

SCW

# STRETCHING & FLEXIBILITY

CERTIFICATION MANUAL



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# SCW CERTIFICATIONS

## SCW Nationally Recognized Certifications

SCW Fitness Education is a nationally recognized certification organization that has trained over 100,000 Fitness Professionals. Our certifications are recognized by fitness facilities across the USA and Internationally. The SCW Fitness Education Certifications are both general and specialty in orientation and span from Group Ex, PT, Aqua, Yoga, Barre, Pilates, Sports Nutrition, Weight Management, Kettle Weights and more. Each certification is developed and lead by qualified, veteran trainers that have 20+ years of fitness experience. Theory, practice, and application combine to credential our SCW professionals and prepare them for quality instruction at large, small and specialty facilities.

Most SCW Online Certifications are presented live at each of our SCW MANIA® conventions. When offered, our live certifications are free (within one year) for those who have completed the courses.

## SCW Fitness Education

SCW is an internationally recognized education body that provides hands-on certifications and continuing education courses and conventions to fitness professionals in multiple disciplines nationwide. For the past 35 years, since 1987, Personal Trainers, Group Exercise Instructors, Small Group Training Leaders, Aquatic Exercise Professionals, Cycling Teachers, Mind-Body Experts, Sport Specific Training Educators and many more get certified through SCW. This outstanding Family of Leaders also supports Managers, Directors and Owners of clubs and facilities nationwide. As the largest Conference Leader and Continuing Education Provider in the world, MANIA® offers seven Professional Training Conventions in California, Florida, Atlanta, Dallas, DC, Midwest (Chicago), and Boston serving over 10,000 health and wellness professionals and reaching over 90,000 virtually.

## SCW Certifications Published by

SCW Fitness Education 151 Pfingsten Rd

Unit P

Deerfield, IL 60015

847-562-4020

[www.scwfit.com](http://www.scwfit.com)

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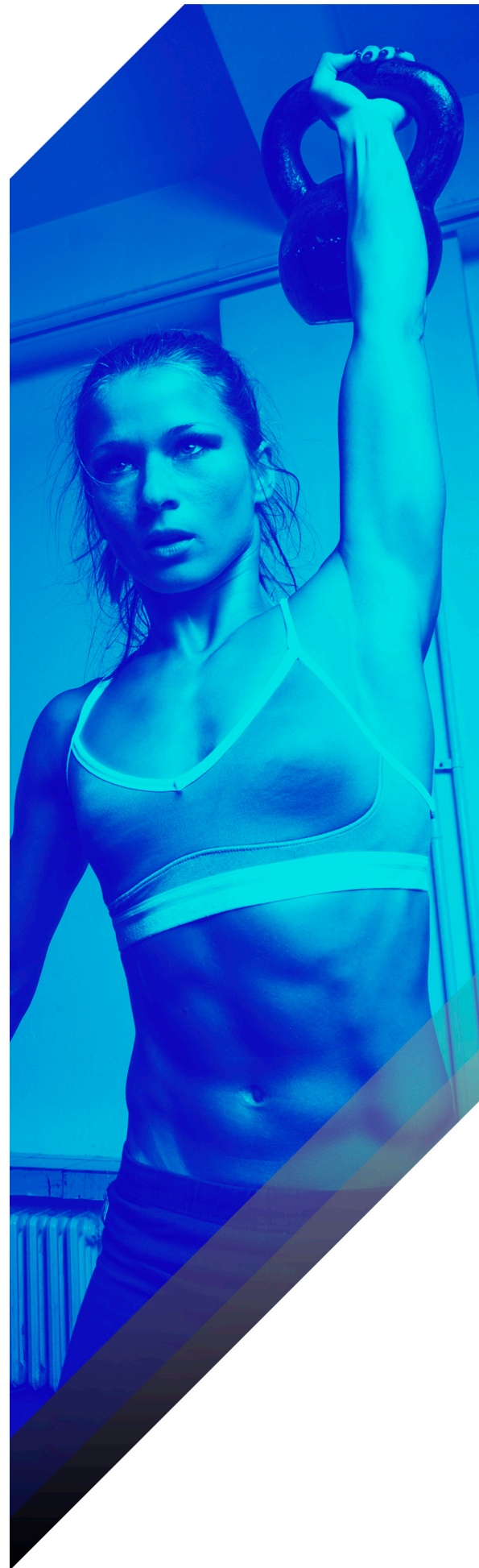
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# SECTION 1

## Introduction

Most Healthcare professionals have little experience in designing exercise programs or providing expertise on how to exercise. Personal Trainers play a vital role helping clients participate in quality exercise programs that result in positive health improvements. With the increase in issues such as obesity and diabetes, personal trainers and group fitness instructors should be prepared to work with clients that range widely in health and fitness levels in addition to age and background.

### ✓ **Role of a personal trainer**

- Perform a variety of assessments to gather relevant information and track progress.
- Build and administer effective and safe exercise programming.
- Motivate clients by setting goals, providing feedback, and being a source of accountability.
- Provide other general health and nutrition guidelines.
- Properly refer clients for issues that fall outside of your scope of practice.

### ✓ **Role of a Group Fitness Instructor**

- Lead group exercise classes and provide instruction in the areas of cardiorespiratory, strength training, stretching and other forms of exercise
- Possess knowledgeable in the principles of exercise science, anatomy, and physiology Posses the ability to motivate and encourage their participants
- Plan and prepare safe and effective exercises
- Provide feedback and correction to ensure proper form and technique
- Provide modifications to suit different fitness levels.
- Group fitness instructors must also demonstrate proper etiquette, professionalism, and enthusiasm

### ✓ **Qualities of a Personal Trainer**

- Excellent communication skills
- Good at motivating and connecting with others.
- In excellent physical shape due to the nature of the job
- Good at sales techniques and follow through (gaining clientele is all about selling yourself!)
- Personable and outgoing

✓ **Qualities of a Group Fitness Instructor**

- Knowledgeable: A group fitness instructor should have a deep understanding of fitness and exercise techniques, as well as the ability to explain them to a group of people.
- Engaging: A good fitness instructor should be able to keep a group of people motivated and engaged throughout their workout.
- Personable: A fitness instructor should be able to connect with their clients, creating a comfortable and enjoyable atmosphere.

## Scope of Practice

A scope of practice defines the legal range of services a professional can provide in each field, and the setting where those services can be provided. The regulations and laws may vary from state to state but scope of practice is generally determined by education, training, and certifications of the professional. The following information will help educate on a personal trainer's scope of practice.

## Professional Responsibility:

<b>Personal Trainers DO NOT:</b>	<b>Personal Trainers DO:</b>
<b>Diagnose</b>	<ul style="list-style-type: none"><li>• Screen for exercise limitations and potential risk factors</li><li>• Apply guidelines received from physician/therapist/dietician diagnosis</li></ul>
<b>Prescribe</b>	<ul style="list-style-type: none"><li>• Design exercise programs and give general nutrition advice</li><li>• Refer clients to appropriate health professional for specific diet plan and supplements</li></ul>
<b>Treat Injury / Disease</b>	<ul style="list-style-type: none"><li>• Use exercise to improve health based off physician advice</li><li>• Refer clients to appropriate health professional for injury treatment</li></ul>
<b>Rehabilitate</b>	<ul style="list-style-type: none"><li>• Improve physical fitness and provide guidance after rehabilitation has been completed</li></ul>
<b>Counsel</b>	<ul style="list-style-type: none"><li>• Coach physical fitness</li><li>• Provide appropriate education</li><li>• Refer clients to appropriate health professional for counseling</li></ul>



- ✓ **Client Privacy** while trainer-client relationships do not have the same legal requirements of confidentiality as a physician or psychologist, personal trainers should maintain the client's health history and private information with the same level of security.
- ✓ **Safety** trainers should do everything possible to minimize risk for clients. This includes cleanliness, properly maintained equipment, and client specific risk management according to health history, physician guidance, and appropriate training level.

## Networks and Referrals:

- ✓ It is important for personal trainers to know their professional boundaries and to refer to the appropriate healthcare professionals when it falls outside their scope of practice.
  - i.e., a client complains of back pain and after performing strengthening and mobility work for the affected area there is no improvement. You may want to refer them to a chiropractor.
- ✓ When building a referral network, you should identify other professionals who are properly licensed and can uphold the same reputation of your own services to a client. If you network properly, you may also be able to gain referrals from other health professionals.
  - Potential referral source examples:
    - Massage Therapist
    - Licensed Physician
    - Licensed Therapist
    - Chiropractor
    - Dietician

## Certification and Renewal

To become an SCW personal trainer you must show that you will be a safe and effective trainer by studying the material and passing our exam.

SCW certifications are valid for two years. If you require further assistance on renewing your certification please reference the resources in the back of the manual (pg x).

## Career Development

It is important for fitness professionals to have an idea on the career path they are looking to follow. Whether it is becoming a club manager, having your own training studio, online personal training, or even just a personal trainer at a box gym. Having a career path in mind can help guide your selection of continuing education and what events or opportunities will help guide your progress.

- ✓ **Continuing Education** SCW Fitness Professionals should select their continuing education based on interest, the clientele they want to train, and alignment with the desired career path.
  - Specialization can help a trainer become recognized as an expert for a particular clientele or type of training. For example, if you are interested in working with an older demographic you

may want to focus on Advanced Aging education opportunities.

✓ **Additional Fitness Certifications** SCW Fitness Professionals can also earn continuing education credits and experience through additional certifications. For example, if a personal trainer wanted to be able to provide advanced nutritional advice, they may take our Nutrition Coaching certification.

✓ **Advanced Degrees** Having a degree in a health-related field is not a requirement for SCW Fitness Personal Trainers but it can help with advancing your career, especially for advanced positions such as management or teaching.





# SECTION 2

## Science of Stretching

**Stretching** - the act of elongating a muscle or soft tissue to increase joint range of motion. In addition, Stretching is an exercise that is done to increase the flexibility of the muscles and tendons in the body. It is an important part of any exercise routine and helps to prepare the body for physical activity

Resulting in:

### Benefits

- Increased joint mobility and range of motion
- Increased blood circulation
- Enhanced recovery from muscle soreness
- Increased strength when combined with strength training
- Improved balance
- Improved posture
- Improve sleep quality
- Improved quality of life

### Integrated Stretching

Integrated stretching is a form of stretching that combines dynamic stretching, static stretching, and muscle activation exercises into one sequence. It is designed to increase flexibility, mobility, and range of motion, while also helping to improve posture and reduce muscular imbalances. Integrated stretching is often used to improve performance, reduce injury risk, and increase overall health and wellbeing

### Traditional Stretching

Traditional stretching is a form of exercise that involves slowly and gently stretching the muscles and joints to increase flexibility and range of motion. It is commonly seen in yoga, Pilates, and other forms of exercise. Traditional stretching is usually done without any bouncing or jerking motions, as these can sometimes cause injury.

## Foundations of Stretching

As a fitness professional, understanding the foundational science of stretching with regards to flexibility and mobility is integral to performing and coaching techniques in a group and one-on-one environment.

**Flexibility** - the normal extensibility (ability to stretch) of all soft tissues including fascia and muscle that allow the complete range of motion of a joint. Simply, Flexibility is the ability of a joint or muscle to move through its full range of motion. It is the ability to stretch and bend without experiencing pain or restriction. Flexibility focuses on the individual joint and muscle.

- Optimal extensibility in fascia and muscles for ADL (activities of daily living) and function. to Essential amount of tension to stabilize joints and maintain alignment
- Optimal tension – maintaining the perfect amount of mobility and stability in the each joint to generate enough force to function in daily life
- Tensegrity/Bio-tensegrity – balance of tension across your entire structure. Bones float in soft tissue, held together by a system of muscle and fascia. Biotensegrity, combines two concepts, tensegrity, and biology, to explain how the physical body of an organism works. Tensegrity is the term for a structure composed of compression elements (struts and bars) and tension elements (cables) that are arranged in a way that creates stability and flexibility. In biotensegrity, the struts and bars are replaced by bones and muscles, and the cables are replaced by ligaments and fascia. This model suggests that the body is composed of a dynamic, self-supporting, tensegrity structure, which provides both support and movement.

**Mobility** - Range of motion around a joint. Mobility is the ability to move freely and easily through a range of motion or activity. Mobility is the ability to perform activities of daily living with ease and comfort. Mobility involves the coordination of multiple joints and muscles working together

- Joint mobility - The degree to which an articulation (where two bones meet) can move before restricted tissues (ligaments/tendons/muscles) (ACE).
- Optimal extensibility (flexibility) enhances joint mobility

**Hypomobility** - A condition in which the joints of the body lack range of motion and mobility. This can be caused by a variety of factors including

- Muscle tightness
- Scar tissue
- Joint misalignment
- Arthritis.
- Injury
- Surgery
- Heredity

Commonly results in pain, stiffness, and decreased ability to move the affected joints.



# Integrated Stretching Systems

Integration of body systems generate and maintain movement at all levels of bodily function. Those systems include cardiovascular, pulmonary, endocrine, integumentary, nervous, and musculoskeletal, and fascial: all interact to move the body and its components

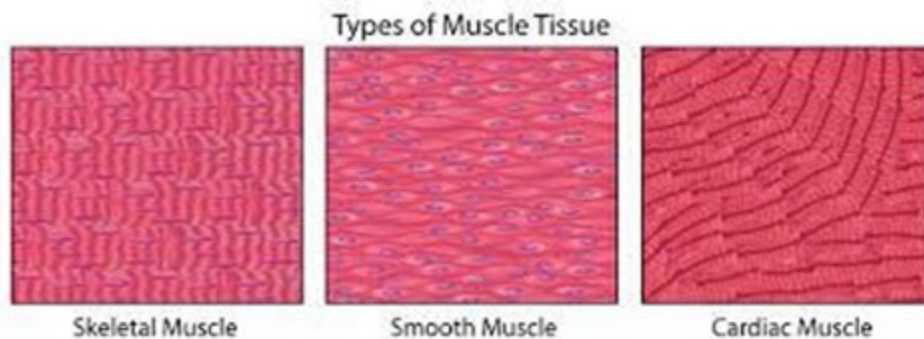
Dysfunction or impairment in any of these systems affects structure, movement, and function. Specifically, the musculoskeletal, nervous, and fascial systems which is reviewed below

## Muscle Terminology

Composed of cells known as muscle fibers of which its main function is contractibility. Muscles attach to bones which move our bodies.

There are 3 types of muscles:

- Cardiac – involuntary movement
- Smooth – involuntary movements
- Skeletal – voluntary movements



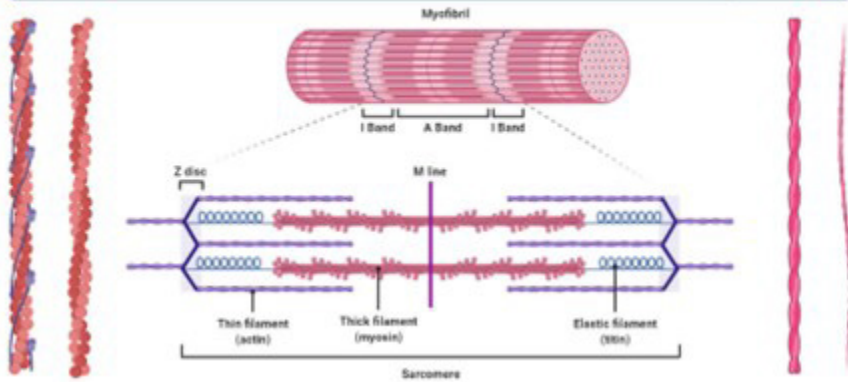
Skeletal muscle is made up of individual muscle cells (fibers) that contain bundles of myofibrils. Myofibrils are organized into sarcomeres, which are the basic contractile unit of muscle fibers. Sarcomeres are composed of two sets of proteins known as myosin and actin filaments, which are arranged in a repeating pattern along the length of the myofibril. The myosin and actin filaments are responsible for the contraction and relaxation of the muscle. Additionally, skeletal muscle is composed of connective tissues, such as tendons, that attach the muscle to bones.

**Actin** – thin contractile protein filament

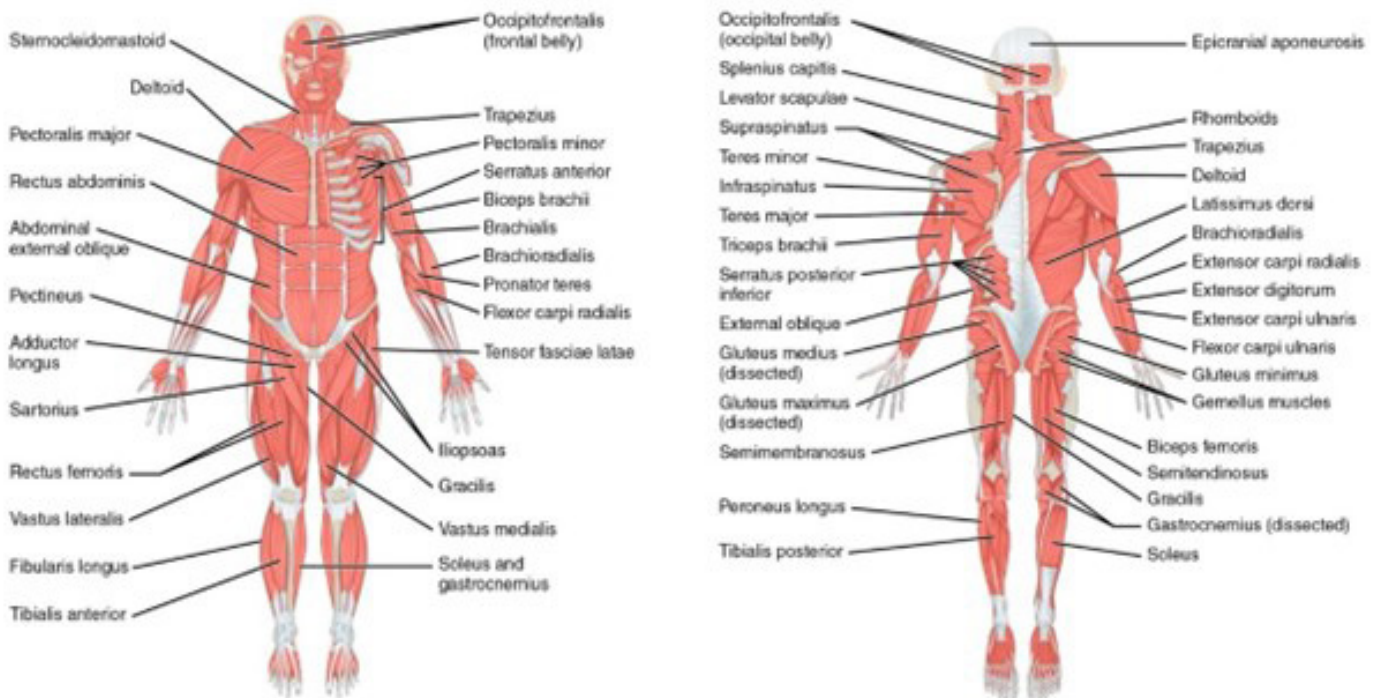
**Myosin** – thick contractile protein filament

Extending or flexing a joint result in overlap of actin and myosin, the contractile filament of a sarcomere that work together to generate force allowing muscles to be stronger and weaker at different joint positions or angles.

## Differences between Actin and Myosin



## Important Muscles in the Human Body



## Fascia Terminology

**Fascia** is a type of connective tissue that covers and separates muscles, bones, and other organs in the body. It is a sheet or band of fibrous connective tissue that covers, separates, and binds together all the muscles, nerves, and blood vessels in the body.

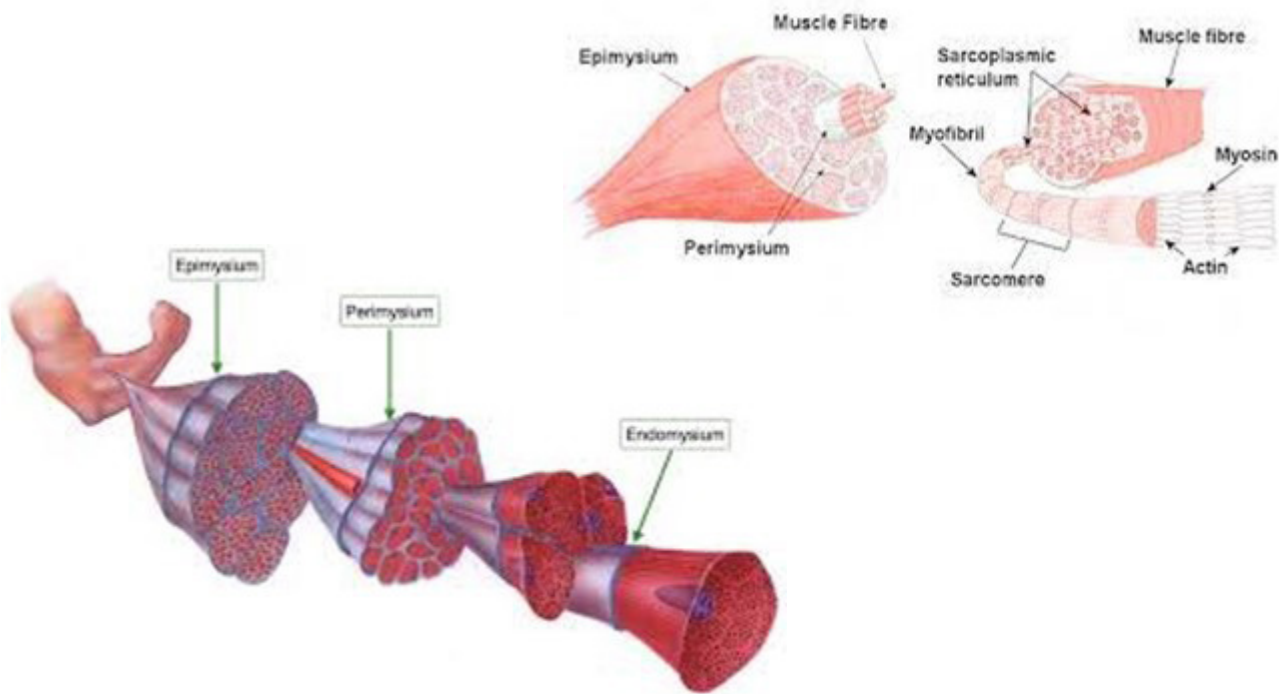
Layers of tissue or fascia is the sheath that encloses and weaves myofibrils together.

