateral movement performed while playing.

VARIATIONS

- Loop the band around the waist, increasing the resistance to the lower body and core, instead of the upper body.
- While performing this exercise, have a partner toss a ball that has to be caught and returned to increase the challenge.



Lacrosse Throw Simulation

All Muscle Groups

Attach one end of the elastic resistance to the stick and secure in a door or with a partner. Secure a second band in the door or with a partner and loop it around your waist to provide core and lower body resistance (a). To simulate the throwing motion with the stick, step forward, elongating the band while overcoming the resistance of the band and simulating the throwing motion (b). Repeat in both directions using proper mechanics.



Soccer

The multidirectional movements and cutting patterns inherent in soccer place great demands on the lower body and core. What is often overlooked is the strength and balance of the supporting leg, which is needed to allow the kicking leg to optimally strike the ball. Large ranges of lower body motion are required, making flexibility of the lower body another key area of focus for soccer players. Muscular strains and tendinitis are common in soccer players. Minimizing the risk of injuries involving the two-joint muscles (in this case, muscles that cross both the hip and knee, including the groin, hamstrings, and quadriceps) requires careful emphasis on not only the concentric (shortening) phase of the training program but also the eccentric (lengthening) phase. Additionally, ensuring that both the quadriceps and hamstrings are addressed to ensure proper muscle balance is essential. In addition to the quadriceps and hamstring work, the lateral movements and cutting behaviors inherent in soccer require focus on diagonal and lateral movements to build strength in the gluteals, specifically the gluteus medius, which is an important stabilizer of the hip and entire lower body in cutting-sport athletes.

In addition to the base exercise movements recommended, diagonal patterns and actual kicking motions using elastic resistance should be performed. Although the hands are not used in soccer to advance the ball (except by the goalkeeper), several upper body resistance exercises are recommended for base strength, as well as the use of elastic resistance while performing functional patterns like the two-hand overhead throw. Several sport-specific movements with elastic resistance are also recommended. Hip rotation is particularly important not only for kicking and stabilization but also for the cutting and multidirectional demands of the game. The TheraBand kick exercise is important for balance as well as for gluteus medius training to provide lateral and rotational stability to the lower limbs alongside exercises that focus on lower extremity rotational stability.

The intermittent nature of soccer, with long periods of running and very short rest periods, make muscular endurance a top priority. Multiple sets of training with high repetition bases are recommended.

Base Exercises

Ankle dorsiflexion	page 65
Ankle plantarflexion	page 66
Ankle inversion	page 67
Ankle eversion	page 68
Monster walk	page 117
Closed-chain hip rotation	page 108
Clam	page 106
TheraBand quick kick	page 122
Lunge	page 110
Front squat	page 114
Knee flexion	page 62
Lat pull-down	page 82
Trunk rotation	page 131
Quadruped stabilization	page 137
Hip clock	page 123

Sport Simulation Exercises

Hip abduction with soccer ball	page 206
Hip adduction with soccer ball	page 206
Diagonal kick with soccer ball	page 207
Controlled kick stabilization	page 207
Throw-in simulation and overhead pass with soccer ball	page 208

Hip Abduction With Soccer Ball

Hip Abductors, Flexors

Loop and secure a band around your ankles or use an extremity strap. Place a soccer ball just in front and to the side of your starting position. Lunge forward toward the ball with the leg closest to the ball.



Hip Adduction With Soccer Ball

Core Muscles, Hip Adductors

Secure both ends of the band to a stationary object a few inches off the floor. Standing beside the point of attachment, loop the band around the ankle of the leg closest to the attachment. With your weight on the other leg, shuffle a soccer ball toward the center of your body.



Diagonal Kick With Soccer Ball

All Muscle Groups

Wrap one end of a band around your kicking leg near the ankle and secure the other end at ankle height to a secure object diagonally behind you. Face away from the attachment point. Begin with your leg lifted behind you and light tension on the band. Simulate the kicking motion. Slowly return to the starting position.



Controlled Kick Stabilization

Gluteals, Hamstrings

Stand on one leg with one end of the band secured to a stationary object at waist height and the other end wrapped around your non-weightbearing leg just below the ankle. Maintain a secure, balanced posture. Slowly raise and bend the knee to approximately 90° to 100° against the resistance then slowly return to the starting position.



Throw-In Simulation and Overhead Pass With Soccer Ball

Shoulder Extensors, Latissimus Dorsi, Core Muscles, Hip Flexors

Secure the ends of a band to a stationary object at about eye level. Facing away from the attachment point, stand with your arms overhead and grasp the middle of the band and the ball with both hands. Simulate a soccer throw-in pattern, bending slightly forward at the hips and trunk.



Individual Sports

Elastic resistance training is ideal for individual sport athletes given their unique demands and individual training focus—unlike that often found in team sports where athletes are working out or exercising together. The sports contained in this chapter all require extensive training of the upper body (tennis, golf, swimming) and lower body (tennis, golf, swimming, skiing, running, cycling) in both endurance and explosive formats for optimal performance development and also for injury prevention. These challenging sports all require both general and sport-specific training exercises to comprehensively train and compete at the highest level.