**Endomysium** is the fascial sheath that encases each individual muscle fiber and cell.

**Perimysium** is the fascia that surrounds bundles of muscle cells or fascicles (the muscle spindle is also located here). **Epimysium** is deep fascia that surrounds the muscle belly.

**Muscle and fascia are interdependent.**

**All muscles are connected to fascia.**



**Fascial System** divides muscles into segments with independent nerve and blood supply made available by thick walls of connective tissues known as septum. Within the fascia is a thin, white, sheath of connective tissue made up of collagen, elastin, retinacula fibers and sticky protein (basal lamina) that connects muscles to bones.

### Superficial Fascia

Superficial fascia is a layer of connective tissue that lies just below the skin, between the skin and the underlying muscle and bone. It is a layer of spongy and fibrous tissue that wraps around the body and helps to support the skin, muscles, and organs. Its primary function is to act as a cushion, protecting the underlying structures from trauma, and helping to regulate body temperature. It also plays an important role in providing insulation for the body.

### Deep Fascia

Deep fascia is a type of connective tissue that is located deep within the layers of the skin. It wraps around muscles, bones, and organs to provide stability and support. It also helps to separate and cushion organs from one another and from the underlying structures. Deep fascia also helps to regulate blood flow, provide insulation, and store energy for muscle contraction.



## Visceral Fascia

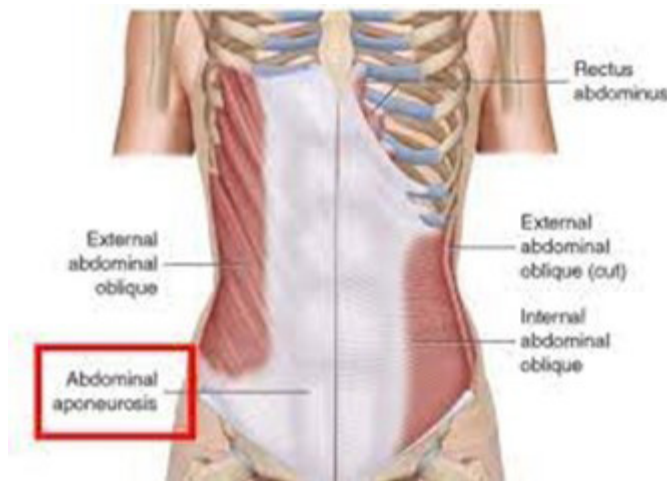
Visceral fascia is a type of connective tissue that surrounds and supports the organs of the body. It is composed of layers of collagen fibers and elastin and provides structural support, protection, and insulation to the underlying organs. It also helps to prevent the organs from shifting or becoming displaced and regulates the flow of blood and other bodily fluids.

## Parietal Fascia

Parietal fascia is a type of connective tissue that helps to support and protect the organs of the body. It is composed of collagen and elastin fibers and is found in many locations throughout the body. The parietal fascia helps to form a protective sac around organs, as well as providing structural support to organs and tissues. Its main function is to keep organs in place and help them to remain in the correct position. It also helps to reduce friction between organs and other structures, allowing them to move smoothly.

## Aponeurosis

Flat, tendon-like deep fascia that attaches muscles to bones or other muscles. It is found throughout the body, and its main function is to provide a flat surface for an extensive range of movement. Aponeurosis is stretched by muscle contractions and absorbs energy to recoil and return muscle to a relaxed position. Elasticity of aponeuroses is essential to transmitting forces from muscle to bone (NASM). Dysfunction of aponeuroses occurs from injury, surgery, scar tissue and muscular imbalances. Since fascia is malleable, trauma and inflammation can damage it causing tightness and restriction often leading to decreased blood flow and pain. Optimal mobility is essential to function and performance.



## Retinaculum

Retinaculum is a type of deep fascia that holds a tendon or muscle in place and prevents it from moving excessively. It is commonly found in the hands and feet, where it helps to keep tendons and muscles in place to allow for optimal movement and function.





## **Main Functions of Fascia**

- Provide structural support and stability to the body, keeping muscles and organs in place and Preventing them from moving out of alignment
- Distributes weight and pressure throughout the body
- Allowing muscles and joints to move freely
- Absorbs shock
- Regulates body temperature
- Reduces friction

## **Muscle/Fascia Terminology**

### **Overactive Myofascia**

A condition in which the band of connective tissue that surrounds muscles (myo-fascia) becomes too tight restricting range of motion. It can cause pain, discomfort, and tightness in the affected area and is often associated with illness and other chronic pain conditions.

Treatment includes stretching, massage, physical therapy, and other forms of manual therapy.

### **Underactive Myofascia**

A condition where the muscles and fascia (the connective tissue that surrounds the muscles) become weak and tight due to lack of use or injury. Symptoms of underactive myo-fascia can include pain, stiffness, and difficulty with range of motion.

Treatment typically involves stretching, strengthening, and manual therapy to help restore normal range of motion.

### **Myofascial Release/Activation**

Myofascial activation is a type of physical therapy that focuses on targeting and releasing tight or restricted muscles, tendons, and fascia, which are the connective tissues that surround and support muscles.

This type of therapy is usually done through hands-on techniques such as soft-tissue manipulation, stretching, and massage. It is used to help reduce pain, improve range of motion and flexibility, and improve overall posture and stability.

Self-Myofascial release is executed unassisted with foam rollers, massage balls, etc. by applying pressure to soft tissue targeting fascia and muscles.

### **Soft Tissue Resistance**

Tissue resistance is the amount of resistance that tissues such as muscles, tendons, ligaments, and fascia offer when they are stretched. As tissues are stretched, they become more tolerant to stretch and consequently more elastic...resistance they offer decreases.

## **The Length/Tension Relationship**

Understanding the length/tension relationship is important for a fitness professional when designing effective and safe workouts for their clients. Muscle length and tension are closely related and can affect how a muscle responds to a particular exercise. By understanding the length/tension relationship, a trainer can maximize the effectiveness of an exercise while minimizing the risk of

injury. This is especially important when working with clients who have specific health or fitness goals. Knowing the length/tension relationship allows the trainer to customize an exercise plan to ensure the client is achieving the desired results in a safe and efficient manner.

The length/tension curve is the relationship between the length of a muscle, and the amount of force it generates at that length. As a muscle shortens or lengthens, its ability to generate tension increases up to a certain threshold. The Length Tension (LT) curve is the maximum isometric force a muscle can generate as the sarcomere length changes. As muscle is stretched from short to long, the force it generates increases over the ascending limb, peaks in the plateau region, and decreases over the descending limb. This relationship is important for understanding how muscles work during movement and how to optimally train a muscle for strength and power.

**Ascending strength curve** - amount of resistance increases as the weight moves through a range of motion.

**Descending strength curve** - the resistance decreases as the weight moves through a range of motion.



### **Underactive vs Overactive and Shortened vs. Lengthened Muscles**

From a resting position, shortened muscles are contracted and remain in a contracted state. They are typically tight and lack flexibility. Lengthened muscles are stretched and remain in a stretched state. They are typically more flexible and can move more freely.

**Underactive muscles** are muscles that have lost strength or have become weak due to several reasons, such as disuse, injury, disease, or aging.

**Overactive muscles** are muscles that have excessive and uncontrolled activation due to nerve or muscle dysfunction. Overactive muscles can lead to pain, spasms, and other problems.

**Shortened muscles** have too much overlap of myosin and actin filament in the resting position. Based on length/tension relationship these muscles could be underactive and weak (inability to generate force) when compared to a muscle in the ideal resting length

**Lengthened muscles** have too little overlap of myosin and actin filament in the resting position and therefore are also underactive or weak based on the length/tension relationship

Lengthened muscles can be overactive and not need stretching. However, they do need activating (NASM)

### **Biotensegrity**

The term coined by Dr. Stephen Levin in the 1970s to describe the structural integrity of living organisms. It is a combination of two words: “biological” and “tensegrity.” Tensegrity is an architectural concept that describes structures composed of isolated components that are held together by tension. In biotensegrity, the components are biological tissues, and the tension is created by the relationships between them. This tension-based architecture is believed to create a structural integrity that is more efficient than the traditional model of bones and muscles. Biotensegrity is thought to be the foundation of how the body moves, maintains balance, and supports itself. When one system is inefficient, imbalances occur to create less than optimal tension to generate force and maintain optimal posture.

## **Skeletal System**

Bones and joints, no bones touch (skull is the exception). Bones float in gelatinous fascia

**Periosteum** – fascia that envelops all bones. The soft tissue that connects bone to bone is called ligaments.

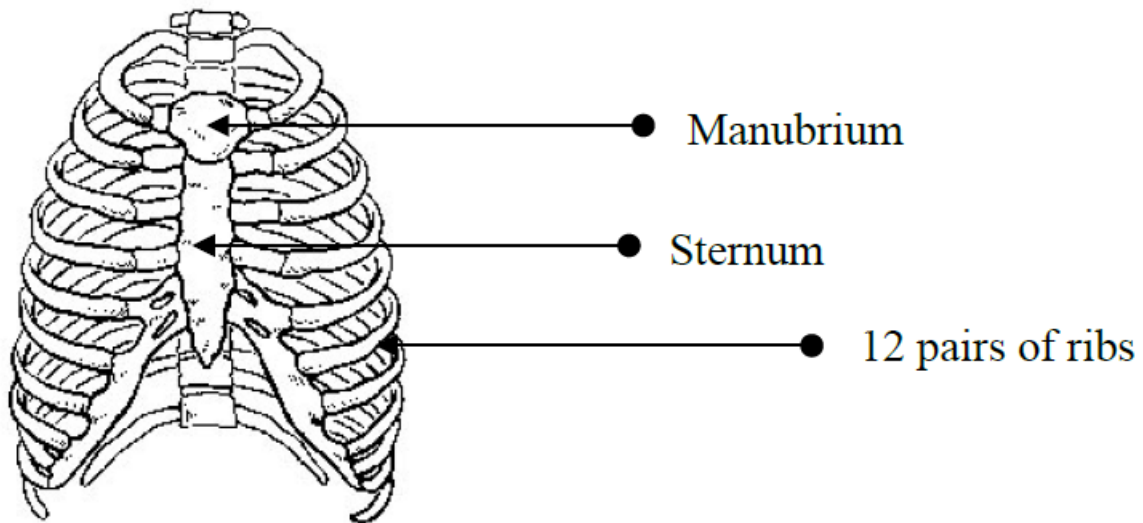
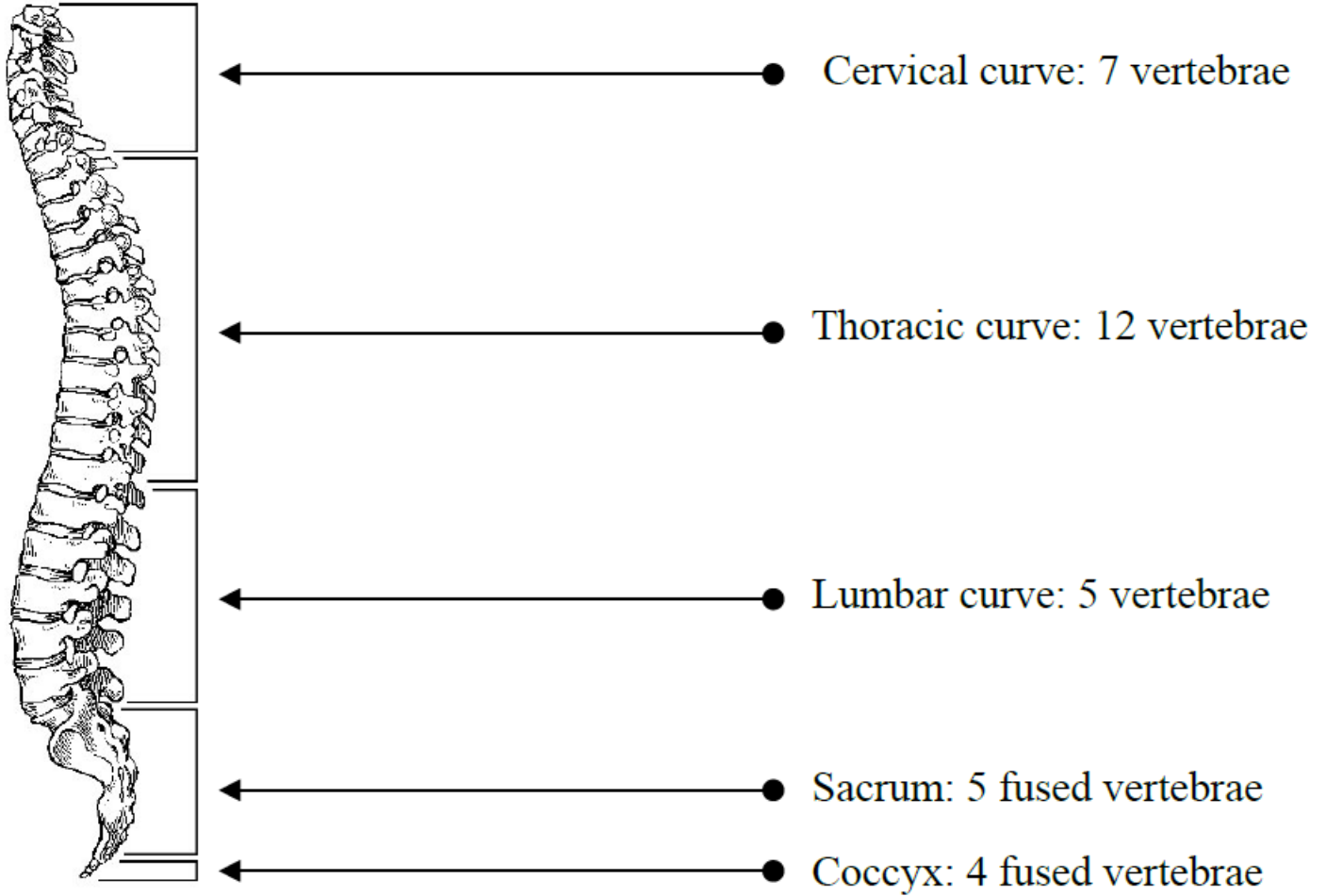
**Overload principle** – The body will adapt to stresses placed upon it. Bones adapt to mechanical loading by getting stronger to accommodate to repetitive forces and soft tissue, muscles heal adapt and heal to stress and stretch

Moving functionally is optimal when bones and joints are balanced and aligned. Evaluation of posture, both static and dynamic is imperative to determining over and underactive areas to be stretched and strengthened

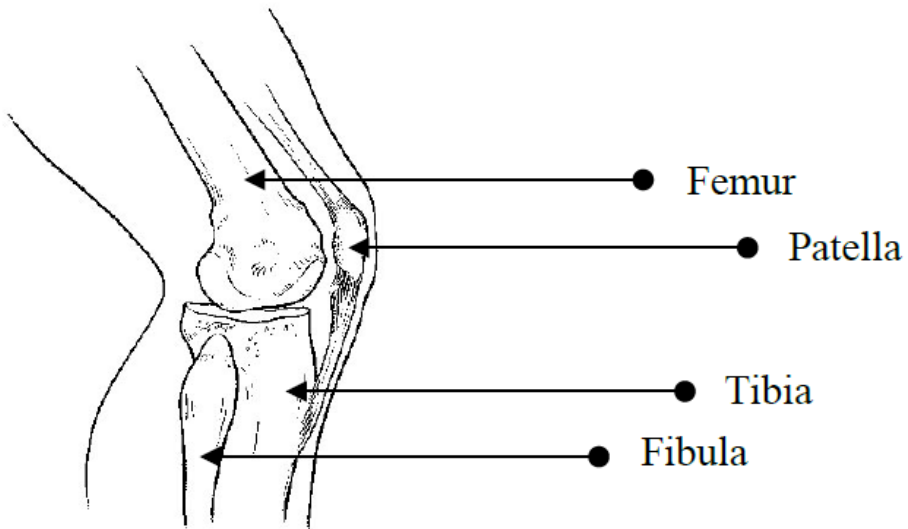
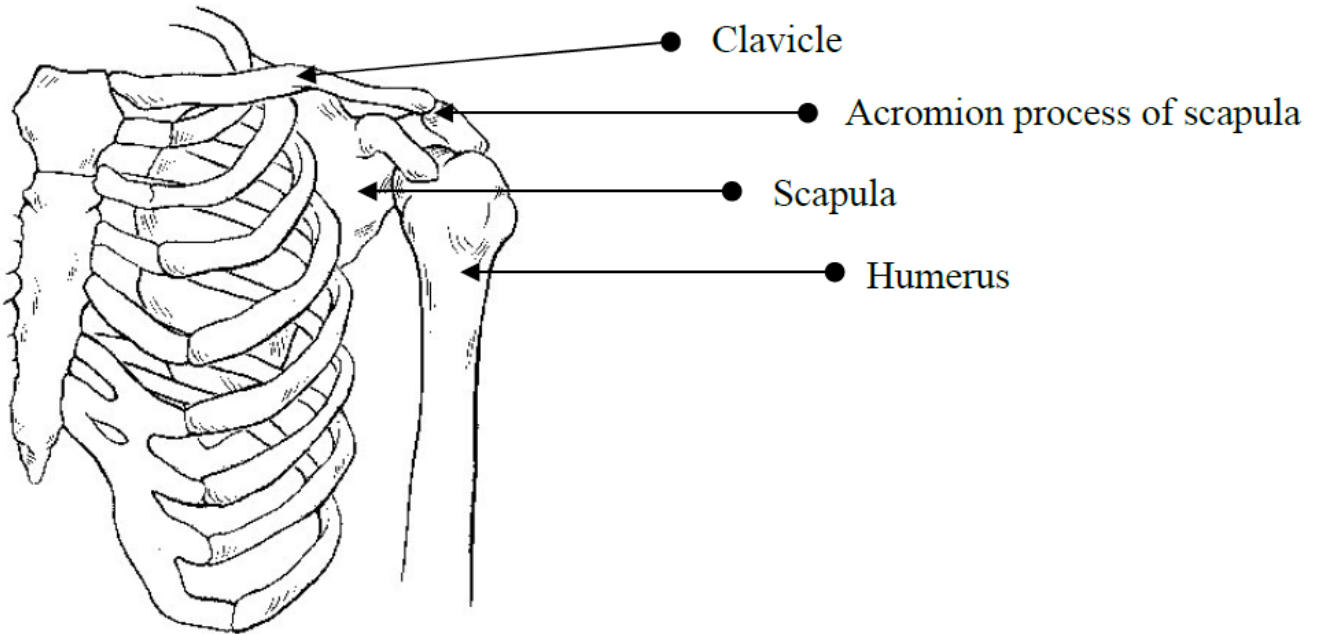
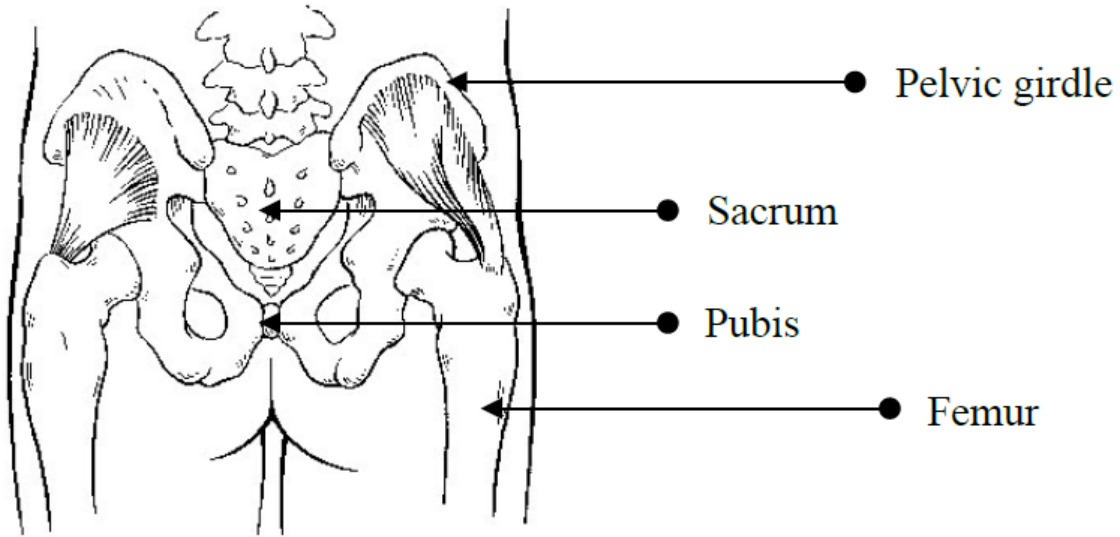
Key points of assessment include

- 1.** Foot/ankle
- 2.** Knee
- 3.** Lumbo-pelvic hip
- 4.** Shoulder
- 5.** Thoracic
- 6.** Cervical

# Skeletal Anatomy







# Nueromuscular Physiology

## Neural Arrangement

The nervous and endocrine systems are the two major communication systems within the body that help control and maintain a stable internal environment (homeostasis) regardless of our surrounding environment or the stimulus placed upon the body (e.g., exercise)

- Both are instrumental in coordinating functions at a cellular, tissue, and organ level.
- The nervous system responds quickly to changes and has short-lived, more localized effects.
- The endocrine system responds more slowly in response to changes and has longer lasting, more generalized effects throughout the body

The nervous system has two major components:

**Central Nervous System (CNS)** that consists of the brain and the spinal cord

**Peripheral Nervous System (PNS)** that consists of the sensory (afferent) division and the motor (efferent) division. It includes all nerves and neuromuscular junctions throughout the body

- The afferent (sensory) division relays information towards the CNS.
- The efferent (motor) division relays information from the CNS.
- This division is further subdivided into the Autonomic (non-voluntary) and Somatic

**The sensory (afferent)** system receives information from the periphery (from the skin, muscles, tendons, sense organs – taste, sight, smell, etc.) and transmits that information to the CNS for processing.