Swimming

Because of the high repetition base required for fitness or elite performance, swimmers have an extremely high incidence of overuse injury in the shoulder. Research has consistently identified imbalances in the shoulder mechanics of swimmers because of the overdevelopment of the internal rotators (muscles used for propulsion) and the underdevelopment of the muscles in the back of the shoulder and shoulder blade region (rotator cuff and scapular muscles). The repetitive stresses to the rotator cuff and the overhead position of the arm during swimming make the shoulder and rotator cuff particularly vulnerable to fatigue and injury. Resistance exercises that strengthen the muscles responsible for the pull-through phase of swimming help to enhance performance, while those focusing on the rotator cuff and upper back muscles help to promote muscular balance and prevent injury.

Swimmers compete in four primary strokes but many swimmers do a great deal of their training in freestyle. Some coaches and training programs do focus on training all strokes equally, but despite the apparent variation in the main strokes, muscular imbalances are formed due to the common muscle group activation to propel the body forward explosively in the water. Using the same pattern over and over further leads to muscular imbalances and can elevate the risk for injury in swimmers. To magnify the muscular imbalances, many swimmers use a dryland training program that mimics the movement patterns of swimming, training the already powerful propulsive muscles to increase their performance. In addition to all the upper body exercise and trunk stabilization needed in swimming, high levels of muscular activity are needed in the muscles that flex and extend the hip and knee joint for various forms of kicking. The exercises listed in this chapter will help swimmers minimize injury risk by addressing common strength imbalances and also strengthen some of the specific muscles needed for better performance. A very high repetition base and multiple sets are needed to address the endurance demands of this sport. The use of sets of 15 to 20 or 25 repetitions can be used as well as time-based sets of 30 to 45 seconds of exercise.

Base Exercises

Shoulder external rotation at 90°	page 95
Shoulder external rotation at side	page 46
Shoulder external rotation with retraction	page 92
Seated row	page 79
Reverse fly	page 80
TheraBand quick kick	page 122
Hip flexion	page 58
Hip extension	page 59
Biceps curl (variation)	page 48
Bilateral extension with retraction	page 85
Elbow extension	page 49
Shoulder internal rotation at 90°	page 94

Sport Simulation Exercises

Swim pull-through	page 212
Shoulder standing horizontal abduction with external rotation	page 213

Swim Pull-Through

Latissimus Dorsi, Triceps, Core Musculature

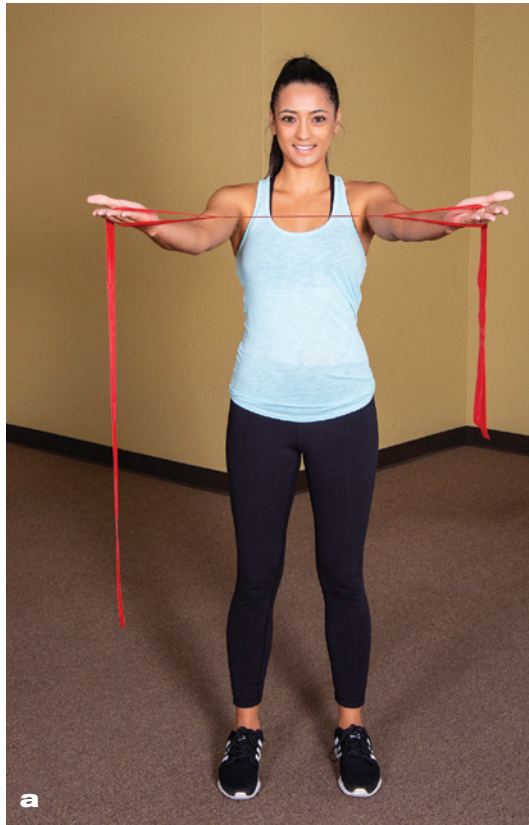
Attach the middle of a band to a secure object in front of you at waist height or slightly higher. Start with your knees slightly bent and your trunk bent 90 degrees. With your arms reaching forward and your head in a neutral position, grab one end of the band in each hand (a). Pull your arms back, simulating the pull-through phase of swimming (b) and slowly return to starting position.



Shoulder Standing Horizontal Abduction With External Rotation

Rotator Cuff, Scapular Musculature

Stand holding a band or tubing in both hands. Grab the band or tubing with the palms up (supinated forearm position) (a). Keep one arm stationary and in front of you at 90 degrees of elevation (shoulder level); move the other arm out to the side, keeping the thumb pointed outward (b). To minimize shoulder stress, do not move the arm outward past the plane of the body. Hold the end position and slowly return to the starting position. Repeat on the opposite side. Complete multiple sets of 10 to 15 repetitions.



Running

While any sport simulation exercises are recommended for running athletes, elastic resistance training is an excellent way to meet a runner's base training needs. Like swimming and other endurance sports, running requires exceptional muscular endurance for optimal performance and injury prevention. Additionally, running requires a stable pelvis and spine, so supplemental exercises are recommended for runners to improve core stability and hip strength. Since most running is truly straight ahead, runners often benefit from side-to-side exercises to increase strength and stability of the hip, as well as from exercises for the low back and abdominal musculature.