- Information entering the CNS varies regarding the degree of identification, interpretation and selection of response needed.
- Basic reflexive responses such as a knee jerk generally operate through the spine without any need for higher processing, but as the sensory information becomes more advanced and complex, it will travel to higher portions of the brain for processing and selection of an appropriate response.

**The peripheral nervous system (PNS)** consists of two major divisions, the **somatic and autonomic nervous systems**.

The **somatic nervous system** consists of sensory neurons and motor neurons that connect the central nervous system (CNS) to the body's external environment

The **autonomic or visceral nervous system** consists of neurons that control involuntary functions, such as heart rate, respiration, digestion, and endocrine functions.

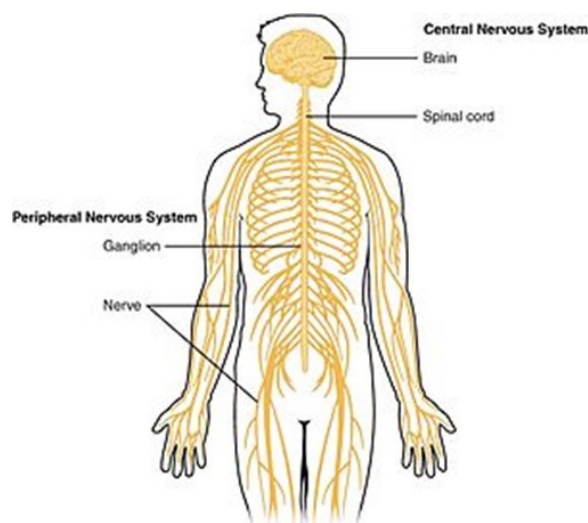
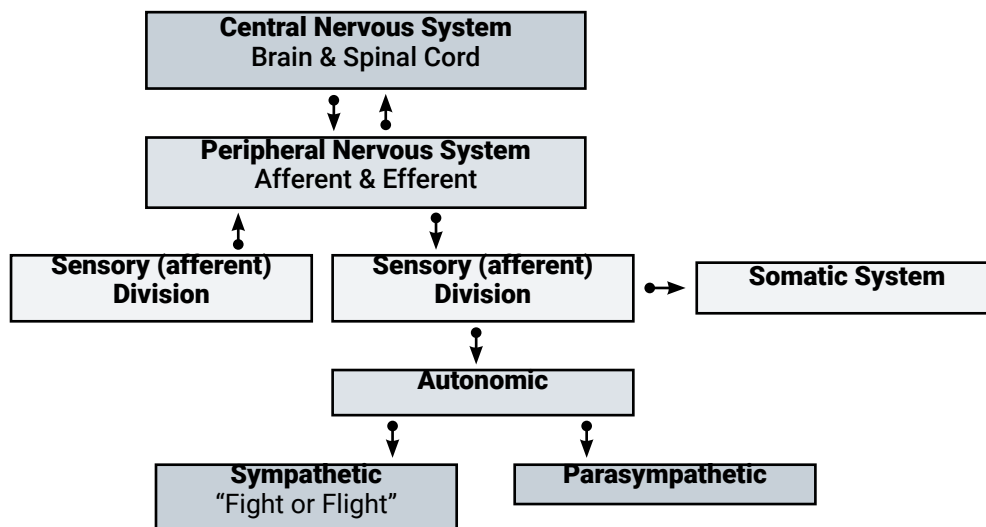
**Motility** is associated with the autonomic nervous system because it is responsible for controlling the smooth muscle contractions that are necessary for the body's digestive processes. The autonomic nervous system is responsible for controlling involuntary movement, such as the heart rate and the

digestion of food that takes place in the gastrointestinal tract. The autonomic nervous system is composed of two components: the sympathetic nervous system and the parasympathetic nervous system. The sympathetic nervous system is responsible for increasing motility in the digestive system, while the parasympathetic nervous system decreases motility. This allows the body to regulate how quickly food is processed, absorbed, and eliminated. Viscera, organs, and other internal structures of the body including the heart, lungs, liver, stomach, intestines can be adversely affected by impaired reflexes that control trunk stability.

**The somatic nervous system** is responsible for the control of voluntary movement. It sends motor signals from the brain to the skeletal muscles to cause movement, as well as sensory signals from the skin, joints, and muscles to the brain. It is also responsible for the control of reflexes, such as the knee-jerk reflex. All conscious activities are controlled by somatic nervous system.

**Motor behavior** is the coordination of muscles, the speed of movement, the sequencing of movements, and the adaptation of movements to environmental demands. It also includes the analysis of how movement is affected by psychological and neurological processes, as well as the effects of motor behavior on learning and performance. Motor learning begins in the Central Nervous systems and spreads peripherally throughout the body.

*The responses will exit the spine and travel along the motor (efferent) nerves to the appropriate muscles to elicit a response.(voluntary) systems*



## Neuron

A nerve cell that transmits information to other cells in the form of electrical signals. Neurons are responsible for processing sensory information, regulating bodily functions, and controlling muscles movement.

## Dendrite

A branch-like structure found on the surface of a neuron. Dendrites receive input from other neurons, allowing the neuron to generate electrical signals that can be sent to other neurons. They are essential for communication between neurons and the body.

## Axon

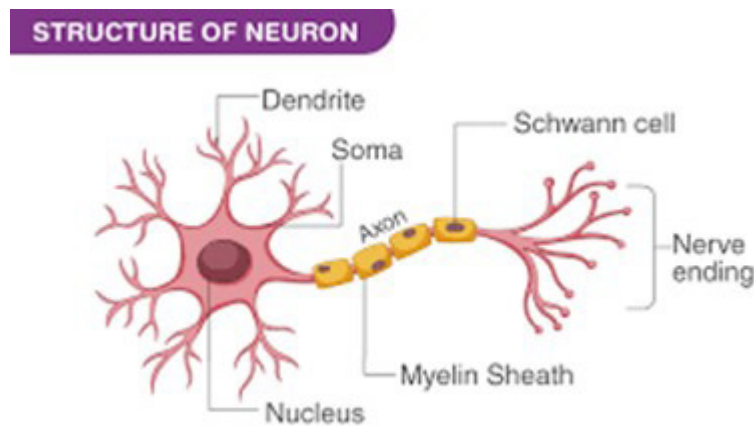
Nerve fibers. Axons are the primary transmission lines of the nervous system, and as bundles, they form nerves.

## Schwann Cell

Cells that produce the myelin sheath that wraps around and insulates axons in the body. This insulation helps to speed up the transmission of signals along the axon. Schwann cells are also involved in the repair and regeneration of damaged nerves in the body.

## Myelin Sheath

A layer of fatty tissue that surrounds and insulates neurons. It is made up of glial cells, which are specialized cells that provide support and protection for the neurons. As mentioned above, the myelin sheath increases the speed at which impulses travel along the neurons and helps to protect them from damage. When damaged, impulses are slowed and less efficient.



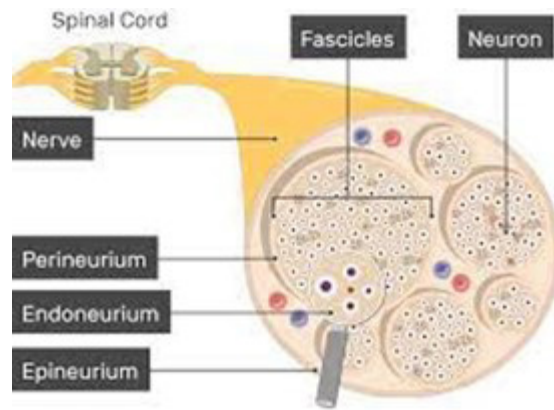
## Fascicles

Fascicles are bundles of nerve fibers that are surrounded by **perineurium**, a layer of fascial connective tissue. These bundles are also arranged in a parallel pattern and provide a way for nerves to transmit signals from the brain to the rest of the body.

**Endoneurium** is a delicate layer of fascial connective tissue around the myelin sheath.

**Epineurium** is the fascia connective tissue that covers a collection of nerve fascicles.





## The Musculo-Skeletal System Connection to the Nervous System

Muscles connect to the nervous system through motor neurons. Motor neurons are a type of nerve cell that send electrical signals from the brain and spinal cord, then through the peripheral system to the muscles. These signals cause the muscles to contract and relax, allowing us to move.

When a motor neuron is stimulated, it releases a neurotransmitter. **Neurotransmitters** transmit signals from one neuron to another by releasing chemicals called neurotransmitters into the synaptic gap between neurons. The neurotransmitter then binds to receptors on the postsynaptic neuron, which may ultimately lead to a muscle contraction.

Neurotransmitters can influence the activity of **mechanoreceptors**, which are nerve cells that detect physical stimuli such as pressure, touch, and vibration. Neurotransmitters can activate or inhibit mechanoreceptors, depending on the type of neurotransmitter.

Fascia is innervated by mechanoreceptors. Mechanoreceptors are sensitive to physical forces such as pressure, stretching, and vibration. They are located throughout the body, including in the fascia, and can provide valuable feedback to the nervous system about the body's movements and environment. Maintaining optimal flexibility allows nervous system to effectively communicate with the body.

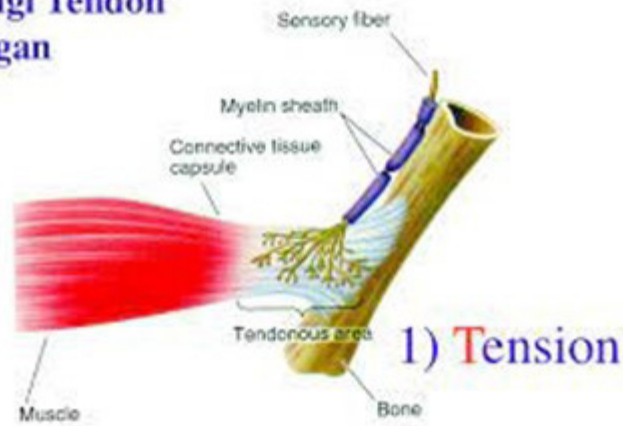
*Tip: Fascia has 6 – 10 times for sensory nerves than muscles (Stillwell, 1957) which makes it a sensitive as skin*

**Proprioceptors** are specialized mechanoreceptors that provide information about the balance, position and orientation of the body and its parts. Sensitive to touch, pressure, vibration both external and internal environments, proprioceptors send information to the brain to coordinate movement and balance.

### **Golgi Tendon Organ**

The Golgi tendon organ (GTO) is a proprioceptor located at the tendinous junction of the muscle and tendon. The GTO protects the muscle from potential injury by detecting excessive tension in the muscle. When tension becomes too great, the GTO sends a signal to the muscle to relax and contract less. This helps prevent the muscle from being overstretched and potentially injured. Relaxing this sensor reduces tension in the tendon and muscle consequently allowing the area to stretch.

## Golgi Tendon Organ



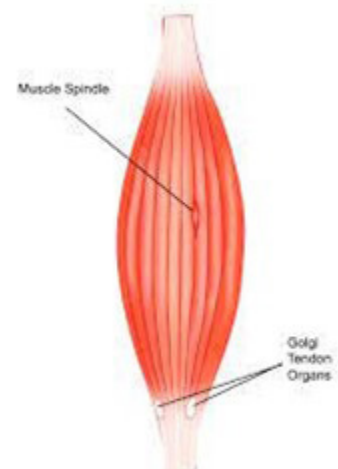
## Muscle Spindles

Mechanoreceptors located in the intrafusal muscle fiber within the belly of skeletal muscles. Responding to mechanical forces such as pressure, touch, and stretch, muscle spindles detect changes in muscle length and rate of stretch. Muscle spindles also trigger the **stretch reflex**, which reflexively contracts the muscle when it is stretched too far, further protecting it from injury. Relaxing this sensor reduces this reflexive contraction allowing the muscle and fascia to lengthen.



## GTO and Muscle Spindle Connection

The Golgi tendon organ works in conjunction with muscle spindles to regulate muscle tension and help protect against injury by providing feedback to the central nervous system about the amount of tension being generated in the muscle. The Golgi tendon organ detects changes in muscle tension and then sends signals to the central nervous system which causes the muscle spindles to relax and reduce tension in the muscle. This helps to prevent the muscle from becoming overstretched or torn due to excessive tension. **GTO rules muscle spindles**



## **Benefits of minimizing Stretch Reflex**

Avoiding stretch reflex when stretching can help prevent injury by allowing the muscles to relax and lengthen gradually. This type of stretching can also help increase flexibility, reduce muscle tension, and improve overall range of motion. Additionally, avoiding the stretch reflex can help prevent the muscles from becoming overworked and sore.

## **How To Avoid Stretch Reflex**

- Warmed up before stretching and exercise
- Breathe deeply and slowly as you stretch and focus on releasing any tension in the muscle.
- Use a slow and controlled movement: When stretching, be sure to move slowly and gently
- Avoid bouncing: Bouncing when stretching can cause the stretch reflex to kick in and cause the muscle to contract
- Short duration of stretch
- Stretching too hard or intensely
- Stretching too fast

# SECTION 3

## Anatomy & Kinesiology

As a fitness professional, a fundamental understanding of anatomy and kinesiology, which is the study of the principles of mechanics related to human movement, is important since an understanding of kinesiology will assist with ensuring Clients perform strength training exercises safely and effectively.

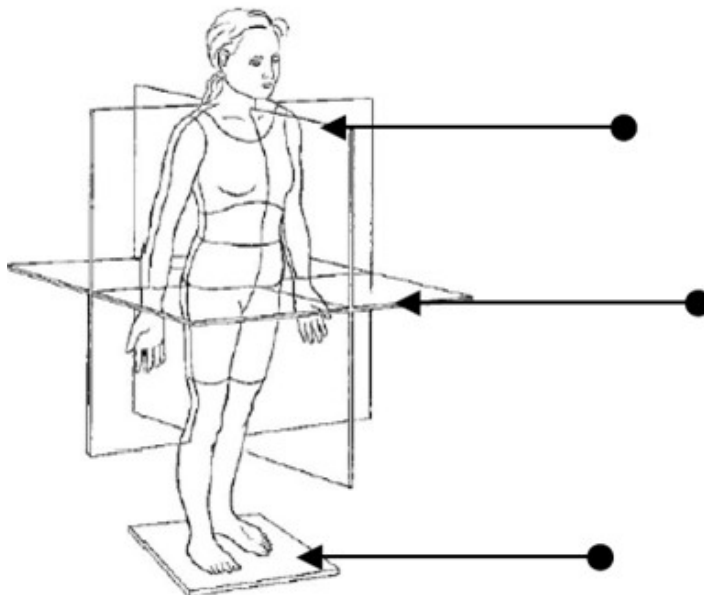
### Three Types of Muscle Actions

- 1. Isometric contraction:** a type of muscle contraction in which the muscle tension remains the same despite a change in muscle length
- 2. Concentric contraction:** a type of muscle contraction in which the muscle shortens as it contracts.
- 3. Eccentric contraction:** a type of muscle contraction in which the muscle lengthens as it contracts

### Planes of Motion

- Sagittal
- Frontal
- Transverse

### Anatomical Terminology





Term	Description
Anterior (ventral)	Toward the front
Posterior (dorsal)	Toward the back
Superior	Toward the head
Inferior	Away from the head
Medial	Toward the midline of the body
Lateral	Away from the midline of the body
Proximal	Toward the attached end of the limb, origin of the structure, or midline of the body
Distal	Away from the attached end of the limb, origin of the structure, or midline of the body
Plantar	The sole or bottom of the feet
Dorsal	The top surface of the feet and hands
Palmar	The anterior or ventral surface of the hands
Cervical (Spine)	Regional term referring to the neck
Thoracic (Spine)	Regional term referring to the portion of the body between the neck and the abdomen; also known as the chest (thorax)
Lumbar (Spine)	Regional term referring to the portion of the back between the abdomen and the pelvis
Sagittal Plane	An imaginary line that divides the body or any of its parts into right and left sections
Frontal Plane	An (imaginary line that divides the body into anterior and posterior parts; lies at a right angle to the sagittal plane)
Transverse Plane	Also known as the horizontal plane; an imaginary line that divides the body or any of its parts into superior and inferior sections

## Muscle Terminology

- **Prime Movers or Agonists** - Muscles primarily responsible for the given joint movement (for example: the Biceps Brachii is the prime mover or agonist for elbow flexion)
- **Antagonists** - Muscles that produce the opposite joint movement when compared to the agonist (for example: the Triceps Brachii is the antagonist to the Biceps Brachii).
- **Synergistic Muscles** - Muscles that act as secondary movers or generally assist the prime mover (for example: the Triceps Brachii is a synergist to the Pectoralis Major during the bench)

press movement).

- **Stabilizer Muscles** - Muscles that stabilize one joint to allow for movement at another joint. Stabilizers are usually located more proximally in relation to the agonist (for example: the muscles around the scapula act as stabilizers to fixate the scapula to the thorax during arm movements).
- **Muscle Origin** - Defines the more fixed end of a muscle
- **Muscle insertion** - Defines the more moveable end of a muscle
- **Ipsilateral** - Referring to muscles on the same side of the body (for example: the left Hamstrings and left Gluteus Maximus)
- **Contralateral** - Referring to muscles on the opposite side of the body (for example: the left Latissimus Dorsi and Right Gluteus Maximus).

## Joint Action

- **Flexion** - Muscle flexion is a movement that bends a joint and decreases the angle between two body parts.
- **Extension** - movement that straightens a joint and increases the angle between two body parts
- **Abduction** - muscle or group of muscles contracts to move a limb or body part toward the midline of the body
- **Adduction** – muscle moves limb away from the midline of the body.
- **Internal Rotation** - muscle contracts to rotate the limb internally, or toward the body's midline
- **External Rotation** - muscle contracts to rotate the limb away from the body's midline
- **Circumduction** - movement where the joint moves in a circular motion
- **Elevation** – Movement where the scapulae are raised up towards the ears
- **Depression** - Movement where the scapulae are lowered away from the ears
- **Retraction** – Movement that draws the scapulae towards the spine
- **Protraction** - Movement that moves the scapulae away from the spine
- **Upward Rotation** – movement of the scapulae up towards the ears and in towards the spine
- **Downward Rotation** – movement of the scapulae down away from the ears and the spine
- **Pronation** – inward and downward rotation
- **Supination** – outward and upward rotation
- **Inversion** - movement of the ankle joint in which the sole of the foot is rotated inward
- **Eversion** - movement of the ankle joint in which the sole of the foot is rotated outward
- **Transverse Shoulder Adduction** (horizontal flexion) – Towards midline, elbows towards chest
- **Transverse Shoulder Abduction** (horizontal extension) – Away from midline, elbows away from chest
- **Transverse Hip Adduction** – towards midline
- **Transverse Hip Abduction** – away from midline

# SECTION 4

## Postural Assessment

### Purpose of Postural Assessment

To evaluate static and dynamic postures that identify the athlete's functional movement and ability to self-correct habits. Assessment might help the coach to evaluate muscle length, joint mobility, and muscle control. Altered posture often relates to muscle and joint imbalances

### Technique

### Static Postural Assessment

**Purpose** - Assess how a client holds alignment in a static position

- Proper posture allows muscles, joints, and nerves to function efficiently.
- Bad posture or structural integrity can lead to imbalances in the muscle or joints.