Elastic resistance training can be used to improve quadriceps and hamstring strength as well as local muscle endurance, using a reasonably low resistance level and high repetition base. Ankle-strengthening exercises are also recommended to prevent ankle sprains and to further support the ankle when running on uneven surfaces, such as trails. Exercises such as the TheraBand kick and hip abduction are helpful to improve hip stability and stabilize the pelvis. Finally, the use of elastic resistance exercises for the upper back and scapular muscles can benefit the distance runner because poor posture, fatigue, and discomfort in these areas can occur during training and ultra-long-distance events. Improving upper back strength can assist runners in the ability to maintain upright postures while running and improve running form overall. Exercises to target biceps and triceps strength in the upper arm are also helpful for overall fitness since running itself does little to develop these muscles in the upper body.

Base Exercises

Seated row	page 79
Lat pull-down	page 82
Shrug	page 81
Oblique curl-up	page 127
Standing back extension	page 135
Quadruped stabilization	page 137
Hip extension	page 59
TheraBand quick kick	page 122
Front squat	page 114
Ankle dorsiflexion	page 65
Ankle plantarflexion	page 66
Ankle inversion	page 67
Ankle eversion	page 68
Hip abduction	page 60
Lateral lunge	page 112

Sport Simulation Exercise

Bridging with unilateral extension and band loop	page 215
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Bridging With Unilateral Extension and Band Loop

Gluteus maximus, hamstrings, abdominals, low back

Place the band around your thighs just above the knees and lie on your back. With your arms crossed over your chest and knees bent, lift your buttocks off the floor, keeping your knees together. Keep one foot off the floor as you raise and lower your buttocks.



Tennis

The sport of tennis places unique demands on the body, including multidirectional lower body movements; large, repetitive, and forceful trunk rotation; and repetitive stresses to the rotator cuff and scapular (shoulder blade) musculature. Tennis players, like athletes in throwing sports, often have an imbalance between the muscles in the front of the upper body (the accelerators) and the smaller, often overmatched muscles in the back of the shoulder and shoulder blade region that decelerate and stabilize the shoulder. Therefore, base exercises geared toward improving strength and endurance of the rotator cuff and scapular muscles are extremely important parts of a tennis player's training program and are emphasized here. Many of these exercises are performed with the upper arm at a right angle to the body (90°). This position simulates the shoulder's position during the serve, and these exercises prepare the muscles to perform their functions in the exact position and manner demanded by the sport. Tennis also places significant repetitive stresses on the elbow and wrist; therefore, base exercises for strengthening the stabilizing muscles that cross both the elbow and wrist joints are provided. Increased emphasis is given in our program to training the wrist in several directions to ensure that proper strength development for stabilization is achieved. Because tennis players have significantly greater strength in the wrist and forearm muscles from playing tennis, as well as greater grip strength on their dominant side, these exercises are a staple in the prevention programs for wrist and elbow injury in frequent tennis players.

Additionally, the challenges the game presents to the lower body require movement training in all directions. Tennis players average four or five direction changes per point. This requires a lot of lateral movement, as well as acceleration and deceleration; ERT can provide similar loads to help players train for this.

The use of trunk rotation is also inherent in virtually every stroke used in tennis. High levels of abdominal muscular contraction are needed even on the volley as players stabilize the core and bridge and optimize power generated in the lower body. This transfers the energy through the core to the upper extremity and racket. Exercises specific for tennis training typically involve trunk rotation and also employ the various stances players use on the court, such as open and square stances. This allows players to position their bodies while performing the exercise as specifically as possible to their tennis strokes.

Base Exercises

Shoulder external rotation at 90°	page 95
Shoulder external rotation at side	page 46
Seated row	page 79
Wrist flexion	page 50
Wrist extension	page 51
Forearm pronation	page 53
Forearm supination	page 52
Radial deviation	page 55
Ulnar deviation	page 54
Shoulder external rotation with retraction	page 92

Bilateral extension with retraction	page 85
Serratus punch	page 47
Bridging with unilateral extension and band loop	page 215
Unilateral row with side bridge	page 146
Monster walk	page 117
TheraBand quick kick	page 122
Lunge with medicine ball rotation	page 143
Shoulder internal rotation/triceps	page 32

Sport Simulation Exercises

Square stance forehand resisted movement with racket	page 218
Rotation with racket	page 219
Horizontal abduction (high backhand) with racket	page 220
Lateral box step-over plyo with racket	page 221

Square Stance Forehand Resisted Movement With Racket

All Muscle Groups

Wrap the middle of the band around your waist and secure the ends to a stationary object at waist height. Stand in the ready position and step, using a square stance, to simulate a forehand stroke. Slowly return to the starting position.



Note: If you mainly employ an open stance on either your forehand or backhand, this exercise can be modified to utilize band stabilization around the waist and against a stationary object to the side of the player. Stepping is then performed in a lateral direction away from the point of attachment of the band using an open stance position.