### Equipment

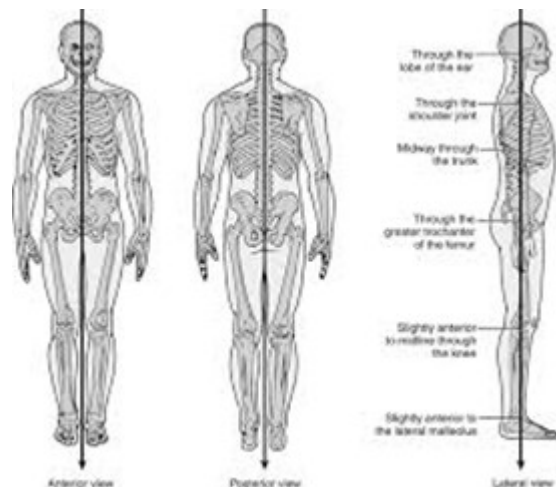
- Goniometer – an instrument for precise measurement of angles
- Observation and assessment

### Procedure:

- Explain the purpose of the test.
- Instruct your client to stand relaxed with feet shoulder width apart as you observe potential imbalances from the frontal plane (anterior and posterior) and the sagittal (side) plane.
- Client stands barefoot
- Coach visually observes athlete's posture from a distance

### Neutral

1. Anteriorly
2. Posteriorly
3. Laterally



# Anterior Checkpoints

## Ankles/Feet

1. Pronation or supination
2. Inversion or eversion
3. Presence of arch
4. Degree of foot turnout
  - Angle originates from hip
  - Angle greater than 12 degrees influences hip and spinal dysfunction

*Deviations can lead to misalignment in knees, hips, and spine*

## Knees

1. Position of kneecap
2. Valgus (adduction/rotation<collapsed>)
3. Varus (abduction/external rotation<bow-legging>)

**Hips** – the hub or center for most dysfunction

1. Adduction of hips
  - One side being hiked up
  - The hip that is elevated is adducted
  - Hip shift
2. Torque

*Deviation reflects weakness or inactivity of hip and spinal stabilizers such as hip abductors (gluteus medius)*

## Shoulders

1. Elevation of shoulders
2. Asymmetrical elevation of one shoulder
3. Rounded Shoulders
4. Sunken chest
5. Arm position
  - Arms out of neutral
  - Palms facing body – thumbs pointing to midline of body
6. Shoulder torque

*Deviation reflects scapular and thoracic spinal mobility and stability*

## Neck and Head

1. Tilting or leaning to one side
2. Rotation
3. Position of eyes

# Lateral Checkpoints

## Feet/Ankles

Plantar/Dorsi-flexion

## Knees

1. Hyperextension or locking out of knees (knees should be soft)
2. Excessive leaning forward from locked out knees

*Deviation may put excessive pressure on ankles, toes, arches inferiorly and lower back, hamstrings superiorly*

## Pelvis/Lumbar Spine

1. Anterior or Posterior tilt – ASIS (anterior superior iliac spine) and PSIS (posterior superior iliac spine) should be dead level with ground (parallel)
2. Hip torque (inward/outward rotation)

*Anterior deviation might lead to underactive glute and hamstring activation and overactive hip flexors and lower back muscles. Posterior deviation might lead to overactive rectus abdominis and hamstrings*

## Shoulders/Thoracic Spine

1. Excessive Kyphosis
2. Scapular elevation
3. Shoulder torque

*Deviation might lead to overactive pectorals, latissimus dorsi, upper trapezius and underactive mid-back muscles. Scapular and thoracic spinal stability and mobility issues might be present*

## Neck and Head

Ears forward of shoulders (15 – 20lbs of pressure for every inch the head is forward of shoulders)

*Deviations in pelvis alignment might lead to misalignment in neck – assess hips first*

LOOK FOR LEANING FORWARD

# Posterior Checkpoints

## Ankles and knees

Plantar or Dorsi-flexion

**Hips** - the HUB for most dysfunction

1. Adduction of hips
  - One hip hiked up
  - The hip that is elevated is adducted
2. Torque
3. Ischial tuberosity position



Deviation reflects weakness or inactivity of hip and spinal stabilizers such as hip abductors (*gluteus medius*)

### Shoulders/Thoracic Spine

1. Elevation
2. Protraction
3. Internal rotation
4. Tilting to one side
5. Winging
6. Inferior scapula is greater than 1.5 inches away from spine
7. Torque

Deviation might lead to overactive pectorals, *latissimus dorsi*, *upper trapezius* and underactive mid-back muscles. Scapular and thoracic spinal stability and mobility issues might be present

## Test Interpretation Chart

### 1. Deviation of Ankle pronation/supination and effect on the feet and tibia

Hip Adduction			
Observation	Position	Alignment	Plane of View
Ankle joint pronation (bend in)	Eversion	Internal rotation	Frontal (Anterior)
Ankle joint supination (bend out)	Inversion	External rotation	Frontal (Anterior)

### 2. Deviation of hip adduction

Hip Adduction			
Observation	Position	Alignment	Plane of View
Right hip adduction	Elevated (vs. left side)	Hips shifted to right	Frontal (Posterior)
Left hip adduction	Elevated (vs. right side)	Hips shifted to left	Frontal (Posterior)

### 3. Deviation of the head position

<b>Pelvic Tilt</b>		
	<b>Anterior Tilt</b>	<b>Posterior Tilt</b>
<b>Rotation</b>	Pelvis tilts downward and forward	Pelvis tilts upward and backward
<b>Muscles suspected to be tight</b>	Hip flexors, erector spinae	Rectus abdominis, hamstrings
<b>Muscles suspected to be lengthened</b>	Hamstrings, rectus abdominis	Hip flexors, erector spinae
<b>Plane of View</b>	Sagittal	Sagittal

### 4. Deviation of the head position

<b>Shoulder Position</b>		
<b>Observation</b>	<b>Muscles Suspected to be Tight</b>	<b>Plane of View</b>
Shoulders not level	Upper trapezius, levator scapula, rhomboids	Frontal
Asymmetry to midline	Lateral trunk flexors (flexed side)	Frontal
Medially rotated humerus	Pectoralis major and latissimus dorsi, subscapularis	Frontal
Protracted (forward/rounded shoulder)	Serratus anterior, anterior scapula-humeral muscles, upper trapezius	Sagittal
Kyphosis and depressed chest	Shoulder adductors, pectoralis minor, rectus abdominis, internal oblique	Sagittal

### 5. Deviation of the head position

<b>Head Position</b>		
<b>Observation</b>	<b>Muscles Suspected to be Tight</b>	<b>Plane of View</b>
Forward-head position	Cervical spine extensors, upper trapezius, levator scapulae	Sagittal

# Dynamic Assessment and Movement Screens

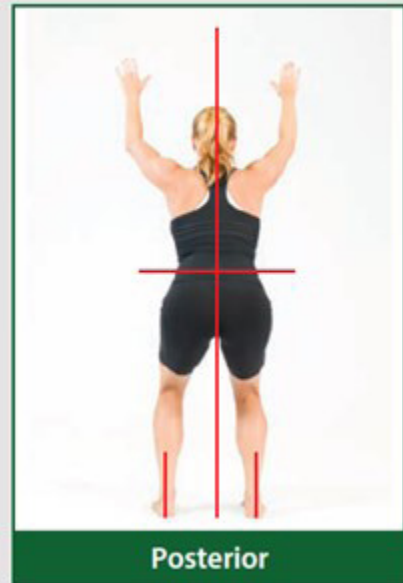
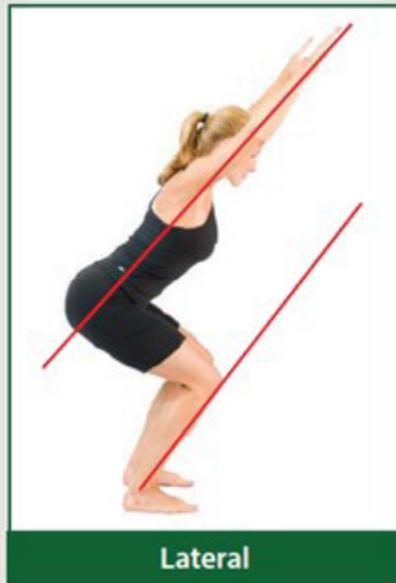
## Purpose

To reinforce observations made during static postural assessment and identify new postural imbalances associated with dynamic flexibility, balance, and core stability

## Overhead Squat



### Overhead Squat Views



## Modifications



### Technique – Anterior/Posterior View

1. Athlete stands barefoot
2. Feet hip width apart – neutral postural position
3. Arms straight and shoulders flexed overhead
4. Eyes forward
5. Client squats at tempo
  - 2 – 4 seconds down (eccentric)
  - 1 second hold at bottom (isometric)
6. 2 – 4 seconds up (concentric)
7. Instruct athlete to sit in chair
8. Coach observes compensation/deviation of athlete

### Checkpoints

1. Feet straight
2. Knees aligned with 2nd – 3rd toes
3. Hips square
4. Shoulders depressed
5. Eyes forward

### Deviations

1. Feet Flatten or roll out – inversion or eversion
2. Knees collapse or move inward
3. Hips shift to one side
4. Shoulders elevate
5. Eyes down



### Technique – Lateral View

1. Athlete stands then turns to lateral view
2. Feet hip width apart
3. Arms straight and shoulders flexed overhead
4. Client squats at tempo
  - 2 – 4 seconds down (eccentric)
  - 1 second hold at bottom (isometric)
  - 2 – 4 seconds up (concentric)
5. Coach observes compensation/deviation of athlete

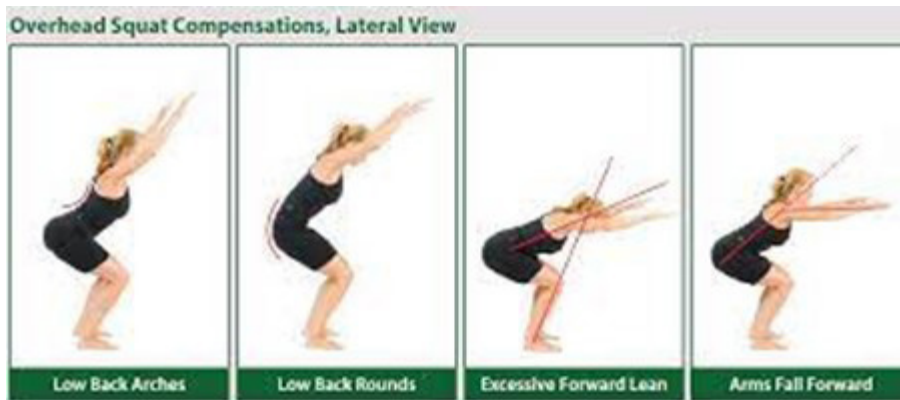
### Checkpoints

1. Position of pelvis and spine
2. Torso angle
3. Arm and shoulder position
4. Head position

### Compensation/Deviation

1. Excessive pelvic tilt – anteriorly or posteriorly
2. Leaning forward
3. Inability to maintain shoulder flexion





## Thomas Test

**Purpose:** Assess the length of the major hip flexor muscles.

- Hip flexors or iliopsoas.
- Rectus femoris (one of the quadriceps muscles).  
**\*\* Note:** This test should not be conducted on Clients suffering from low back pain unless cleared by their physician.

### Equipment

- Stable table.

### Procedure

- Explain the purpose of the test and provide a brief demonstration.
- Allow for warm-up and active ROM if needed.
- Instruct your Client to sit at the end of a table with their mid-thigh aligned with the edge of the table.
  1. Ask your Client to lift both knees gently towards their chest as you slowly assist them; roll back onto the table to touch their back and shoulders to the tabletop.
  2. In the supine position, their low back and sacrum should lay flat against the table.
  3. Instruct your Client to pull one thigh (hip) deeper towards their chest while reaching with both hands to grasp the backside of the thigh without raising or moving their torso from the table.
  4. Ask them to relax the opposite leg slowly allowing that knee to fall towards the table – this positions the hip of the lowered leg into extension (~ 10°) while stretching the hip flexors.
- Given the nature of the movement associated with this test, Fitness Pros may want to consider placing a towel over the client's groin area.

### Test Interpretation

1. The back of the lower thigh should touch the table.
  2. The knee should demonstrate about 80° of flexion.
  3. The knee should remain aligned and straight.
- Tightness in all muscles:
    - With the back and sacrum flat, check to see that the back of the lower leg does not touch the table and the knee doesn't flex to 80°. This indicates that it is reasonable to assume tightness in all four hip flexor muscles.
  - Tightness in the hip flexors:

- With the back and sacrum flat, if the back of the lower leg does not touch the table, but the knee does flex to 80°, then suspect tightness in the iliopsoas.
- Tightness in the Quadriceps:
  - With the back and sacrum flat, if the back of the lower leg does touch the table, but the knee does not flex to 80°, then suspect tightness in the rectus femoris.



## Shoulder Internal and External Rotation Test

**Purpose** Assess the rotation of the humerus at the shoulder joint

### Equipment

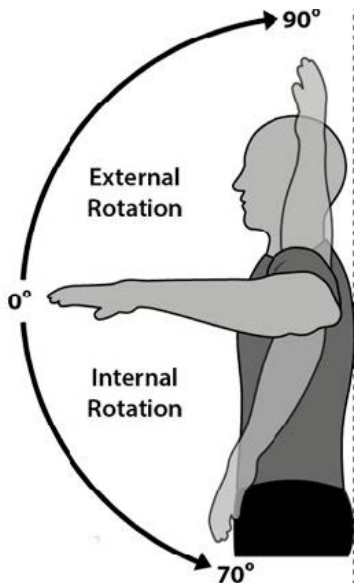
- Exercise mat (can also be done against the wall)

### Procedure

- Explain the purpose of the test.
- Instruct your Client to lie supine with their legs bent and back flat on the mat, with arms 90-degrees from the body with a 90-degree bend at the elbow.
- The upper arms must stay aligned with the shoulder and rest against the mat throughout the test
  1. External Rotation: Have the client rotate their forearms backward toward the mat, aiming to rest the forearms and back of hands on the mat. (there should be no arching in the back and maintain a neutral wrist)
  2. Internal Rotation: Have the client rotate their forearms forward towards the mat, aiming to rest their forearms and palm on the mat. (there should be no arching in the back and maintain a neutral wrist)

### ✓ **Test Interpretation:**

- Normal external rotation is indicated by being able to rotate the forearms back 90 degrees to touch the mat.
- Normal internal rotation is indicated by being able to rotate the forearms forward 70 degrees toward the mat.



## Bend and Lift Screen

**Purpose** Assess symmetrical mobility and stability during a bend and lift movement.

### Equipment

- Two dowels, pvc pipes, or brooms.

### Procedure

- Explain the purpose of the test.
- Instruct your Client to stand relaxed with feet shoulder width apart and place the dowels on the outside of each foot.
- Have the client perform a squatting movement to bend and lift the dowels off the floor and repeat as many times as necessary. (Do not cue good form but observe the natural movement)

### Test Interpretation

Hip Adduction				
Observation	Compensation	Overactive/tight Muscle	Lengthened/ Underactive Muscle	Plane of View
Feet	Ankles collapse inward	Soleus, lateral gastrocnemius	Medial gastrocnemius, tibialis group, sartorius	Frontal (Anterior)
Knees	Move inward	Hip adductors, tensor fascia latae	Gluteus medius and maximus	Frontal (Anterior)
Torso	Lateral shift to side	Muscle imbalance due to potential lack of stability		Frontal (Anterior)

Feet	Unable to keep heels down to floor	Plantar flexors	N/A	Sagittal
Hip and Knee	Knee initiates movement	May indicate quadricep and hip flexor dominance, or underactive gluteus group		Sagittal
Tibia and torso relationship	Unable to achieve parallel between tibia and torso	Lack of dorsiflexion due to tight plantar flexors		Sagittal
Lumbar and thoracic spine	Back excessively arches Back rounds forward	Hip flexors, back extensors, latissimus dorsi  Latissimus dorsi, teres major, pectoralis major and minor	Core, rectus abdominis, gluteal group, hamstrings  Upper back extensors	Sagittal

Data from: Kendall, F.P. et al. (2005). *Muscles Testing and Function with Posture and Pain* (5th ed.). Baltimore, Md.: Lippincott Williams & Wilkins; Cook, G. (2003). *Athletic Body in Balance*. Champaign, Ill.: Human Kinetics; Donnelly, D.V. et al. (2006). The effect of direction gaze on kinematics during the squat exercise. *Journal of Strength and Conditioning Research*, 20, 145-150; Fry, A.C., Smith J.C., & Schilling, B.K. (2003). Effect of knee position on hip and knees torques during the barbell squat. *Journal of strength and Conditioning Research*, 16, 516- 524; Sahrman, S.A. (2002). *Diagnosis and Treatment of Movement Impairment Syndromes*. St. Louis, Mo.: Mosby.



# Common Compensations, Muscle Imbalances and Corrective Strategies

Compensations, Muscles Imbalances and Corrective Strategies						
View	Checkpoint	Compensation	Probable Overactive Muscles	Probable Underactive Muscles	Sample SMR (Foam Roll) and Static Stretch Techniques	Sample Strengthening Exercises
Anterior	Feet	Turn Out	Soleus Lateral gastrocnemius Biceps femoris (short head)	Medial gastrocnemius Medial hamstring complex Gracilis Sartorius Popliteus	SMR: Gastrocnemius/ soleus SMR: Biceps femoris (short head) Static gastrocnemius stretch Static supine biceps femoris stretch	Single-leg balance reach
	Knees	Move Inward	Adductor complex Biceps femoris (short head) Tensor fascia latae Vastus lateralis	Gluteus medius/maximus Vastus medialis oblique (VMO)	SMR: Adductors SMR: TFL/IT band Static supine biceps femoris stretch Static standing TFL stretch	Tube walking: side to side
Lateral	LPHC	Excessive Forward Lean	Soleus Gastrocnemius Hip flexor complex (TFL, rectus femoris, psoas) Abdominal complex (rectus abdominis, external obliques)	Anterior tibialis Gluteus maximus Erector spinae	SMR: Gastrocnemius/ soleus SMR: Quadriceps Static gastrocnemius stretch Static kneeling hip flexor stretch	Quadruped arm/opposite leg raise Ball wall squats
		Low Back Arches	Hip flexor complex (TFL, rectus femoris, psoas) Erector spinae Latissimus dorsi	Gluteus maximus Hamstring complex Intrinsic core stabilisers (transverse abdominus, multifidus, transversospinalis, internal oblique, pelvic-floor muscles)	SMR: Quadriceps SMR: Latissimus dorsi Static kneeling hip flexor stretch Static latissimus dorsi ball stretch	Quadruped arm/opposite leg raise Ball wall squats
	Upper Body	Arms Fall Forward	Latissimus dorsi Teres major Pectoralis major/minor	Mid/lower trapezius Rhomboids Rotator cuff (supraspinatus, infraspinatus, teres minor, subscapularis)	SMR: Thoracic spine SMR: Latissimus dorsi Static latissimus dorsi ball stretch Static pectoral wall stretch	Squat to row
		Shoulder Elevate (pushing/pulling assessment)	Upper trapezius Sternocleidomastoid Levator scapulae	Mid/lower trapezius	SMR: Upper trapezius (Thera Cane) Static stretch upper trapezius/ scalene stretch	Ball cobra
		Head Protrudes Forward (pushing/pulling assessment)	Upper trapezius Sternocleidomastoid Levator scapulae	Deep cervical flexors	SMR: Upper trapezius (Thera Cane) Static stretch upper trapezius/ scalene stretch	Chin tuck (keep head in neutral position during all exercises)

(NASM)

## Average Range of Motion at Specific Joints (Healthy Adults)

Joint and Movement	ROM (°)	Joint and Movement	ROM (°)
<b>Shoulder:</b>		<b>Thoraco-lumbar Spine</b>	
Flexion	150 – 180°	Rotation	30 – 45°
Extension	50 – 60°	<b>Hip</b>	
<b>Cervical Spine:</b>		Extension	30°
Rotation	65 – 75°	<b>Knee</b>	
		Flexion	125 – 145°
		<b>Ankle</b>	
		Dorsiflexion	20°
		Plantar Flexion	45 – 50°



# SECTION 5

## Fascial Lines

Fascial Lines (Nets) provide a great approach to understanding how the body functions, transmits power, and enables movement. Understanding that muscles rarely work in isolation rather multiple systems are integrated to generate movement. This is key to resolving many mobility issues and optimizing function. According to Thomas Myers, no matter what muscles do individually, each affects tissues throughout the entire body through fascial based interconnections.

**Front Functional Line (FFL)** – lower edge of pec major, lateral sheath of Rectus Abdominis and Adductor longus

### Stretches

- Chest Stretch
- Adductor Stretch

**Back Functional Line (BFL)** – Latissimus Dorsi, Lumbodorsal Fascia, Sacral Fascia, Sacral Fascia, Contralateral Gluteus Max, Vastus Lateralis, Sub-patellar Tendon

### Stretches

- Glute Stretch
- Latissimus Dorsi Stretch – Side Lying

**FFL**



**BFL**



**Spiral Line (SL)** – Splenius Capitis and Cervicis, Contra-lateral, Rhomboids Major/Minor, Serratus Anterior Infraspinus, External Oblique, Abdominal Aponeurosis, Linea Alba, Contralateral Internal Oblique, Tensor Fascia Latae, Iliotibial Tract, Tibialis Anterior, Peroneus Longus, Biceps Femoris, Sacrotuberous Ligament, Sacrolumbar Fascia Erector Spinae

*Stretches*

- Supine Rotational stretch
- TRX Stretch

**Superficial Front Line (SFL)** – Scalp Fascia, Sternocleidomastoid, Sternalis/Sternochondral fascia, Rectus Abdominis, Rectus Femoris/Quadriceps, Subpatellar Tendon, Short and Long Toe Extensors, Tibialis Anterior, Anterior Crural Compartment

*Stretches*

- Side Lying Hip Flexor/Quad Stretch
- Hip Flexor/Quad Stretch – Thomas Test

**Deep Front Line (DFL)** - Deep neck muscles/scalene, Throat muscles, Lungs and Heart muscles and fascia, Diaphragm, Anterior spine, Psoas, Iliacus, Pectineus, Pelvic Floor Muscles (Obturator, Levator Ani), Hip Adductors, Popliteus, Tibialis Posterior, Long Toe flexors

*Stretches*

- Hip Flexor Stretch – Thomas Test
- Adductor Stretch

**Lateral Line (LL)** – Splenius Capitis, Sternocleidomastoid, External and Internal intercostals, Lateral Abdominal Obliques, Gluteus Maximus, Tensor Fascia Latae, Iliotibial Tract/Abductor Muscles, Anterior Ligament of the Fibula, Peroneal, Lateral Crural Compartment

*Stretches*

- Glute Stretch
- Lateral Lumbopelvic Stretch

**Superficial Back Line (SBL)** – Galea Aponeurotica/Epicranial Fascia, Sacrolumbar Fascia/Erector Spinae, Sacrotuberous Ligament, Hamstrings, Gastrocnemius/Achilles Tendon, Plantar Fascia, Short Toe Extensors

*Stretches*

- Calf Stretch
- Hamstring Stretch



**Superficial Front Arm Line (SFAL)** – Pectoralis Major, Latissimus Dorsi, Medial Intermuscular Septum, Flexor Group, Carpal Tunnel

*Stretches*

Shoulder against wall stretch

**Deep Front Arm Line (DFAL)** – Pectoralis Minor, Clavipectoral Fascia, Biceps Brachii, Radial Periosteum, Anterior Border, Radial Collateral Ligaments