Rotation With Racket

Obliques, Core

Secure one end of the band to an attachment point next to you and grasp the other end of the band in your hands. Grasp the racket with both hands straight out in front and tense your abdominal muscles. Rotate to one side, keeping the elbows extended. Slowly return to the starting position.



Note: This exercise can be performed while standing on one leg and alternating leg support for each set. Additionally, standing on a balance platform or unstable surface will also increase the difficulty of this exercise.

Horizontal Abduction (High Backhand) With Racket

Posterior Deltoid, Rotator Cuff, Scapular Muscles

Secure one end of the band to a stationary object at shoulder height. With the attachment point behind you, hold the other end of the band and position your arm to simulate a high one-handed backhand. Move your racket arm forward and outward against the resistance of the band, keeping the other arm stationary. Slowly return to the starting position.



Lateral Box Step-Over Plyo With Racket

All Lower Extremity Muscle Groups

Begin with a band wrapped around your waist and secured to a stationary object at waist height to the side of you. Place one foot on the platform (box) and hold your racket in your hands, looking straight ahead to simulate your ready position. Begin by jumping laterally in an explosive manner to the side across the box. Place the opposite foot on top of the box while recovering and absorbing the load with the outside leg. Repeat, alternately jumping across and back over the box for sets of 30 seconds or more. Alternate the band position so that you receive resistance in both directions during alternate sets.



Golf

Injuries to golfers commonly involve the wrist, hand, shoulder, and low back. Exercises to improve stabilization of the wrist joint and low back are key parts of a training program for golfers. Additionally, very large amounts of trunk rotation are used to generate power in the golf swing, with contributions from the legs and hips playing a key role. Therefore, exercises to improve leg strength and hip power assist the golfer in producing power during the swing. A balanced program for both low back and abdominal strength is recommended to stabilize the spine, with rotational movements as the predominant movement. Exercises to improve rotator cuff strength are also important because of the role the shoulders play in the golf swing and the important stabilization these muscles provide throughout the golf swing.

In addition to the base exercises, elastic resistance can be used to provide simulation to several phases of the golf swing. Performing these simulation drills, along with work on balance using foam platforms or stability trainers during the exercise, will add an additional dimension to this training for golfers of all ages and ability levels.

Base Exercises

Shoulder internal rotation at 90°	page 94
Shoulder external rotation at 90°	page 95
Diagonal extension: PNF	page 91
Wrist flexion	page 50
Wrist extension	page 51
Radial deviation	page 55
Ulnar deviation	page 54
Forearm pronation	page 53
Forearm supination	page 52
Trunk rotation	page 131
Quadruped stabilization	page 137
Hip internal rotation	page 56
Hip external rotation	page 57
Front squat	page 114
Closed-chain hip rotation	page 108

Sport Simulation Exercises

Golf swing acceleration with club	page 223
Golf swing take-back with resistance with club	page 224
Trunk rotation with arm rotation twists	page 225

Golf Swing Acceleration With Club

All Muscle Groups

Secure one end of the band to a stationary object at shoulder height and assume the golf stance. Grip both the club and the other end of the band in both hands. From the take-back position, accelerate against the resistance of the band to contact position. Slowly return to the starting position.



Golf Swing Take-Back With Resistance With Club

All Muscle Groups

Secure one end of a long band to a secure object near the floor. Grip both the club and the other end of the band in both hands. Assume the starting position of your swing and, against the resistance of the band, move your arms and the club to the take-back position of your swing. Slowly return to the starting position.



Trunk Rotation With Arm Rotation Twists

Core Musculature, Shoulder Stabilizers

Secure the center of the band to a stationary object. Stand with one end of the band in each hand and a medicine ball placed between your hands. Start in a position of right trunk rotation as pictured. Your left hand will be on top of the ball and the right hand on the bottom. Rotate to your left against the resistance of the band, keeping your elbows straight. As you rotate your trunk to the left, your hands also rotate so that the right hand is on top of the ball and the left hand is on the bottom of the ball. Your knees remain slightly bent, and your buttocks are gently pressed against the wall. Practice slow, controlled returns to the starting position. After completing all repetitions to the left, repeat on the right.



Skiing

The skier requires exceptional balance, muscular strength, and endurance in the lower body. Upper body extension and propulsion are also needed, indicating the necessity for exercises that work the triceps and latissimus dorsi. Even with advances and improvements in skis and ski binding technology, injuries to the knee make up the majority (up to 50 percent) of skiing injuries. Strengthening the quadriceps and hip musculature helps to stabilize the knee and reduce the risk of injury. To avoid traumatic injuries from falls, such as shoulder dislocations and upper body fractures, balance training should be included as well.

Skiers' muscles are worked in complex patterns to both stabilize the joints and allow for specific motions such as turning and other adjustments to optimize their body position. Skiers rely especially on the gluteals, quadriceps, and hamstrings, as well as the adductors (groin) and calf muscles. Action of these muscles allows skiers to maintain proper control of their center of gravity even while using a very limited base of support (the skis). Many of the exercises in this program can be made more challenging to suit advanced skiers, and those who want to become advanced skiers, by placing a balance platform under the feet to add balance control to the exercise. Simply adding the balance platform greatly increases both the challenge of the exercise and the number of stabilizing muscle contractions required during the exercise.

Programs to improve muscle strength and endurance are widely recommended by top coaches and physicians who work with both novices and high-level skiers. Using the following modified exercises to strengthen the quadriceps, hamstrings, and gluteals will prepare skiers for the sport's demands, as well as allow the skiers to absorb loads and control their body motion in the many challenging situations they face. Concentration on balance and eccentric components of these exercises is very important.

Base Exercises

Hip flexion	page 58
Hip extension	page 59
Hip abduction	page 60
Lunge	page 110
Single-leg squat	page 116
Lat pull-down	page 82
Elbow extension	page 49
Lateral lunge	page 112

Sport Simulation Exercises

Tuck squat	page 227
Balance squat with bench	page 228
Double-leg resisted squat	page 229

Tuck Squat

Hip Extensors, Quadriceps, Calves

Assume a tuck position with the middle of a long band wrapped around the low back. Secure the ends of the band under your feet. Maintain the tuck position while performing a mini squat.



Balance Squat With Bench

All Muscle Groups

Stand on one leg with one end of the band or tubing secured underfoot. Grasp the other end of the band and pull it to waist level. Rest the other leg on a bench behind you. Perform a single-leg squat, bending your knee 45° to 60°. Remain upright and look straight ahead.



Double-Leg Resisted Squat

Hip Extensors, Quadriceps, Calves

Stand with the middle of the band secured under your feet. Grasp the ends in both hands and wrap the band up over the top of the shoulders. Perform a partial squat, looking straight ahead and minimizing any forward trunk bend. Slowly return to the starting position.



Cycling

At first, one would not think that a cyclist would have much use for elastic resistance training. The sport itself produces fantastic development of the quadriceps and calf muscles from the repetitive movement patterns; however, ERT can develop complementary muscles that can be very helpful to cyclists to round out their training. For example, given the position on the drops, cyclists must endure long periods of time in a trunk-flexed posture, stressing the low back. Additionally, leaning forward onto the upper arms produces tension in the upper back and trapezius muscles. ERT provides a wonderful training adjunct for the cyclist to work on these muscle groups, helping with riding posture and overall strength development. However, the base exercises in this program are designed to work the scapular and low back muscles as well as the hip stabilizers, providing a tremendous stimulus for lower body development.

Given the endurance or repetitive environment in which the cyclist performs, we recommend a multiple-set training format with either 15 to 25 repetitions per set or time-based sets of 20 to 30 seconds.

Base Exercises

Serratus punch	page 47
Shrug	page 81
Seated row	page 79
Bridge	page 102
Quadruped stabilization	page 137
Lat pull-down	page 82
TheraBand quick kick	page 122
Hip extension	page 59
Wall walk (60-90 degrees)	page 97

Sport Simulation Exercises

Romanian deadlift (RDL) with CLX	page 231
Resisted forward step-over	page 232

Romanian Deadlift (RDL) With CLX

All Lower Extremity Muscle Groups, Core Musculature

Stand with one end of a CLX band secured around the thigh. Keep the other end of the band to the inside. Wrap the band outward—both above and below the knee—for one rotation. Place the opposite foot in the loop over the foot, producing a fatiguing tension during the exercise (*a*). Keeping the torso erect, bend forward from the waist and extend the non-weight-bearing limb backward, holding that position for an extended period while minimizing any motion and using optimal balance (*b*). Return to the starting position. Perform multiple times using time intervals that produce significant fatigue (e.g., 20 to 30 seconds).



Resisted Forward Step-Over

Quads, Gastrocnemius, Hip Flexors, Glutes,
Core Musculature

Stand with a band secured behind you and looped around you at waist level. Place one foot on top of a platform approximately 6 to 8 inches in height (*a*). Step forward with the back foot; place it in front of the platform, touching the ground and producing increased tension in the band (*b*). Slowly and with control, return to the starting position and repeat. Alternate which leg is placed on the platform to produce a balanced load for the exercising musculature.



Rehabilitation

The purpose of this chapter is to provide very general and basic recommendations for the use of elastic resistance for the rehabilitation of common musculoskeletal injuries. The application of these exercise recommendations, however, must be undertaken with caution. These important recommendations are not meant to be a substitute for a formal evaluation by a physician, physical therapist, or medical provider who can diagnose the injury and make specific rehabilitation recommendations. Instead, these exercises are meant to demonstrate particular exercises that can be helpful when common injuries are encountered. The general strengthening work shown here, using specific movement patterns coupled with appropriate levels of resistance, can assist in the improvement of an injury or condition. Remember this: If any of the exercises produce localized pain over a joint or injured area, do not continue the exercise and seek out a formal medical evaluation from a qualified provider.