*Stretches*

Shoulder against wall stretch – fingers together, arm abducted – palm down

**Superficial Back Arm Line (SBAL)** – Trapezius, Deltoid, Lateral Intermuscular Septum, Extensor Group

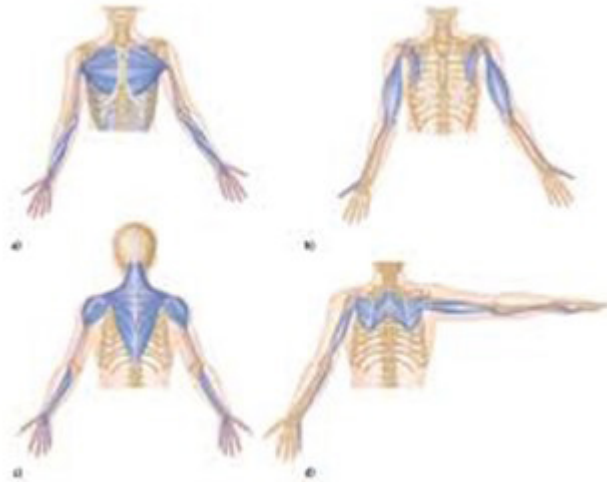
*Stretches*

- Trapezius Stretch
- Internal Shoulder Rotators

**Deep Back Arm Line (DBAL)** – Rhomboids, Levator Scapulae, Rotator Cuff Muscles, Triceps Brachii, Ulnar Periosteum, Ulnar Collateral Ligaments, Hypothenar Muscles

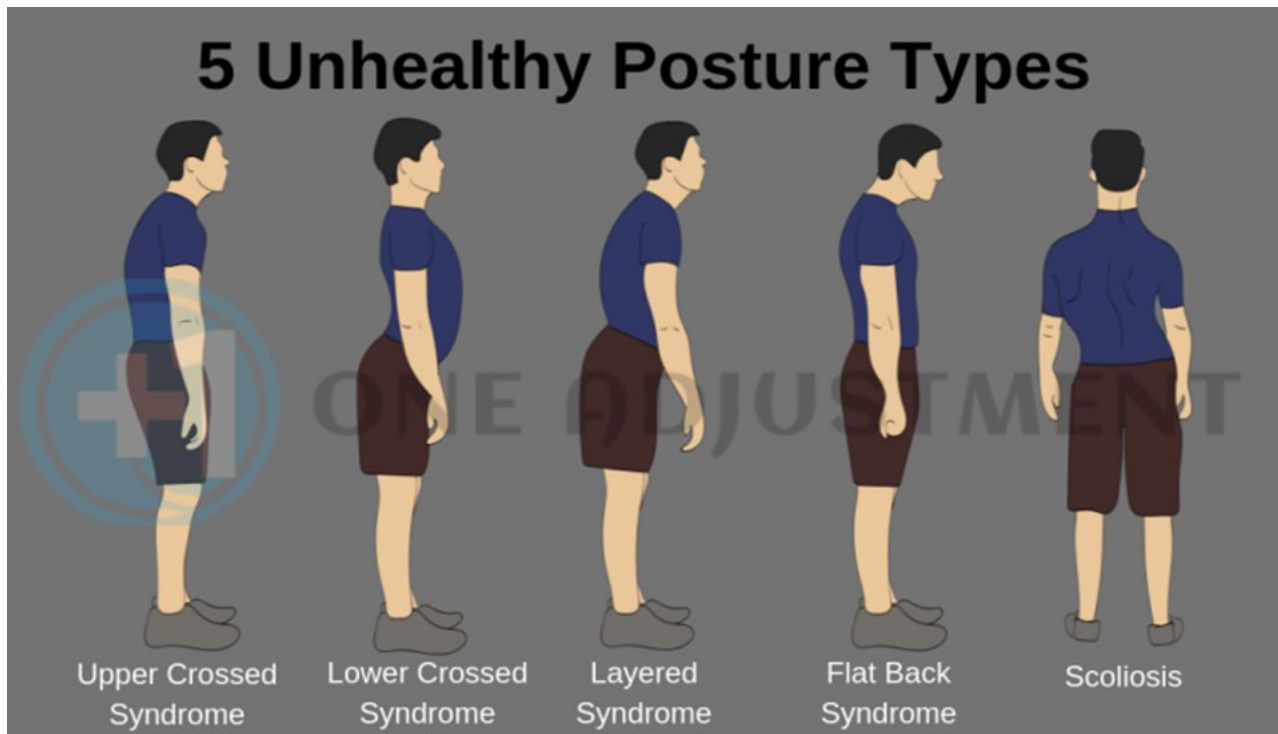
*Stretches*

Rhomboids Stretch



# SECTION 6

## Identifying Typical Imbalances



### Upper Crossed Syndrome

Upper Crossed Syndrome (UCS) is a postural disorder characterized by sustained overactivity of the upper trapezius and levator scapulae muscles, along with tightness in the pectoralis minor and major muscles and lengthened and weakened deep neck flexors and rhomboids. It is associated with forward head, rounded shoulders, increased thoracic kyphosis, and downward rotation of the scapulae. UCS can lead to biomechanical imbalances and pain in the neck and shoulder regions.

It looks like a person with rounded or hunched shoulders, with a head that sits in front of the body with elevated chin (extreme curvature of the neck and upper back). Symptoms include headaches, pain & weakness on the anterior of the body.

Goal: Increase space in the chest and shoulders on the front side of the body



<b>Upper Cross Syndrome</b>		
<b>Static Position</b>	<b>Shortened/Overactive Muscles</b>	<b>Lengthened/Underactive Muscles</b>
Forward Head Cervical spine is extended Shoulders are Rounded Lumbar spine is normal or extended	Cervical Extensors Upper trapezius Levator Scapulae Sternocleidomastoid Scalene Latissimus Dorsi Teres Major Subscapularis Pectoralis Major and Minor	Deep Cervical Flexors Serratus Anterior Rhomboids Trapezius – Mid/Lower Teres Minor Infraspinatus

## Lower Crossed Syndrome

Lower crossed syndrome is a muscular imbalance of the lower body that involves tightness in the hip flexors, lower back muscles, and lateral hip musculature, as well as weakness in the abdominal wall, gluteus medius, and posterior hip musculature including gluteus maximus. This muscular imbalance can lead to dysfunction in the low back and hip, resulting in pain and decreased mobility.


A person with lower crossed syndrome typically displays a posture in which the pelvis is tilted forward, and the chest is slightly collapsed. The shoulders may be rounded forward, and the head may be pushed forward. This type of posture can cause the hips to be pulled tight and the abdominal muscles to be weak, resulting in a sway in the lower back. The person may also have tightness in the hip flexors, which can cause the legs to be held in a position of flexion. Additionally, the person may have difficulty standing up straight and may experience frequent lower back pain.

<b>Lower Cross Syndrome</b>		
<b>Static Position</b>	<b>Shortened/Overactive Muscles</b>	<b>Lengthened/Underactive Muscles</b>
Pelvis is anterior tilted Hips are flexed Knees are hyperextended Ankles are plantar flexed	Gastrocnemius Soleus Hip Flexor Complex Adductors Latissimus Dorsi Erector Spinae	Anterior Tibialis Posterior Tibialis Hamstrings Gluteus Maximus Gluteus Medius Transverse Abdominus Obliques

# Layered Crossed Syndrome

A combination of both upper crossed and lower crossed syndrome and pattern of muscular imbalances. It is characterized by overactive and tight muscles in the chest, upper and lower back, as well as weak and inhibited muscles in the hip and shoulder girdle and middle back region. This can lead to postural issues, as well as potential pain and/or injury to the shoulder, neck, and back.

<b>Layered Cross Syndrome</b>		
<b>Static Position</b>	<b>Shortened/Overactive Muscles</b>	<b>Lengthened/Underactive Muscles</b>
Cervical spine is extended	Cervical Extensors	Deep Cervical Flexors
Shoulders are Rounded	Upper trapezius	Serratus Anterior
Lumbar spine is extended	Levator Scapulae	Rhomboids
Pelvis is anteriorly tilted	Erector Spinae	Trapezius – Mid/Lower
Knees hyperextended	Latissimus Dorsi	Teres Minor
Ankles are plantar flexed	Hip Flexor Complex	Infraspinatus
	Adductors	Gluteus Maximus
	Gastrocnemius	Gluteus Medius
	Soleus	



# SECTION 7

## Types of Stretching

### Static Stretching

Slowly stretching a muscle or tissue to a point and holding it for a set period of 10-30 seconds. Often done after the workout or after fatiguing a muscle group when the body is warm

#### *Benefits*

- Increased flexibility
- Improved range of motion
- Decreased risk of injury
- Reduces muscle tension
- Reduces muscle soreness

### Dynamic Stretching

Actively moving a joint through its full range of motion and is often used as part of a warm-up routine to prepare the body for exercise or intense movement

#### *Benefits*

- Improved acute flexibility
- Reduced risk of Injury
- Improved performance
- Improved coordination
- Improved mind-body connection

### Ballistic Stretching

Involves rapid bouncing movements to stretch a muscle beyond its normal range of motion and is most appropriate after a thorough warm-up, never done cold

#### *Benefits*

- Improved acute, soft tissue flexibility
- Improved performance
- Improved coordination
- Reduced risk of injury
- Increase strength

## Active Stretching

Using your own muscles to stretch a joint by contracting the opposing muscle group

### Benefits

- Improved flexibility
- Increased joint range of motion
- Improved posture
- Increased blood flow to reduce muscle soreness
- Enhanced performance

## Passive Stretching

Using an external force such as a partner, device, or a wall to move a joint beyond its normal range of motion

### Benefits

- Increased soft tissue range of motion
- Reduced risk of injury
- Improved circulation for overall well-being
- Decreased stress
- Improved posture

## Proprioceptive Neuromuscular Facilitation (PNF)

PNF Stretching involves both the stretching and contracting of muscles to increase range of motion and flexibility. PNF stretching involves a series of isometric contractions and relaxations of the muscle being stretched, which can help to increase flexibility and range of motion more quickly than traditional static stretching (Contract/Relax)

### Autogenic inhibition PNF

A type of muscle relaxation technique that combines passive stretching and active muscle contraction with the goal of increasing soft tissue flexibility and joint range of motion. It uses the principle of autogenic inhibition, a technique used to relax contracted muscle in response to a sustained, gentle stretch. This technique can help reduce muscle tightness, improve muscle coordination, and increase joint range of motion.

### Reciprocal inhibition PNF

A type of physical therapy technique used to improve muscle strength, flexibility, and coordination. It involves stretching a muscle, then contracting the opposing muscle group to relax the stretched muscle. This technique helps to restore proper balance to the body, improve postural alignment, and enhance neuromuscular coordination.



# SECTION 8

## Assisted Stretching Techniques

### Practical Application

- 1. Static-Hold PNF:** This type of stretching involves alternating between holding a muscle in a stretched position for 10-20 seconds, then contracting the muscle for 5-10 seconds while the stretch is held.
- 2. Autogenic Inhibition PNF:** This type of stretching is similar to static-hold PNF but involves contracting the focus (agonist) muscle to a greater degree. After the muscle contraction, the muscle is relaxed, and the static stretch is held for 10-20 seconds. Autogenic Inhibition interferes with the neural impulse from the Golgi Tendon Organ (GTO) that senses tension causing the muscle to contract and allowing the muscle to relax.
- 3. Reciprocal Inhibition PNF -** This type of stretching involves contracting the opposing (antagonist) muscle group to the one being stretched. This type of stretching helps to increase range of motion by providing increased resistance to the stretched muscle.
- 4. Dynamic PNF:** This type of stretching involves a series of muscle contractions and stretches in a circular motion. This type of stretching helps to increase flexibility and range of motion in a particular muscle group.

### Assisted Stretching System

#### One-on-One Stretches

Initially find client's passive range of motion to assess soft tissue feeling at 1st point of tension and 2nd point of tension. Understand the client's ability to tolerate tissue stretch

#### Rationale

- 1. Traction –** Perpendicular pull to a joint without changing position, relaxes client, enhance joint mobility while stretching and transition from one stretch to another
  - Creates space in the joint by separating of joint surfaces
  - Decreases pressure in the joint
  - Reduces joint hypomobility
  - Reduces compression
- 2. Passive ROM –** range of motion achieved by a joint with no external forces applied
- 3. First point of tension –** 1st point of tension when stretching refers to the feeling of tightness that is experienced when stretching a particular muscle group. It is the point at which the muscle begins to feel resistance beyond passive ROM as it is stretched
- 4. Second point of tension –** 2nd point of tension refers to the feeling of resistance that is felt when the muscle is stretched past its normal range of motion. It occurs when the muscle is

stretched beyond its normal limit. This tension should not be pushed past a certain point, as it can lead to injury.

**5. Dynamic Movement**– wave-like, undulating movements, dynamic range of motion

<b>Assisted Stretching System</b>		
<b>Technique</b>	<b>Execution</b>	<b>Duration</b>
Traction	Pull limb away from mid-line	5 – 10 seconds
Static Stretch	Fit pro applies stretch at 1st point of tension	20 – 30 seconds
Relax		5 seconds
Static Stretch (PNF)	Fit pro applies stretch at 1st point of tension	10 seconds
Autogenic Inhibition (PNF)	With 10 – 30% of strength client engages agonist	3 – 5 seconds
Relax		5 – 10 seconds
Reciprocal Inhibition (PNF) w/Static Stretch	Client engages antagonist as fit pro applies stretch	30 seconds
	REPEAT PNF TECHNIQUES 2 – 3 TIMES	
Dynamic Stretch	Circular, continuous movement to find different ranges of motion	10 – 20 seconds

## **Stretching System**

- 1.** Traction the joint – 30 seconds
- 2.** Static – First point of tension 10 seconds (passive ROM)
- 3.** Relax
- 4.** PNF
  - Autogenic Inhibition – engage agonist (focus muscle) 10-30% of pressure for 2-4 seconds, then
  - Reciprocal Inhibition – relax agonist then, engage antagonist (opposing muscle) to achieve greater ROM
  - Continue stretch for 30 seconds
  - Repeat Autogenic and Reciprocal 2 – 3 times
- 5.** Dynamic Movement – find different areas of tightness with wave-like and circular movements



## Rules

- No pain
- Traction the joint
- Equal on both sides
- Maintain open dialogue to assess intensity of stretch and discomfort
- Continue to evaluate ROM and assess program design

# Assisted Stretching Library

## Traction – Double Leg



**Goal** – improve range of motion, release tension in soft tissue of fascial lines and create space in joint and relax mind and body

**Position of client** – Supine with legs and hips extended, feet hip width apart and arms extended by sides. Heels off table if possible.

### Position of fitness professional

- Standing at foot of table
- Gently hold both heels of client
- Lift both of client's legs at 10 – 20 degrees hip flexion

**Movement/Technique** – (Traction) Gently pull legs away from hips and torso

**Duration** – 5 – 10 seconds

**Repetition** – 2 – 3 times

**Remember** – Fit pro should stand tall and lean back away from client

### Errors

- Fit pro squatting to perform stretch
- Pull too hard or too fast
- Holding ankles too tightly

Note any imbalances

# Traction – Single Leg



**Goal** - improve range of motion, release tension in soft tissue of fascial lines and create space in joints and relax mind and body

**Position of client** - Supine with legs and hips extended, feet hip width apart and arms extended by sides. Heels off table if possible.

## **Position and movement of fitness professional**

- Standing at foot of table
- Gently hold both heels of client
- Lift both of client's legs at 10 – 20 degrees hip flexion

**Movement/Technique** - (Traction) Gently pull leg away from hips and torso

**Duration** – 5 – 10 seconds

**Repetition** - 2 – 3 times

**Remember** - trainer should stand tall and lean back away from client

## **Errors**

- Squatting
- Pull too hard or too fast
- Holding ankles too tightly
- Trying to make a joint adjustment (popping, etc)

Note any imbalances between each side

# Calves



**Goal** – improve range of motion in posterior leg and flexibility in gastrocnemius

**Position of client** – Supine with one leg and hip extended, other leg bent, and arms extended by sides. Heel of moving leg off table if possible.

## Position and movement of fitness professional

- Standing at foot of table
- With inside hand, grip top of ankle
- Place client's ankle in neutral

## Movement/Technique

1. Traction the ankle
2. Static Stretch – fit pro holds anterior ankle with inside hand and heel with outside hand. Apply pressure to pull anterior foot/toes toward shin into dorsiflexion to find 1st point of tension for 20 – 30 seconds.
3. Relax
4. Autogenic Inhibition PNF – Static stretch 10 second hold at first point of tension. Fit pro cues client to contract calf (focus muscle) at 10 – 30% of total strength for 3 – 5 seconds.
5. Reciprocal Inhibition PNF – Contract anterior tibialis (opposing muscle) as fit pro applies stretch to target muscles
6. Hold new stretch for 30 seconds
7. Repeat for 2 repetitions
8. Dynamic PNF – continue to apply stretch with slow, wave-like, circular movement to explore different ranges of motion

**Remember** – Fit pro should leverage body weight by leaning into stretch

## Errors

- Holding Achilles tendon



- Stretching ankle past second point of tension

Note any imbalances between each side

## Lateral Torso Stretch



**Goal** –improve range of motion in lumbopelvic hub and lateral line including quadratus lumborum, tensor fasciae latae

**Position of client** – supine with legs extended, feet hip width apart and arms extended by sides

### Position and movement of fitness professional

- Stand at foot of table facing client
- Hold client's ankles into neutral position
- Client's legs lift 1 inch off table
- Step side of table to move client's leg laterally

### Movement/Technique

1. Traction the legs and hips
2. Static Stretch – fit pro moves both legs laterally, while client's shoulder and ribs remain on table. Hold stretch at first point of tension for 20 – 30 seconds and repeat each side 2 – 4 times
3. Relax back to center
4. Autogenic Inhibition PNF – Static stretch 10 second hold at first point of tension. Fit pro cues client to contract focus area, obliques, TFL at 10 – 30% of total strength for 3 – 5 seconds.
5. Reciprocal Inhibition PNF – Contract opposing muscles as fit pro applies stretch of focus muscles
6. Hold new stretch for up to 30 seconds
7. Repeat for 2 – 3 repetitions each side
8. Circular PNF – continue to apply stretch with slow, wave-like, circular movement to explore different ranges of motion

**Remember** – fit pro should leverage body weight to lean into stretches

### Errors

- Lifting client's legs too high
- Rotating client's torso/hips vs. lateral flexion
- Moving too fast
- Stretching past 2nd point of tension

Note imbalances between each side

## Adductors



**Goal** – improve range of motion in hip adductors

**Position of client** – supine near one side of table with legs extended, feet hip width apart and arms extended by sides

### Position of fitness professional

- Stand at foot of table off to side
- Face client
- Hold client's ankle with both hands (hold knee for support if needed)

### Movement/Technique

1. Traction the legs and hips
2. Static Stretch – fit pro abducts (moves laterally) stretching leg while client's shoulders, ribs and hips remain on table. Hold stretch at first point of tension for 20 – 30 seconds and repeat 2 – 4 times
3. Relax back to center
4. Autogenic Inhibition PNF – Static stretch 10 second hold at first point of tension. Fit pro cues



client to contract focus area, (adductors) at 10 – 30% of total strength for 3 – 5 seconds.

**5.** Reciprocal Inhibition PNF – Contract opposing muscles (abductors) as fit pro applies stretch of focus muscles

**6.** Hold new stretch for up to 30 seconds

**7.** Repeat for 2 – 3 repetitions

**8.** Circular PNF movement – continue to apply stretch with slow, wave-like, circular movement to explore different ranges of motion

**9.** Repeat sequence on other leg

**Remember** – client steps forward to leverage body weight into stretch

### Errors

- Stretching past 2nd point of tension
- Not supporting knee
- Rotating hip vs. abducting hip

Note imbalances between each side

## Hamstrings



**Goal** – improve flexibility in hamstring and mobility in back lines

**Position of client** – supine with legs extended, hip-width apart and arms extended by sides

### Position and movement of fitness professional

- Stand at foot of table off to side
- Face client
- Hold client's ankle/leg with both hands

### Movement/Technique

**1.** Traction the leg – lift straight leg and flex hip to 10 degrees off table

**2.** Static Stretch – with client's leg straight, fit pro lifts leg to flex hip to 1st point of tension for 30

seconds. Repeat 2 – 4 times

**3.** Relax

**4.** Autogenic Inhibition PNF – Static stretch 10 seconds at 1st point of tension. Fit pro cues client to contract focus area, (hip extensors) at 10 – 30% of total strength for 3 – 5 seconds.