Principles of Elastic Resistance Exercise Application to a Recovering Area

It is important to further clarify and discuss some general principles for using elastic resistance in an area that has sustained an injury or has a history of prior musculoskeletal injury. One of the benefits of elastic resistance is that the level of resistance can be easily changed by greater elongation of the band itself, as well as by increasing the resistance (density) of the actual band being used in the progression. Great care must be taken to not use too much resistance, particularly when exercising around an area that has been injured. Low-resistance programming coupled with higher numbers of repetitions, intended to foster and create muscular fatigue, are typically recommended and followed by physical therapists who rehabilitate musculoskeletal injuries. Additionally, use a range of motion that is not painful and do not take the joint to end ranges of motion. This can allow important muscular contractions and muscle work to be performed in an area that otherwise could not accommodate full range-of-motion exercise.

Finally, as we move through each of the sections, exercises that are proximal (closer to the center of the body) are commonly recommended as part of the exercise progression for injury to a body segment further from the center of the body (distal). This is important to note; proper rehabilitation and recovery from a musculoskeletal injury seldom include only isolated exercises to that segment but include segments above and below the injured segment. This important concept is termed the “kinetic chain” and is a key principle applied in the rehabilitation of nearly all parts of the extremities of the human body. For example, the inclusion of exercises for the scapular (midback) musculature for an elbow or shoulder injury illustrates this concept well.

Upper Extremity

Injuries to the upper extremity can benefit from greater strength and endurance of the musculature of the entire upper extremity kinetic chain. One key example here is to ensure there is proper balance between the muscles in the front of the body, which are primarily responsible for pushing and accelerating the body, and the muscles in the back of the shoulder and upper back region, which are more responsible for pulling and decelerating the body. This imbalance between the front and back of the body is a key part of both injury prevention and rehabilitation work, and elastic resistance can be a very important source of this type of balancing work to improve overall function and efficiency in the body. The use of elastic resistance is also optimal for ensuring that both concentric or shortening contractions and eccentric or lengthening contractions are used. This section will profile the use of elastic resistance for common injuries to the shoulder, elbow, and wrist.

Shoulder Injury

The shoulder is the most mobile joint in the entire body and, as such, relies to a great extent on muscles to stabilize this important joint. The muscles primarily responsible for providing this stability are those that comprise the rotator cuff. Exercises to improve the strength of the rotator cuff, along with improving strength and endurance of the scapular muscles (muscles that support the shoulder blade), are often successful at treating injuries to the shoulder, such as rotator cuff tendinitis, impingement, and shoulder instability. Additionally, for many athletes and active individuals, the rotator cuff and scapular muscles are often ignored in traditional weightlifting programs. Particularly for sports such as tennis, baseball, or volleyball, high levels of stress and activity are needed by these important muscles to perform at competitive levels.

The following exercises are often part of key rehabilitation programs recommended for individuals with shoulder pain from rotator cuff injuries. Using these exercises in a low-resistance and high-repetition format is recommended. Also, avoid exercises that place the shoulders in overhead positions or in positions where the arm is brought behind the body. These types of aberrant movement patterns are often used by active individuals trying to improve shoulder strength; however, such movement may unknowingly produce significant stress on the rotator cuff and stabilizing tissues in the shoulder.

Recommended Exercises

Shoulder external rotation at side	page 46
Shoulder internal rotation at side	page 45
Seated row	page 79
Shoulder external rotation with retraction	page 92
Bilateral extension with retraction	page 85
Wall walk (60 to 90 degrees)	page 97
Biceps curl at shoulder level	page 87
Serratus punch	page 47

As these base exercises become easy and well tolerated (i.e., you have good control with the exercise and are able to complete the exercises properly), you can progress the difficulty of the exercise program by adding the following exercises to the base program.

Progression

Shoulder external rotation at 90°	page 95
Shoulder internal rotation at 90°	page 94
Shoulder standing horizontal abduction with external rotation	page 213

Elbow Injury

The most common injury in the elbow is an overuse injury known as tennis elbow. This injury occurs from repetitive use and can limit performance in day-to-day activities as well as athletics. There are two main forms of this injury: lateral (outside) and medial (inside). Exercise can assist in the rehabilitation process and includes the entire upper extremity kinetic chain. As it is an overuse injury, using higher loads and performing exercise through pain is not recommended and can actually prolong the injury. Most cases of tennis elbow can be resolved through rest and proper care and exercise.

A unique feature of the elbow rehabilitation exercise is that to activate the muscles and tendons that cross the elbow, motion is not required at the elbow itself but rather at the wrist and forearm. Listed below are the recommended exercises that may aid the healing of tennis elbow. What is important to note is that, regardless of whether the symptoms (pain) are at the outside or inside of the elbow, a complete approach using the exercises below is recommended to improve both strength and local muscular endurance of the muscles of the forearm.

Recommended Exercises

Wrist extension	page 51
Wrist flexion	page 50
Forearm pronation	page 53
Forearm supination	page 52
Radial deviation	page 55
Ulnar deviation	page 54
Seated row	page 79
Shoulder external rotation with retraction	page 92
Shoulder external rotation at side	page 46

Wrist Injury

Injuries to the wrist primarily involve tendinitis, as the muscles of the forearm cross the wrist as tendons and lend support and primary movement control for the wrist joints. Repetitive use—be it from typing, housework, or athletic activity—can create a wrist injury. Similar to the treatment of tennis elbow, exercises that work the muscles of the forearm through wrist and forearm motion are clearly indicated. In fact, the list of exercises for wrist rehabilitation are identical to those recommended for elbow rehabilitation. Exercises that activate the forearm muscles on all sides of the wrist are needed to improve wrist stability and also provide strength and stability to the elbow joint. Exercises for the scapular muscles and rotator cuff (external rotation) help to ensure that the entire upper extremity kinetic chain is recruited to aid in treatment of an injury to this important region.