**5.** Reciprocal Inhibition PNF – Contract opposing muscles (hip flexors/Quadriceps) as fit pro applies stretch of focus muscles

**6.** Hold new stretch for up to 30 seconds

**7.** Repeat 2 – 3 times

**8.** Circular PNF movement – continue to apply stretch with slow, wave-like, circular movement to explore different ranges of motion

**9.** Repeat sequence on other leg

**Remember** – fit pro leans into stretch and uses one or both hands by holding on to heel or leg

### Errors

- Stretching past 2nd point of tension
- Client lifting hips off table

Notes imbalances in each leg

## Glutes



**Goal** – improve flexibility in glutes and mobility in back lines

**Position of client** – supine with one leg straight and one leg bent and external rotated (foot moves towards midline)

### Position and movement of fitness professional

- Stand beside client's straight leg, aligned near client's moving leg
- Inside hand on outside of client's moving knee
- Outside hand on outside part of client's moving ankle
- Client's foot may be placed on fit pro's abdomen

## Movement/Technique

1. Traction the leg – lift moving leg up, away from body
2. Static Stretch – with client's foot below knee externally rotate hip to move leg towards the center of body to 1st point of tension for 30 seconds. Repeat 2 – 4 times
3. Relax
4. Autogenic Inhibition PNF – Static stretch 10 seconds at 1st point of tension. Fit pro cues client to contract focus area, (hip extensor and external rotators<glutes>) at 10 – 30% of total strength for 3 – 5 seconds.
5. Reciprocal Inhibition PNF – Contract opposing muscles (hip flexors/adductors) as fit pro applies stretch of focus muscles
6. Hold new stretch for up to 30 seconds
7. Repeat 2 – 3 times
8. Circular PNF movement – continue to apply stretch with slow, wave-like, circular movement to explore different ranges of motion
9. Repeat sequence on other leg

**Remember** – fit pro should lean into the stretch, bend knees, and stand on toes for more leverage

## Errors

- Allowing foot to higher than knee
- Stretching beyond 2nd point of tension
- Pinching hip

Note any imbalances

## Supine Hip Flexors





**Goal** – improve flexibility in hip flexors and range of motion in Front lines

**Position of client** – supine at bottom edge of table. With both hands, client holds non-stretch leg with knee bent, close to chest. Stretching leg hangs down comfortably at end of table

**Position and movement of fitness professional**

- Stand at end of table facing client
- Hold stretching leg from bottom of femur
- Lift client’s stretch leg into hip flexion to allow knee to relax

**Movement/Technique**

1. Traction the hip – lean away from client
2. Static Stretch – lower stretching leg into hip extension to 1st point of tension for 30 seconds. Repeat 2 – 4 times
3. Relax
4. Autogenic Inhibition PNF – Static stretch 10 seconds at 1st point of tension. Fit pro cues client to contract focus area, (hip flexors) at 10 – 30% of total strength for 3 – 5 seconds.
5. Reciprocal Inhibition PNF – Contract opposing muscles (glute max) as fit pro applies stretch of focus muscles
6. Hold new stretch for up to 30 seconds
7. Repeat 2 – 3 times
8. Circular PNF movement – continue to apply stretch with slow, wave-like, circular movement to explore different ranges of motion
9. Repeat sequence on other leg

**Remember** – Client should keep back on table and maintain posterior tilt

**Error** – Stretching past 2nd point of tension

Note any imbalances

## Side Lying Hip Flexors



**Goal** – improve flexibility in hip flexors and mobility in Front lines

**Position of client** – Side lying with bottom leg and hip flexed and top leg flexed with hip extended. Bottom shoulder and elbow flexed with head supported by bottom arm. Top arm firmly planted in front of body on floor or table to stabilize body

**Position and movement of fitness professional**

- Standing behind and below client's top knee
- With inside hand, hold client's top knee/thigh
- Client's leg pressed against fit pros abdomen with client's foot wrapped around fit pros hip

**Movement/Technique**

1. Traction – lift moving leg up, away from body
2. Static Stretch – extend hip to 1st point of tension for 30 seconds. Repeat 2 – 4 times
3. Relax
4. Autogenic Inhibition PNF – Static stretch 10 seconds at 1st point of tension. Fit pro cues client to contract focus area, (hip flexors) at 10 – 30% of total strength for 3 – 5 seconds.
5. Reciprocal Inhibition PNF – Contract opposing muscles (hip extensors/glutes) as fit pro applies stretch of focus muscles
6. Hold new stretch for up to 30 seconds
7. Repeat 2 – 3 times
8. Circular PNF movement – continue to apply stretch with slow, wave-like, circular movement to explore different ranges of motion
9. Repeat sequence on other leg

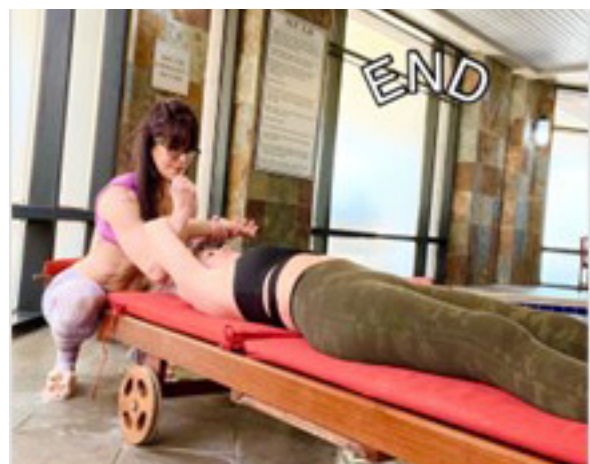
**Remember** – Fit pro leans away from client to increase stretch. Keep client's hips stacked

**Errors**

- Fit pro pulling with arms
- Client's hip rotating
- Stretching past 2nd point of tension

Note any imbalances

## Latissimus Dorsi



**Goal** – improve flexibility in lats and obliques and mobility Back lines and Lateral lines

**Position of client** – supine with legs extended and non-stretching arm extended by side. Shoulder of stretching side is flexed with elbow bent overhead

**Position and movement of fitness professional**

- Face client by standing at top end of table
- Outside arm hooks under client's elbow
- Inside hand holds client's wrist

**Movement/Technique**

1. Traction the shoulder - pull client's arm up towards ear
2. Static Stretch – flex and externally rotate shoulder to 1st point of tension for 30 seconds.  
Repeat 2 – 4 times
3. Relax
4. Autogenic Inhibition PNF – Static stretch 10 seconds at 1st point of tension. Fit pro cues client to contract focus area, (lats) by depressing scapula and pulling shoulder away from ear at 10 – 30% of total strength for 3 – 5 seconds.
5. Reciprocal Inhibition PNF – Contract opposing muscles (shoulder and chest) as fit pro applies stretch of focus muscles
6. Hold new stretch for up to 30 seconds
7. Repeat 2 – 3 times
8. Circular PNF movement – continue to apply stretch with slow, wave-like, circular movement to explore different ranges of motion
9. Repeat sequence on other side

**Remember** – fit pro should lean away from client and sink into squat to leverage bodyweight for deeper stretch

**Errors**

- Pinching shoulder
- Stretching past 2nd point of tension
- Stretching too quickly

Note imbalances



# Pectorals



**Goal** – improve flexibility in pectorals and mobility in Front lines

**Position of client** – supine with stretching arm abducted and externally rotated with shoulder flexed to neck height

## Position and movement of fitness professional

- Stand facing client at top end of table above client's stretching arm
- With outside hand hold client's arm above wrist
- Support elbow with other hand if needed
- Pull arm/shoulders towards floor

## Movement/Technique

1. Traction the shoulder - pull client's arm laterally away from midline
2. Static Stretch – horizontally abduct shoulder to 1st point of tension for 30 seconds. Repeat 2 – 4 times
3. Relax
4. Autogenic Inhibition PNF – Static stretch 10 seconds at 1st point of tension. Fit pro cues client to contract focus area, (pecs) by horizontally adduct (squeeze chest) at 10 – 30% of total strength for 3 – 5 seconds.
5. Reciprocal Inhibition PNF – Contract opposing muscles by horizontally abducting shoulder (rear delts and mid-back muscles) as fit pro applies stretch of focus muscles
6. Hold new stretch for up to 30 seconds
7. Repeat 2 – 3 times
8. Circular PNF movement – continue to apply stretch with slow, wave-like, circular movement to explore different ranges of motion
9. Repeat sequence on other side

**Remember** - Stretch is increased by both horizontal shoulder abduction and shoulder flexion, fit pro sinks into squat to enhance intensity of stretch

## Errors

- Stretching past 2nd point of tension
- Stretching too quickly

Note imbalances

## Upper Trapezius



**Goal** – improve flexibility in upper trapezius, shoulder, and mobility in Superficial Back Arm line

**Position of client** – supine with arms at sides

### Position and movement of fitness professional

- Stand at side of table near stretching arm facing client
- Hold client's arm/wrist with bottom arm and apply downward pressure to client's shoulder with top arm
- Internally rotate shoulder

### Movement/Technique

1. Traction the shoulder
2. Static Stretch – depress shoulder/scapula to pull shoulder away from ear to 1st point of tension for 30 seconds. Repeat 2 – 4 times
3. Relax
4. Autogenic Inhibition PNF – Static Stretch 10 seconds at 1st point of tension. Fit pro cues client to contract focus area, (upper trapezius) by elevating shoulder/scapula (towards ear) at 10 – 30% of total strength for 3 – 5 seconds.
5. Reciprocal Inhibition PNF – Contract opposing muscles by depressing shoulder/scapula (lats and lower traps) as fit pro applies stretch of focus muscles
6. Hold new stretch for up to 30 seconds
7. Repeat 2 – 3 times
8. Circular PNF movement – continue to apply stretch with slow, wave-like, circular movement to explore different ranges of motion

9. Repeat sequence on other side

**Remember** – lean away from client to traction shoulder

### Errors

- Stretching past 2nd point of tension
- Allowing shoulder to round forward
- Pushing too hard down on shoulder

Note imbalances

## Rear Deltoids and Rotator Cuff Muscles



**Goal** – improve flexibility of rear shoulder and mobility of Superficial Back Arm Line

**Position of client** – supine with one arm by side and stretching shoulder abducted to less than 90 degrees from spine with elbow bent at 90 degrees

### Position and movement of fitness professional

- Stand at side of table, sideways to client
- Hold client's wrist with outside arm and inside elbow with inside arm
- Press client's elbow against fit pros inside thigh
- Stretch by pushing client's forearm into internal rotation

### Movement/Technique

1. Traction the shoulder - pull shoulder away from midline of body
2. Static Stretch – internally rotate shoulder by pressing palm towards floor to 1st point of tension for 30 seconds. Repeat 2 – 4 times



3. Relax
4. Autogenic Inhibition PNF – Static stretch 10 seconds at 1st point of tension. Fit pro cues client to contract focus area, (rear delts and external shoulder rotators) by pushing hand up at 10 – 30% of total strength for 3 – 5 seconds.
5. Reciprocal Inhibition PNF – Contract opposing muscles (internal shoulder rotators) as fit pro applies stretch of focus muscles
6. Hold new stretch for up to 30 seconds
7. Repeat 2 – 3 times
8. Circular PNF movement – continue to apply stretch with slow, wave-like, circular movement to explore different ranges of motion
9. Repeat sequence on other side

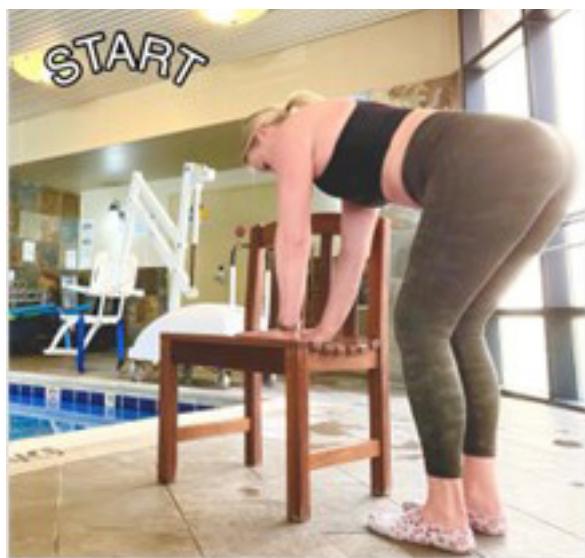
**Remember** – support client’s elbow with inside hand, lean away from client to traction shoulder

### Errors

- Allowing scapula to lift off table
- Allowing shoulder to round forward
- Stretching past 2nd point of tension

Note imbalances

## Rhomboids and Mid-Back Muscles



**Goal** – improve flexibility in rhomboids and mobility in Deep Back Arm line and Spiral Line

**Position of client** – Standing facing table or elevated surface, bent over table (hinge at hip) with spine in neutral, inside hand or forearm resting on table, outside arm bent under chest

## **Position of fitness professional**

- Standing facing client
- Bottom hand holding client's forearm wrist
- Top hand applies pressure to client's back to maintain client's position
- Stretch client by pulling arm across/under body toward opposing waist to rotate thoracic spine

## **Movement/Technique**

1. Traction the shoulder – pull arm under body
2. Static Stretch – rotate thoracic spine and horizontally adduct shoulder (pull arm under body) to 1st point of tension for 30 seconds. Repeat 2 – 4 times
3. Relax
4. Autogenic Inhibition PNF – Static stretch 10 seconds at 1st point of tension. Fit pro cues client to contract focus area (rhomboids), rotate thoracic spine towards ceiling by pushing hand up at 10 – 30% of total strength for 3 – 5 seconds.
5. Reciprocal Inhibition PNF – Contract opposing muscles (pecs) as fit pro applies stretch of focus muscles
6. Hold new stretch for up to 30 seconds
7. Repeat 2 – 3 times
8. Circular PNF movement – continue to apply stretch with slow, wave-like, circular movement to explore different ranges of motion
9. Repeat sequence on other side

**Remember** – fit pro rotates away from client to enhance stretch, wider stance for both client and fit pro creates stability and allows for leverage

## **Errors**

- Rotating at lumbar spine
- Pulling arm more than rotating thoracic spine

Note imbalances



# SECTION 9

## Group Fitness Stretching Techniques

### Self-Myofascial Release with Foam Roller or Massage Ball Techniques

Self-Myofascial Release based on the Davis's Law "soft tissue models along lines of stress" creates sustained pressure against the foam roller to allow the GTO to turn off muscle spindles and help muscles to relax and stretch further.

Self-myofascial release techniques such as foam rolling can be done before static and dynamic stretches to enhance muscle lengthening during the stretch. SMR can also be utilized during the recovery part of the workout.

#### Compression

Compression techniques using foam rolling and myofascial release are techniques that involve applying pressure to specific areas of the body with a foam roller, massage ball, or other form of myofascial release device. This pressure helps to promote relaxation of the muscles, improve circulation, reduce pain, and improve mobility and range of motion.

**Rationale** – reduces contraction of muscle spindle to allow muscle and fascia to relax

#### How

1. Find trigger point or area of tension and apply direct pressure
2. Thirty seconds – 2 minutes

#### Stripping

Stripping technique is a myofascial release technique that involves using a foam roller or other tool to apply direct pressure to a muscle or muscle group to release adhesions. The technique is used to break up scar tissue, reduce tension, and restore proper muscle and fascial alignment.

**Rationale** – rolls out areas of tightness (knots) to regain normal resting length of muscle

#### How

1. Roll with muscle line in the same direction of muscle fiber (understand muscle origin and insertion)
2. Constant movement



## **Cross-Fiber**

Cross-fiber technique is a form of myofascial release that involves applying pressure across the grain of the muscle fibers to break up adhesions and promote blood flow and healing. This can be done with a foam roller, massage ball, or other tool. The goal is to improve mobility, reduce pain, and improve range of motion by releasing tight, restricted fascia

### **Rationale**

1. Stretches and loosens fascia
2. Breaks up adhesions, areas of tightness responsible for restricted movement
3. Increases blood flow
4. Can stimulate collagen production

### **How**

1. Roll across muscle fiber
2. Side to side or various oblique angles

## **Pin and Stretch**

Self-myofascial release and stretching technique that helps reduce pain, improve mobility, and increase flexibility. It involves placing a foam roller on a muscle group, such as the quadriceps or hamstrings, and then applying pressure with your bodyweight while stretching the muscle group. The pressure will help your muscles to relax, while the stretching helps to increase flexibility. This technique can also help to break up any adhesions in the fascia and can be used to help alleviate pain in certain areas

### **Rationale**

1. Brings elasticity to fascia
2. Reestablishes muscle contractibility
3. Identifies tight areas and helps to turn off trigger points

### **How**

1. Locate sensitive, tight area by pinning foam roller between body and floor
2. Leverage bodyweight to target sensitive area over foam roller
3. Stretch sensitive area while pinning foam roller

# **Self-Stretching and Myofascial Release**

Along with Self Myofascial Release (SMR), Autogenic Inhibition interferes with the neural impulse that senses tension causing the muscle to contract and allowing the muscle to relax

## **Benefits of Myofascial Release**

1. Increased Mobility and Flexibility: Myofascial release helps to increase mobility and flexibility by gently stretching and mobilizing the fascia
2. Improved Posture by correcting muscle imbalances: Myofascial release can help to improve posture by increasing muscle flexibility and strength, which can improve posture.
3. Stress and Tension Relief: Myofascial release can help to release muscle tension, reduce stress, and promote relaxation.
4. Pain Management and Injury Prevention: Myofascial release can reduce pain, improve muscle

function, and reduce inflammation. It can also help to prevent future injuries by releasing tight muscles and correcting imbalances.

5. Enhanced length-tension relationship: Allows muscle to generate more force
6. Improved neuromuscular efficiency: the nervous systems ability to control and coordinate muscular contraction to produce better motor patterns to maximize performance

### **Directions for Self-Myofascial Release**

1. Start with a light foam rolling session for short amounts of time
2. Use a foam roller that is the appropriate size and density for your body
3. Apply a moderate amount of pressure to the muscle NOT bone
4. Start self-myofascial release at the origin of the muscle, which is usually the point of least tension. Work your way towards the insertion
5. Roll the foam roller slowly and evenly over the muscle
6. Roll in small segments
7. Roll the muscle in one direction for 30 seconds - 2:00 minutes
8. Move the foam roller to nearby areas and repeat the process
9. Avoid any areas of pain or discomfort
10. Drink plenty of water after your session to assist in the recovery process.

### **Contraindications for Self-Myofascial Release**

1. Acute injuries
2. Open wounds
3. Osteoporosis
4. Recent surgery
5. Any area of skin infection
6. Areas with varicose veins
7. Any area of nerve damage
8. Any area of deep vein thrombosis
9. Areas of unstable joints
10. Directly over a tumor or a hernia

### **Group Stretching System**

1. Myofascial Technique/Foam Roller 30 – 90 sec (sometimes longer)
2. Static Stretch – 30 seconds
3. Relax - 5 seconds
4. Autogenic Inhibition Engage Focus Muscle 2 – 4 seconds/Relax 2 - 3 seconds
5. Reciprocal Inhibition Engage Opposing Muscle w/Static stretch 30 seconds
6. Repeat 5 - 10 times
7. Dynamic Stretch
8. Repeat, if necessary

<b>Group Fitness Stretching System</b>		
<b>Technique</b>	<b>Equipment</b>	<b>Duration</b>
Self-Myofascial Release	Foam roller or Massage ball	30-2:00 minutes
Static Stretch	Yoga strap or stretching strap	30 seconds
Relax		2 – 3 seconds
Static Stretch	Same	10 seconds
Autogenic Inhibition PNF	Same	3 – 5 seconds
Relax		2 – 3 seconds
Reciprocal Inhibition w/ static stretch	Same	30 seconds
Dynamic Stretch		

# Library of Stretches

## Feet/Arches







### Posture Check

- Stand in neutral
- Hinge at hip with spine in neutral
- Fold Forward with spine in neutral
- Forward flexion and reach hands towards toes
- Note any restrictions in calves, posterior thighs, and feet

**Start Position** – Stand near wall or chair, hold for support, arch of foot on foam roller or ball

**SMR Technique** – Explore arch and sole of foot with compression, Stripping, Cross  
Repeat Posture check – note new unrestricted position

### Calves – Gastrocnemius/Soleus







**1. SMR Start Position**

- Seated or supine
- Mid-calf of focus calf on FR or ball
- Other leg crossed-over focus leg to apply appropriate pressure

**2. SMR Action – Compression, Cross Fiber, Stripping 30 – 90 seconds**

**3. Stretch Position**

- Stand facing wall about an arms-length away from wall
- Legs parallel, staggered with both knees bent and ankle dorsi-flexed
- One foot in slightly in front of body and one foot slightly behind body

**4. Stretch Technique**

**5. Static Stretch - Press weight into heel of back foot for 30 seconds**

**6. Relax**

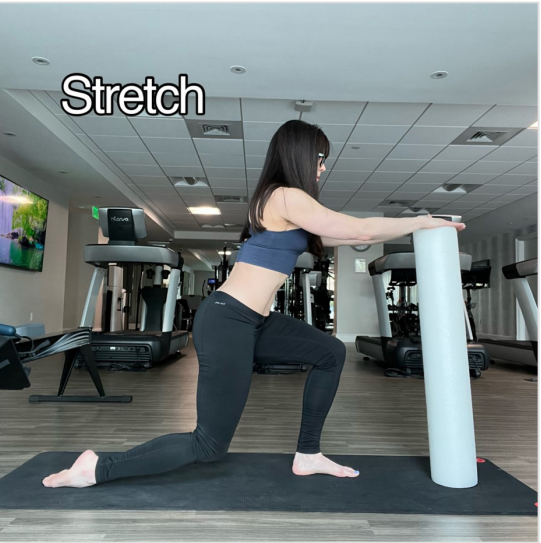
**7. PNF Autogenic Inhibition – Static stretch calf at 1st point of tension for 10 seconds then contract focus area, plantar flex ankle of back ankle to lift heel at 10 – 30% of strength for 3 - 5 seconds**

**8. PNF Reciprocal Inhibition – Contract opposing muscles, dorsi-flex ankle by lifting toes toward calf as participant applies stretch to focus muscle (calf) for 30 seconds**

- Repeat all steps 2 – 3 more times or repeat Stretching steps 2 – 3 more times

**9. PNF Dynamic Stretch – shift bodyweight and apply load to other areas of calf**

# Tibialis Anterior





### 1. SMR Start Position

- Kneeling in quadruped
- Mid-shin (focus muscle) on FR or ball
- Focus leg on roller or ball while other leg is kneeling on floor

### 2. SMR Action – Compression, Cross Fiber, Stripping 30 – 90 seconds

### 3. Stretch Position

- Stand in lunge position facing wall or near stable surface
- Legs parallel, staggered with both knees bent, front flat on floor and back ankle plantar flexed with toenails and dorsal region of foot pressed into floor

### 4. Stretch Technique

### 5. Static Stretch - Press bodyweight into dorsal part of foot, toenails down to find 1st point of tension for 30 seconds