Lower Extremity

Elastic resistance exercise can be helpful in training the muscles of the lower extremity following injury. For the lower extremity, we also employ exercises where more isolated training occurs, which are often referred to as open chain exercises, where the end of the lower extremity (i.e. the foot) is not placed upon the ground or not against a platform or object, coupled with closed kinetic chain exercise whereby the elastic resistance is used along with the body pushing or stabilizing against the ground or a stable immovable object. Both of these types of exercises are important for the activation of key musculature in the lower body. The exercises in this section focus on the lower extremity kinetic chain.

Hip Injury

Injuries to the hip include muscles and tendons that cross the joint and provide prime movement assistance and stabilization. Unlike the shoulder, the hip is a much more stable joint but still functions most effectively with optimal muscle strength and stability. Some of the most common injuries are to muscles that cross the hip joint: quadriceps, hamstrings, and adductors (groin). These muscles are referred to as two-joint muscles as they cross both the hip and knee joints. Improving hip and core muscle strength and stabilization are key elements to any hip rehabilitation program. Isolated exercises that are done while lying on your back or side can work specific hip muscles, while exercises performed while weightbearing (closed kinetic chain exercises), such as lunges and squats, work multiple muscles without isolation and can provide more general strengthening for the hip joint. The following are key exercises to address hip weakness that causes hip injury.

Recommended Exercises

Clam	page 106
Monster walk	page 117
Side-lying hip lift	page 105
TheraBand quick kick	page 122
Hip adduction	page 61

Band loop bridge	page 103
Hip extension	page 59
Hip internal rotation and external rotation	pages 56-57
Double-leg resisted squat	page 229
Hip clock	page 123
Leg extension	page 170
Romanian deadlift (RDL) with CLX	page 231
Resisted forward step-over	page 232

Knee Injury

Injuries to the knee can involve the ligaments rending the knee unstable, as well as causing damage to the cartilage and bone. Chondromalacia, one of the most common ailments, involves the patellofemoral joint. Similar to the shoulder, this joint relies on muscular support to stabilize the patella or kneecap along the end of the femur. Injuries to this important joint are common and can affect everyday activities as well as athletic movement.

Many factors go into treating knee injuries, but exercises to improve hip and core stabilization are among the current recommendations for treating most knee injuries at the highest level. While exercises targeting the quadriceps were traditionally applied for most knee injuries, the added understanding of the important role the hip musculature plays in stabilizing the lower extremity necessitates inclusion of hip and core exercises to any program for rehabilitation of the knee.

Recommended Exercises

Terminal knee extension	page 64
Knee extension	page 63
Front squat	page 114
Romanian deadlift (RDL) with CLX	page 231
Resisted forward step-over	page 232
Hip abduction	page 60
Monster walk	page 117

Ankle Injury

The most common ankle injury is called the plantarflexion inversion ankle sprain. It describes an injury where the foot rolls inward and sprains the important ligaments on the outside of the ankle. This can be a very debilitating injury with frequent recurrence if optimal strength and endurance is not restored to the muscles that support the lower limb. Also important is proximal hip strength, with studies showing weakness in the hip in athletes with chronic ankle instability. This points once again to the important role that exercises for the entire kinetic chain play in addressing ankle injury.

Another important element in all lower body rehabilitation exercise is to utilize exercises that challenge the balance system, technically called proprioception. Altered proprioception has been documented in patients with chronic or even first-time ankle injuries. Adding a balance platform or challenging environment

to the exercises during ankle and lower extremity exercise can be very helpful and is recommended. This concept applies to core, hip, and knee exercise as well and increases the demand on the musculature of the lower body through the balance or proprioception challenge inherent in many of the exercises supplied in this book.

Recommended Exercises

Ankle plantarflexion	page 66
Ankle dorsiflexion	page 65
Ankle inversion	page 67
Ankle eversion	page 68
Hip abduction	page 60
TheraBand quick kick	page 122
Clam	page 106
Lunge with medicine ball rotation	page 143
Monster walk	page 117

Spine Injury

Exercises that improve strength and stabilization of the shoulders and hips can ultimately influence spinal stability and can be part of a larger program of rehabilitation for the spine. Moreover, specific exercises that are traditionally used to improve core and scapular stabilization can also be effective for the rehabilitation of spinal injury. This section will deal with both upper and low back injury exercise that can be applied using elastic resistance.