### 6. Relax

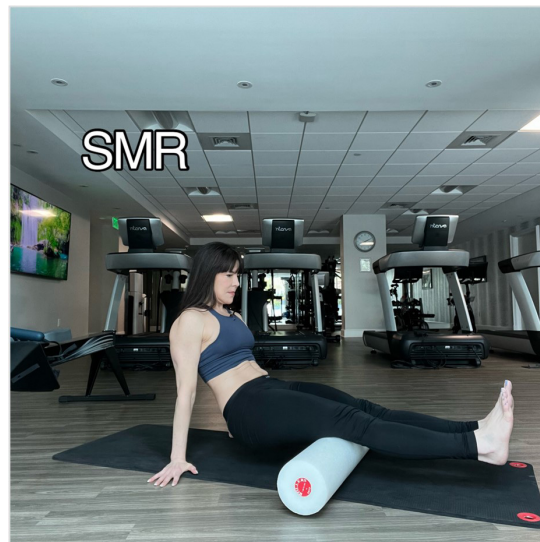
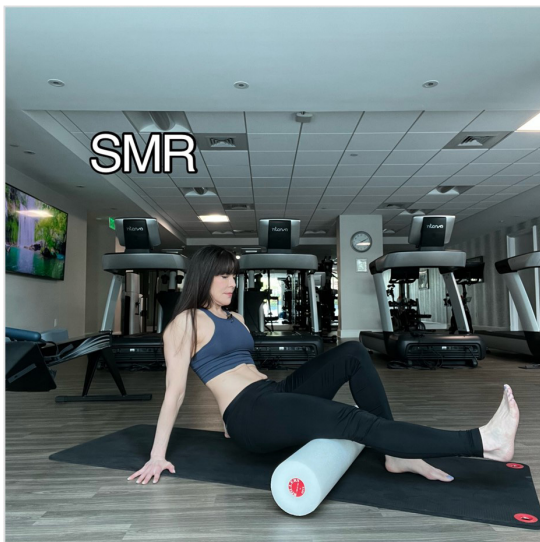
### 7. PNF Autogenic Inhibition – Static stretch shin (tibialis anterior) at 1st point of tension for 10 seconds then contract focus area, dorsi-flex ankle of back leg (press into floor) at 10 – 30% of strength for 3 - 5 seconds

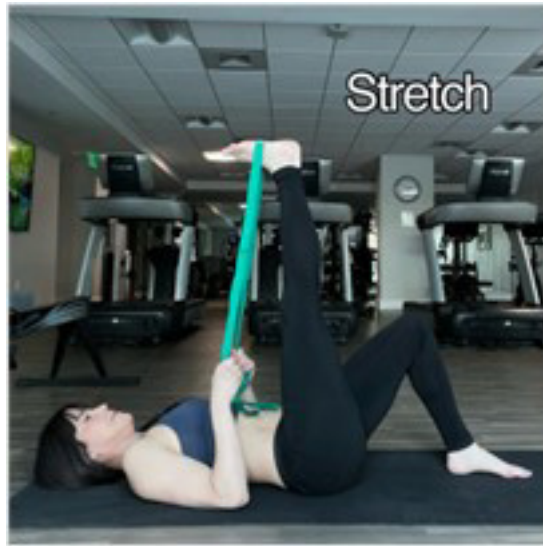
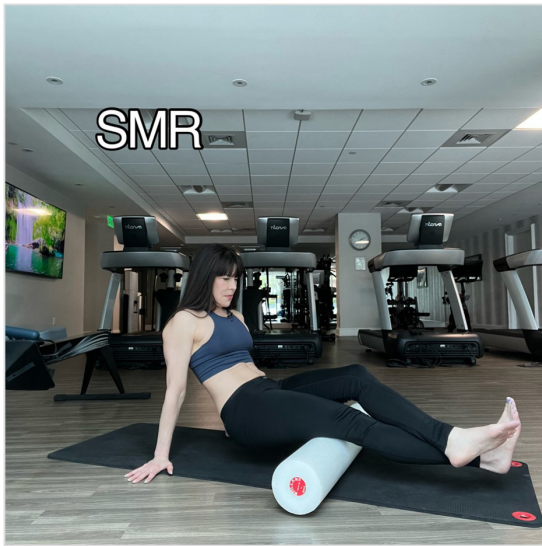
### 8. PNF Reciprocal Inhibition – Contract opposing muscles, plantar flex ankle by pressing toes toward floor as participant applies stretch to focus muscle (tibialis anterior) for 30 seconds

- Repeat all steps 2 – 3 more times or repeat stretching steps 2 – 3 more times

### 9. PNF Dynamic Stretch

## Hamstrings





### 1. SMR Start Position

- Seated
- Mid-thigh of focus leg on FR or ball
- Alternate position 1 - thighs (focus muscle) on FR or ball
- Alternate position 2 - one thigh on FR or ball with other leg crossed over the focus thigh for more pressure
- Arms on extend behind body with hands on floor support vertical posture

### 2. SMR Action – Compression, Cross Fiber, Pin and Stretch, Stripping 30 – 90 seconds

### 3. Stretch Position

- Lie supine with focus leg extended toward ceiling, other leg bent with foot on floor
- Yoga strap or stretching strap wrapped around arch of foot, arms holding ends of strap to enhance stretch

### 4. Stretch Technique

**5. Static Stretch** – With focus leg straight, use arms to pull focus leg into hip flexion to find 1st point of tension for 30 seconds

### 6. Relax

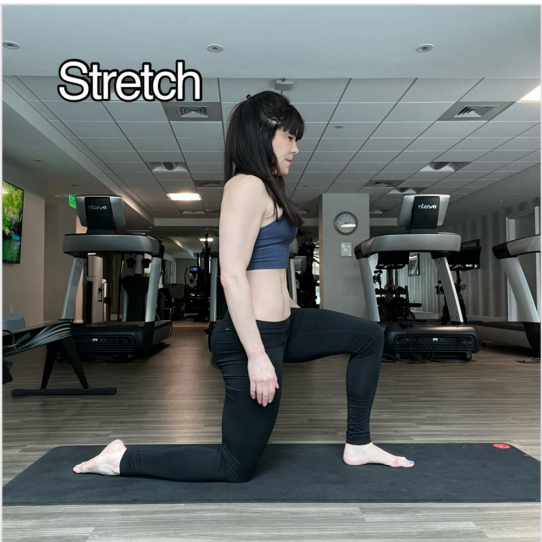
**7. PNF Autogenic Inhibition** – Static stretch of focus thigh (hamstring) at 1st point of tension 10 seconds then contract focus area, then extend hip to push foot into strap at 10 – 30% of strength for 3 - 5 seconds

**8. PNF Reciprocal Inhibition** – Contract opposing muscles, flex hip with leg straight while applying stretch to focus muscle for 30 seconds

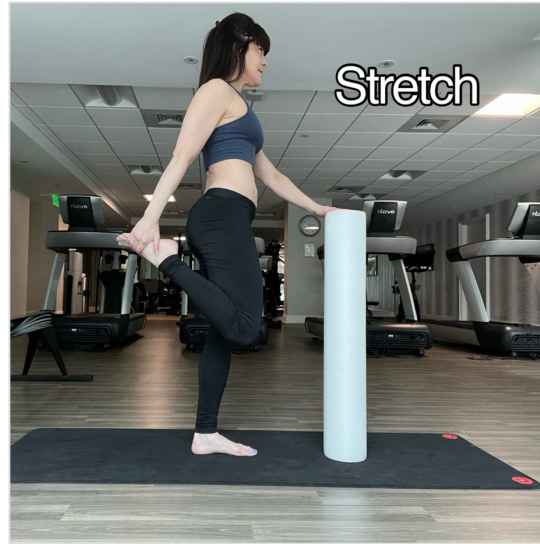
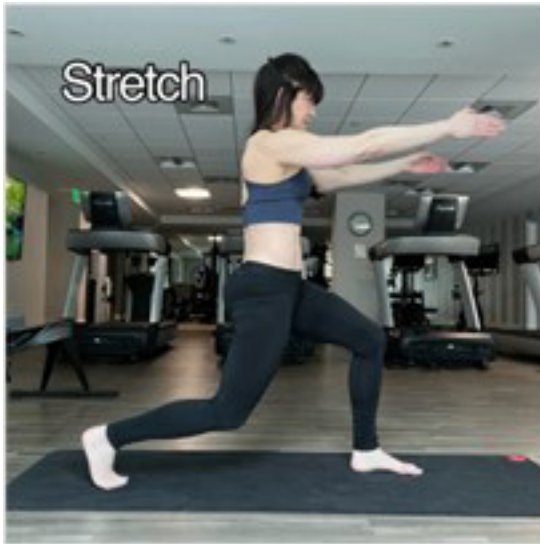
- Repeat all steps 2 – 3 more times or repeat stretching steps 2 – 3 more times

**9. PNF Dynamic Stretch** – with arms directing, create circles with leg to explore different ranges of motion and stretch at different angles

# Quadriceps







### 1. SMR Start Position

- Prone in plank position with thighs over FR or ball
- Forearms on floor and one leg extended over FR or ball and other leg in kneeling position to offset load onto non-focus thigh
- Or both legs extended on

### 2. SMR Action – Compression, Cross Fiber, Pin and Stretch, Stripping 30 – 90 seconds

### 3. Stretch Position

- Kneeling lunge position
- Alternate position 1 - standing lunge position
- Alternate position 2 - single leg stance holding ankle of stretching leg, knee flexed with one hand holding ankle behind body

### 4. Stretch Technique

### 5. Static Stretch

- In kneeling lunge position, hold back ankle or foot with ipsilateral hand to flex knee to find 1st point of tension for 30 seconds. Maintain hip extension on same side
- Alternate 1 – Same stretch performed standing on single leg

### 6. Relax

**7. PNF Autogenic Inhibition** – Static stretch of focus thigh (quadriceps) to find 1st point of tension for 10 seconds then contract focus area, engage quadriceps muscle by extending knee to push foot into hand at 10 – 30% of strength for 3 - 5 seconds

**8. PNF Reciprocal Inhibition** – Contract opposing muscles, engage hamstring to flex knee (foot towards hip) while applying stretch to focus muscle for 30 seconds. Maintain hip extension

- Repeat all steps 2 – 3 more times or repeat stretching steps 2 – 3 more times

### 9. PNF Dynamic Stretch

# Hip Flexors





## 1. SMR Start Position

- Prone in plank position with hip crease over FR or ball
- Forearms on floor and one hip extended over FR or ball and other leg in kneeling position to offset load onto non-focus thigh
- Or both hips extended on FR or ball

## 2. SMR Action

- Compression, Cross Fiber, Pin and Stretch, Stripping 30 – 90 seconds
- Roll from ASIS (top of hip bone) to top of femur

## 3. Stretch Position

- Half kneeling position
- Alternate position 1 - standing lunge position
- Alternate position 2 - single leg stance with stretching knee flexed, hip extended and sole of foot anchored to wall

## 4. Stretch Technique

## 5. Static Stretch

- In half-kneeling position, lean forward into hip extension to passively stretch hip flexor at 1st point of tension for 30 seconds. Option: hold back foot or ankle with ipsilateral hand to flex knee.
- Alternate 1 – Same stretch performed standing on single leg or foot against wall

## 6. Relax

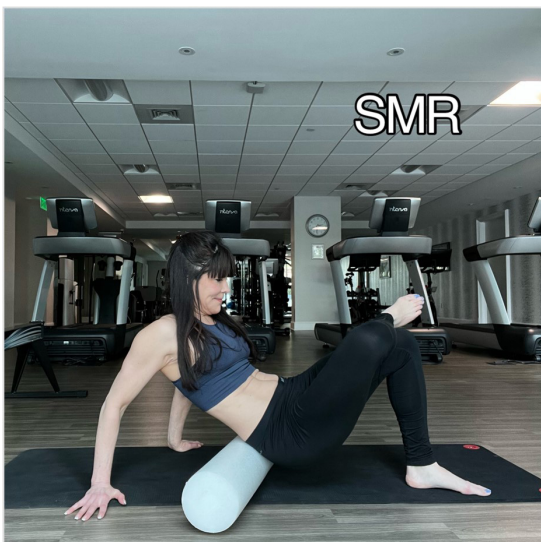
7. PNF Autogenic Inhibition – Static stretch of focus muscle (hip flexor) to find 1st point of tension for 10 seconds then contract focus area, engage hip flexor muscles by flexing hip at 10 – 30% of strength for 3 - 5 seconds

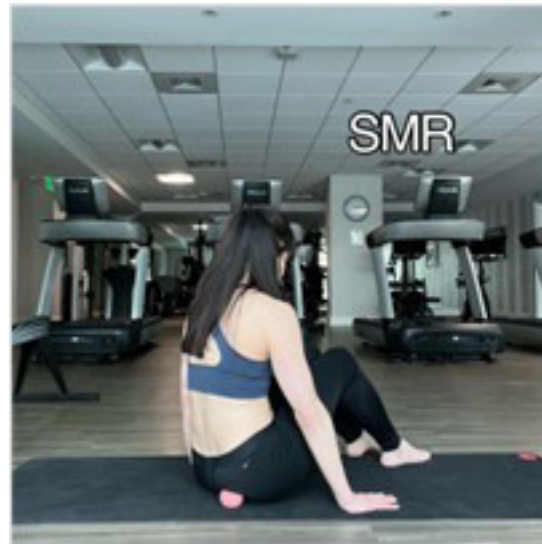
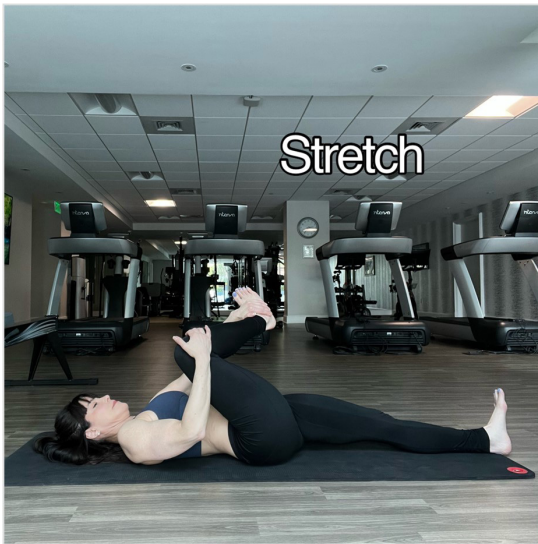
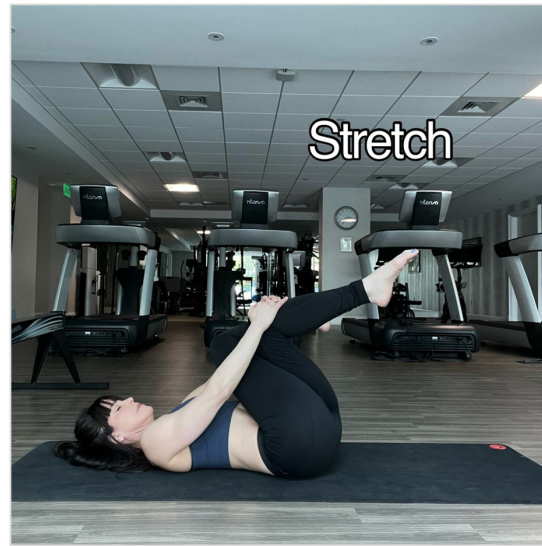
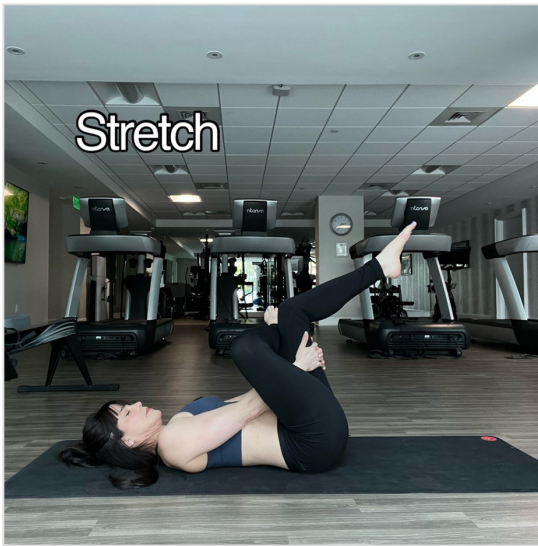
8. PNF Reciprocal Inhibition – Contract opposing muscles, engage glute max to extend hip while applying stretch to focus muscle for 30 seconds.

- Repeat all steps 2 – 3 more times or repeat stretching steps 2 – 3 more times

9. PNF Dynamic Stretch – move laterally into different positions

## Glutes/External Hip Rotators





### 1. SMR Start Position

- Sit on FR behind sit bones with knees bent
- Focus hip externally rotated and crossed over support/floor leg above knee in figure 4 position
- Hands on floor behind body and floor
- Alternative position 1 – Sit over ball

### 2. SMR Action –

- Compression, Cross Fiber, Pin and Stretch, Stripping 30 – 90 seconds
- Roll from PSIS (top of hip bone) to ischial tuberosity (sit bones)

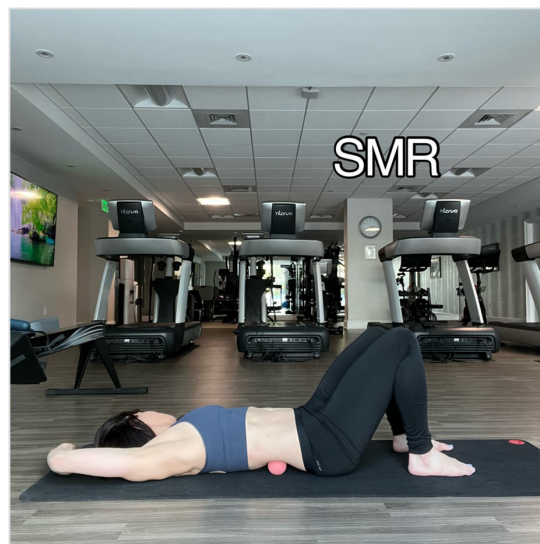
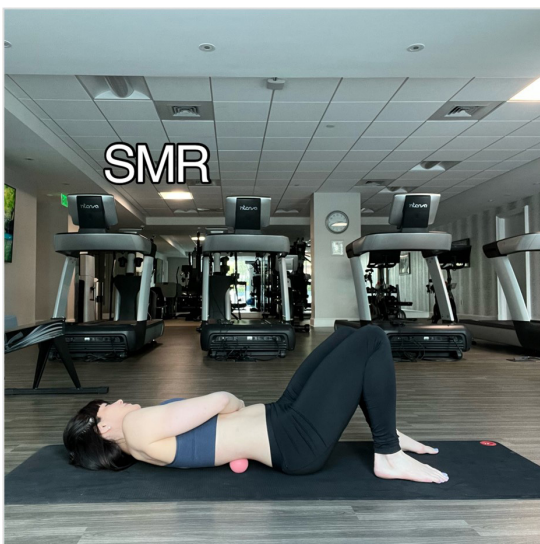
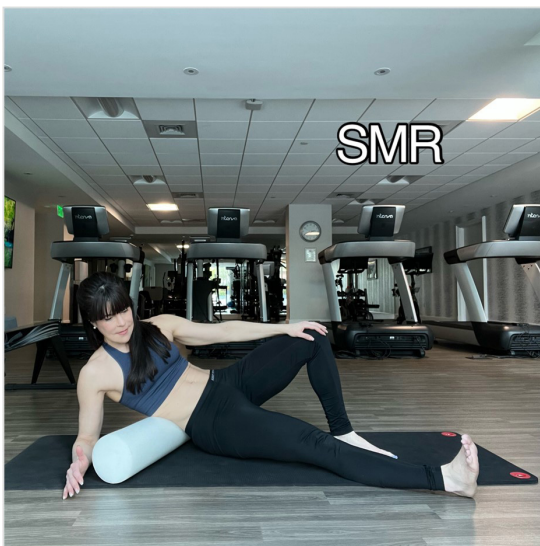
### 3. Stretch Position

- Supine on floor with both knees and hips flexed
- Focus hip externally rotated and crossed over support leg slightly above knee
- Hands wrapped around thigh of support leg

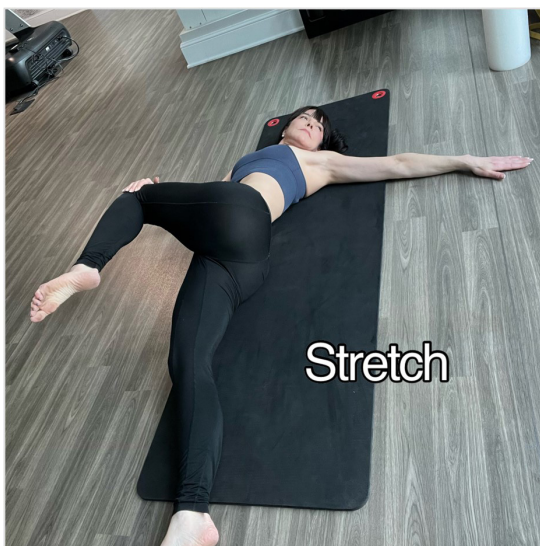
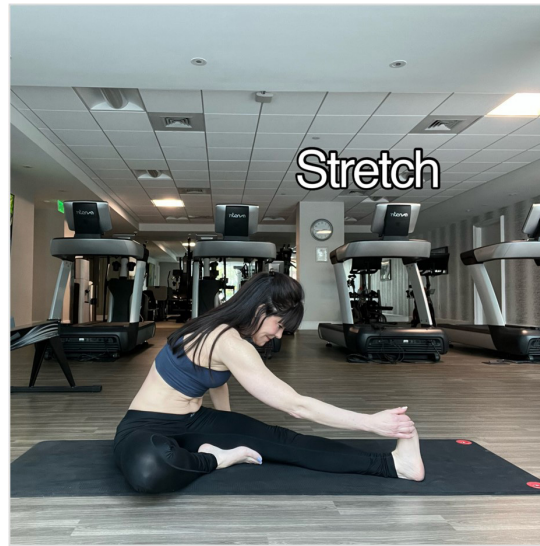
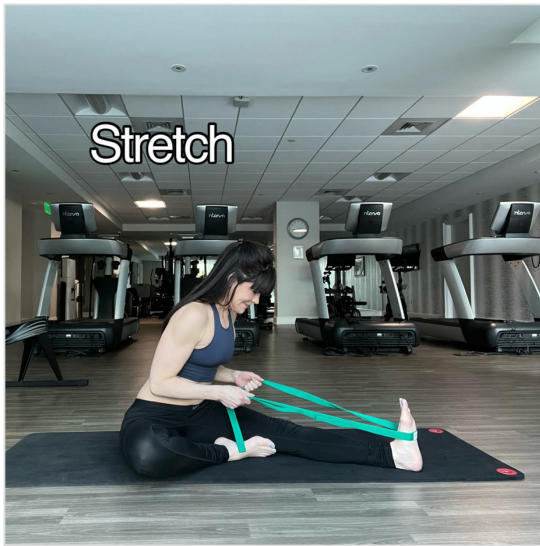