Upper Back and Neck Injury

Exercises targeting the muscles that stabilize the shoulder blades (scapulae) and originate between the neck or skull and the shoulder complex can provide support to the cervical and thoracic spine. Humans typically display daily postures with rounded shoulders and a forward-head position while working on a computer, reading, driving, and doing many other activities in front of the body. This leads to poor posture and strain on these important muscles that are meant to support the head and neck region. Similar to other regions of injury discussed in this chapter, using low loads and higher repetition strategies to fatigue the muscles and build endurance are recommended for individuals with an injury in this area. Specific emphasis on using proper posture and body position during these exercises is of paramount importance. Mirrors or other forms of biofeedback can be helpful to allow for individual monitoring of posture during exercise.

Recommended Exercises

Shrug	page 81
Neck stabilizer	page 156
Seated row	page 79
Bent-over row	page 83
Shoulder external rotation with retraction	page 92

Bilateral extension with retraction	page 85
Wall walk (60 to 90 degrees)	page 97
Lat pull-down	page 82

Low Back Injury

Injuries to the low back are one of the most common injuries throughout all age ranges. Athletes can injure the low back from repetitive high-level rotations and loading, while the general public can injure the back from poor posture, poor abdominal control, being overweight, and general disuse. This makes exercise both to prevent and rehabilitate an injury in this location most helpful. The exercises included here improve hip and core stabilization and can be used to improve stabilization and provide support to the low back via the important erector spinae musculature as well as additional important muscles that span from the low back to the hips. Using proper posture and spinal positioning during these exercises is important, and using the photos, descriptions, and videos provided in this book will enable the reader to better understand these key tips for proper exercise for low back rehabilitation. Higher numbers of sets and repetitions are again important in this region of the body to allow for the development of local muscle endurance.

Recommended Exercises

Band loop bridge	page 103
Abdominal crunch	page 126
Clam	page 106
Hip abduction	page 60
TheraBand quick kick	page 122
Trunk rotation	page 131
Seated back extension	page 134
Oblique curl-up	page 127
Fire hydrant	page 124

The exercises and descriptions in this section of the book are meant to provide very general recommendations for readers who seek to improve strength and stabilization of injured areas to improve overall function. These exercises are not meant to substitute for an evaluation or a specific exercise program created by a qualified health professional. Rather, these exercises are meant to target key muscles and muscle groups that can provide needed stabilization to injured areas. The programs laid out in this chapter, coupled with the inclusion of total body fitness exercises from the remainder of this book, can assist individuals in improving overall fitness through the use of portable elastic resistance exercise.

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ABOUT THE AUTHORS

Phil Page, PhD, PT, ATC, LAT, CSCS, FACSM, is the global director of clinical education and research for Performance Health, the company that manufactures the TheraBand, Biofreeze, and Cramer product brands. He is also an adjunct instructor for the physical therapy doctorate program at Franciscan University and a clinical instructor of orthopedics for the Tulane University School of Medicine in New Orleans. He studied physical therapy at Louisiana State University (LSU), received his master's degree in exercise physiology from Mississippi State University, and then returned to LSU to earn his doctorate in kinesiology. He has received the Lifetime Excellence in Education Award from the American Academy of Sports Physical Therapy, and he serves as chair of the research committee. Dr. Page is a fellow of the American College of Sports Medicine.



Dr. Page's clinical and research interests include the role of muscle imbalance in musculoskeletal pain and the promotion of physical activity for health-related physical fitness, particularly for chronic disease management. He is editor in chief of the *Journal of Performance Health Research*, is a member of the editorial board of the *International Journal of Sports Physical Therapy*, and serves as a member of several national advisory boards.

Page lectures extensively and provides workshops on a variety of topics around the world. He has authored over 100 publications, including three books. He has worked with the athletic programs at LSU and Tulane University and has worked with the New Orleans Saints, the Seattle Seahawks, and the U.S. Olympic Track and Field Trials. He lives with his wife and four children in Baton Rouge, Louisiana.

Todd S. Ellenbecker, MS, DPT, SCS, OCS, CSCS, a physical therapist with more than 30 years of experience, joined Rehab Plus Sports Therapy–Scottsdale in August 2018. He serves as the vice president of medical services for the ATP Tour and is a member of the TheraBand Research Advisory Committee (TRAC). He holds several certifications, including Sports Clinical Specialist (from the American Physical Therapy Association [APTA]), Orthopaedics Clinical Specialist (from APTA), and Strength and Conditioning Specialist (from the National Strength and Conditioning Association [NSCA]). He is a USPTA-certified tennis teaching professional.



Ellenbecker earned an undergraduate degree in physical therapy from the University of Wisconsin–La Crosse, a master's degree in exercise physiology from Arizona State University, and a doctorate of physical therapy from the MGH Institute of Health Professions. Well recognized for his vast expertise, he has been the recipient of many industry awards, including the NSCA's Sports Medicine Professional of the Year in 2003 and the Sports Physical Therapy Section's Ron

Peyton Award in 2007. In 2008 he was the recipient of the Samuel Hardy Award from the International Tennis Hall of Fame.

He is a manuscript reviewer for the *American Journal of Sports Medicine*, serves on three editorial boards, and is the author or editor of 15 books, more than 75 book chapters, and over 55 peer-reviewed articles in scientific journals. Ellenbecker lives in Scottsdale, Arizona, with his wife, Gail.



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