4. Stretch Technique
  5. Static Stretch - Pull legs toward body to flex and externally rotate hip and stretch focus muscle (glute max) at 1st point of tension for 30 seconds.
  6. Relax
  7. PNF Autogenic Inhibition – Static stretch of focus muscle (glute max) to find 1st point of tension for 10 seconds then contract focus area, engage focus muscles (glute max) by extending/rotating hip (push ankle of crossed over leg into stable leg) at 10 – 30% of strength for 3 - 5 seconds
  8. PNF Reciprocal Inhibition – Contract opposing muscles, engage hip flexors while applying stretch to focus muscle for 30 seconds.
    - Repeat all steps 2 – 3 more times or repeat stretching steps 2 – 3 more times
  9. PNF Dynamic Stretch – move circularly into different positions
- Lower Back – Quadratus

## Lumborum (QL) and Erector Spinae (ES)







### 1. SMR Start Position

- Lie seated/supine with lower back draped over FR or ball
- One hip and leg extended, and one hip and leg flexed with foot on floor
- Lean into side with leg and hip extended
- One forearm on floor for support
- Alternative position 1 – lie supine with ball under lower back and both knees bent

### 2. SMR Action –

- Compression, Cross Fiber, Pin and Stretch, Stripping 30 – 90 seconds
- Roll from bottom of ribcage to ASIS (top of hip bone)

### 3. Stretch Position

- Seated with legs abducted
- One leg extended and one leg flexed with foot position near pelvis
- Flex over and rotate torso towards straight leg and reach oppositional hand towards extended leg
- Alternate position 1 – (spinal rotation) Lie supine with both legs extended, one hip flexed with footed pointed to ceiling – strap wrapped around foot, hand holding strap to control spinal rotation

**4. Stretch Technique**

**5. Static Stretch** – Rotate and flex spine over to stretch QL/ES at 1st point of tension for 30 seconds, keep even pressure over sit bones

**6. Relax**

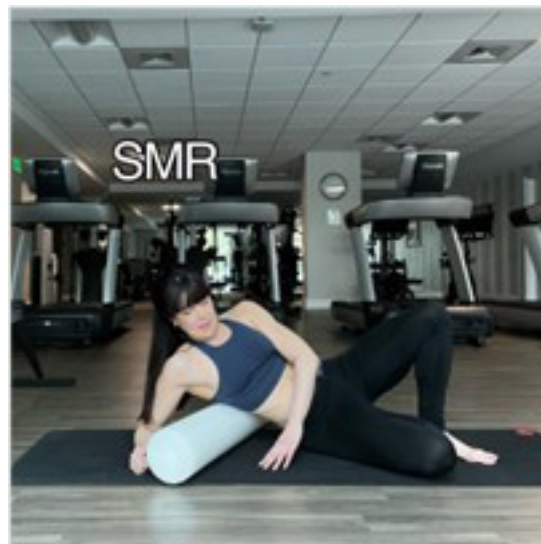
**7. PNF Autogenic Inhibition** – Static stretch of focus muscle QL/ES to find 1st point of tension for 10 seconds then contract focus area by holding foot with hands or strap, engage focus muscles (QL/ES) by extending/rotating spine at 10 – 30% of strength for 3 - 5 seconds

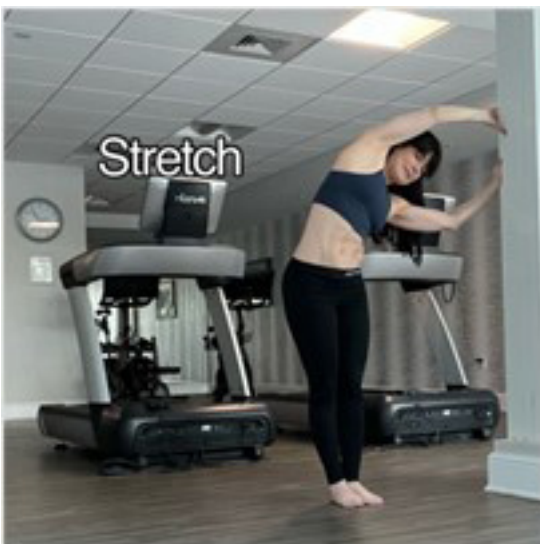
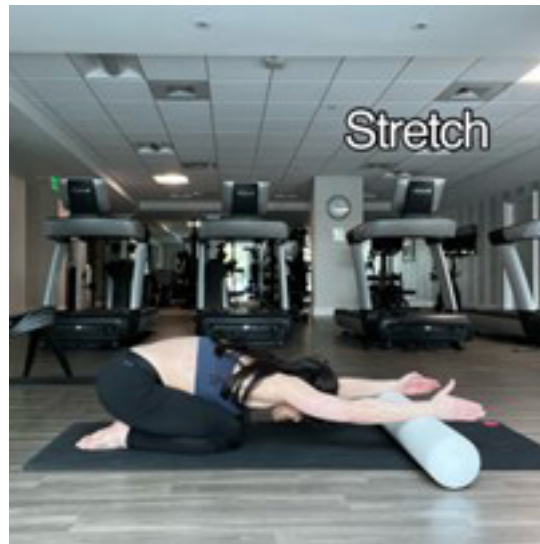
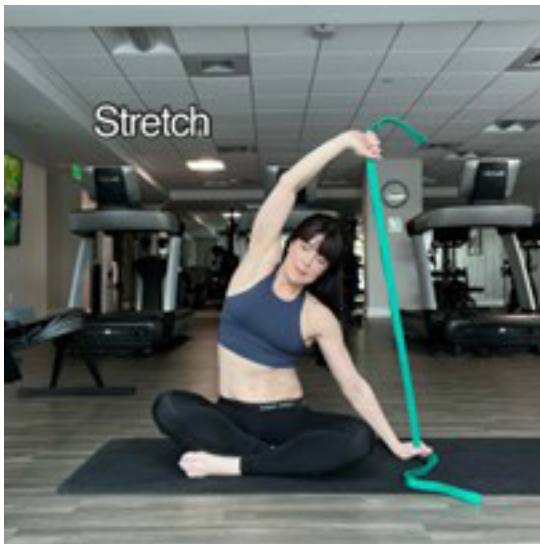
**8. PNF Reciprocal Inhibition** – Contract opposing muscles, engage obliques and abdominals while applying stretch to focus muscle for 30 seconds.

- Repeat all steps 2 – 3 more times or repeat stretching steps 2 – 3 more times

**9. PNF Dynamic Stretch** – move circularly and rotate into different positions

## Latissimus Dorsi





**1. SMR Start Position**

- Seated/sideways with underarm draped over FR or ball
- Both legs flexed with hips flexed and externally rotated
- Top knee points to ceiling, both leg flat on floor
- Alternative position 1 – lie supine with ball under lower back and both knees bent

**2. SMR Action –**

- Compression, Cross Fiber, Pin and Stretch, Stripping 30 – 90 seconds
- Roll from bottom of ribcage to ASIS (top of hip bone)

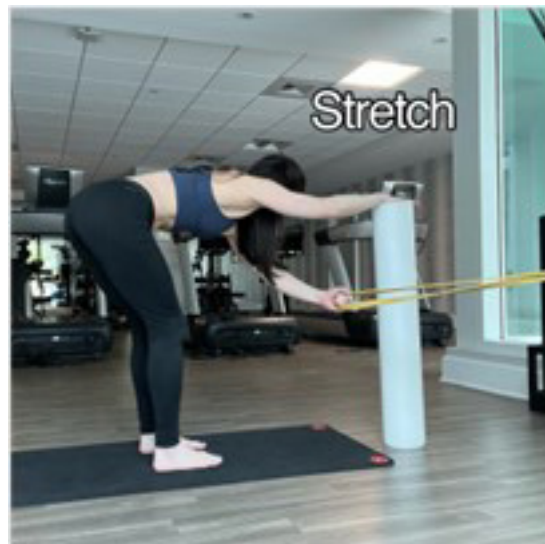
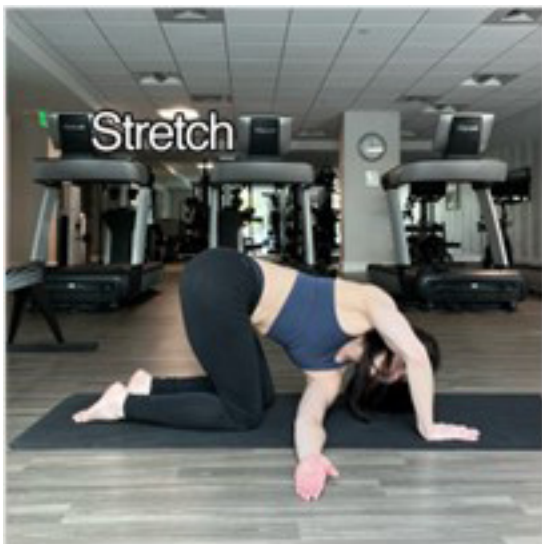
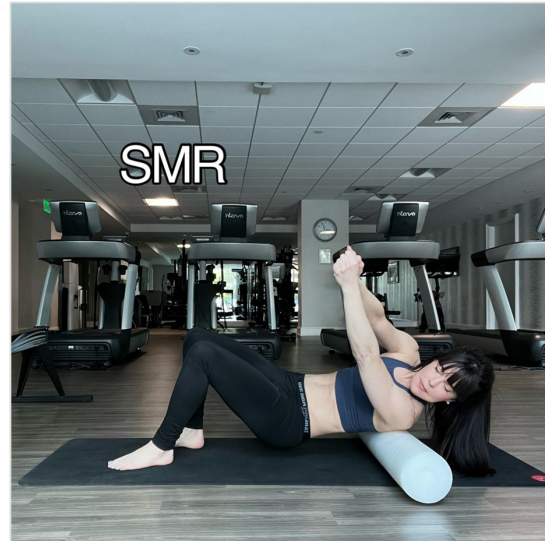
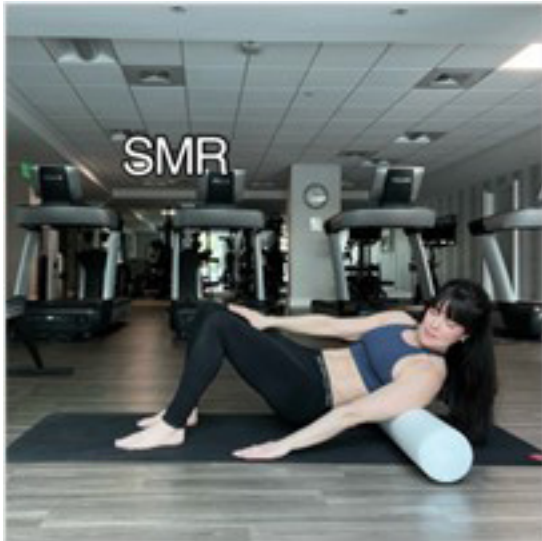
**3. Stretch Position**

- Seated, cross-legged
- Laterally flex spine while reaching arm over body
- Alternate position 1 – kneel in child’s pose position with forearms on FR
- Alternate position 2 – stand hinged at hip sideways to doorway or stable surface, with outside arm, hold door frame



4. Stretch Technique
5. Static Stretch – Laterally flex spine while elevating shoulder and protracting scapula to stretch lats at 1st point of tension for 30 seconds
6. Relax
7. PNF Autogenic Inhibition – Static stretch of focus muscle (lats) to find 1st point of tension for 10 seconds then contract focus area (lats) by depressing scapula and shoulder, at 10 – 30% of strength for 3 - 5 seconds
8. PNF Reciprocal Inhibition – Contract opposing muscles, chest and shoulders while applying stretch to focus muscle for 30 seconds.
  - Repeat all steps 2 – 3 more times or repeat stretching steps 2 – 3 more times
9. PNF Dynamic Stretch – explore different range of motions by moving circularly and rotate into different positions

## Mid Back (MB) – Middle and Lower Trapezius, Rear Deltoids (RD) and Rhomboids





### 1. SMR Start Position

- Lie supine with weight shifted sideways of spine on FR or ball
- Both legs flexed with hips flexed and feet flat on floor
- Fingers laced behind head to support neck

### 2. SMR Action

- Compression, Cross Fiber, Pin and Stretch, Stripping 30 – 90 seconds
- Roll from thoracic vertebra 1 to thoracic vertebra 12

### 3. Stretch Position

- Kneel in quadruped
- Laterally reach one arm under body to rotate thoracic spine, palm facing ceiling (thread the needle)
- Alternate position 1 – hip hinged position over table
- Alternate position 2 – standing, holding door frame for leverage

### 4. Stretch Technique

5. Static Stretch – rotate thoracic spine, protract, and elevate scapula to stretch mid-back muscles at 1st point of tension for 30 seconds

### 6. Relax

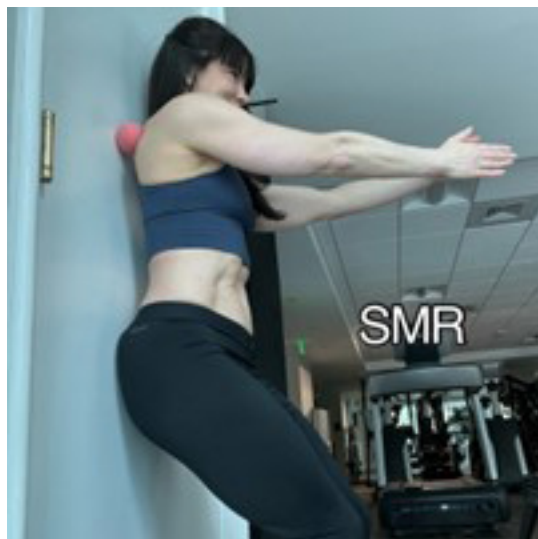
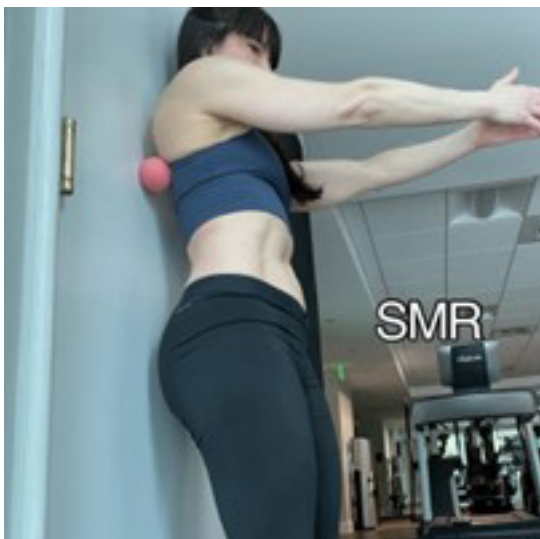
7. PNF Autogenic Inhibition – Static stretch of focus muscle (MB) to find 1st point of tension for 10 seconds then contract focus area (MB) by engaging MB, retract and depress scapula at 10 – 30% of strength for 3 - 5 seconds

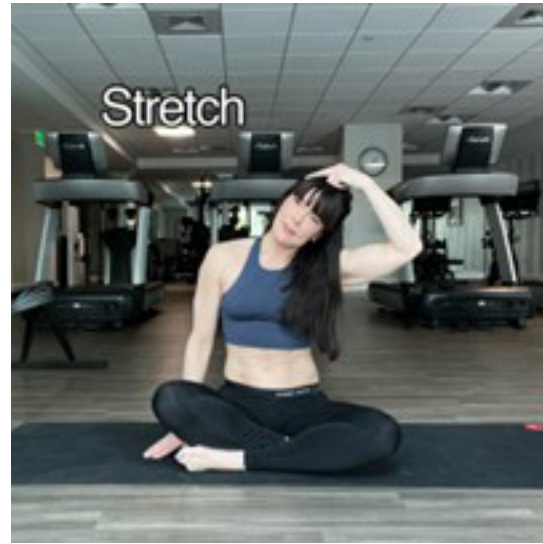
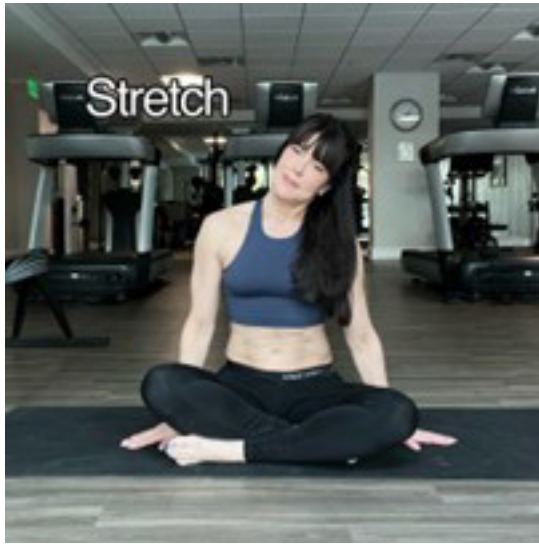
8. PNF Reciprocal Inhibition – Contract opposing muscles, chest and shoulders while applying stretch to focus muscle for 30 seconds.

- Repeat all steps 2 – 3 more times or repeat stretching steps 2 – 3 more times

9. PNF Dynamic Stretch – explore different range of motions by moving circularly and rotate into different positions

## Upper Trapezius (UT) and Levator Scapulae (LS)





### 1. SMR Start Position

- Stand facing away and against wall
- Pin ball between upper back/upper inner corners of scapula and wall

### 2. SMR Action

- Compression, Cross Fiber, Pin and Stretch, Stripping 30 – 90 seconds
- Roll from below cervical vertebra 7 (C7) to upper inner corners of scapula

### 3. Stretch Position

- Seated or standing with spine in vertical position
- Laterally flex cervical spine, drawing one ear towards shoulder and other ear lifting towards ceiling
- Alternate position 1 – Diagonally flex cervical spine, drawing chin towards one clavicle

### 4. Stretch Technique

**5. Static Stretch** – laterally flex cervical spine to stretch upper trapezius and levator scapulae (UT and LS) muscles at 1st point of tension for 30 seconds

### 6. Relax

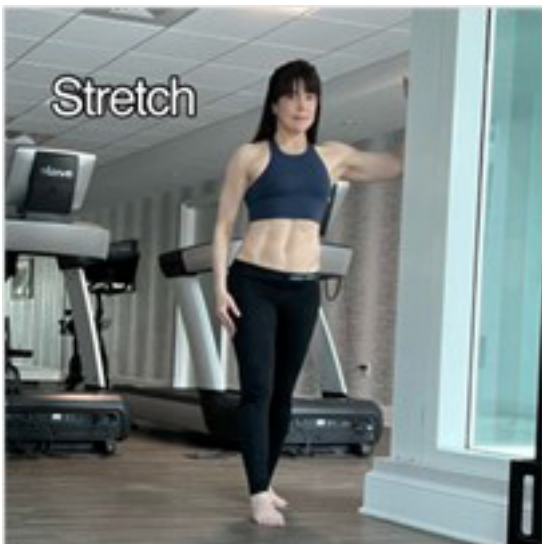
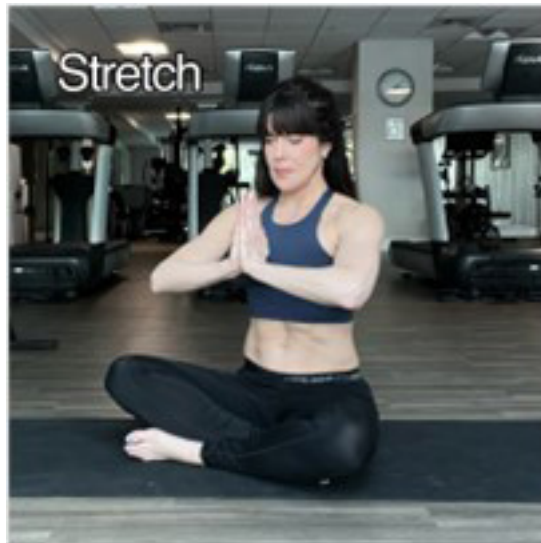
**7. PNF Autogenic Inhibition** – Static stretch of focus muscle (UT and LS) to find 1st point of tension for 10 seconds then contract focus area (UT and LS) by pressing head into fingers laterally towards midline of body at 10 – 30% of strength for 3 - 5 seconds

**8. PNF Reciprocal Inhibition** – Contract opposing muscles, rhomboids and mid-back (depress scapula while applying stretch to focus muscle for 30 seconds.

- Repeat all steps 2 – 3 more times or repeat stretching steps 2 – 3 more times

**9. PNF Dynamic Stretch** – explore different range of motions by moving circularly and rotate into different positions

# Pectorals and Anterior Deltoid



### **1. SMR Start Position**

- Stand facing and against wall with feet in lunge position
- Pin ball between clavicle and wall

### **2. SMR Action**

- Compression, Cross Fiber, Pin and Stretch, Stripping 30 – 90 seconds
- Roll along (clavicle) collarbone from sternum to shoulder (head of humerus)

### **3. Stretch Position**

- Seated or standing with spine in vertical position
- Fingers laced behind head
- Alternate position 1 – shoulder abducted with elbow flexed, elbow pressed into stable surface (wall)
- Transversely abduct shoulder, (move arm posteriorly away from chest) away from midline

### **4. Stretch Technique**

**5. Static Stretch** – Transversely abduct shoulder, (move arm posteriorly away from chest) away from midline muscles at 1st point of tension for 30 seconds

### **6. Relax**

**7. PNF Autogenic Inhibition** – Static stretch of focus muscle (pectorals) to find 1st point of tension for 10 seconds then contract focus area (pectorals) by engaging pectorals and squeezing elbows towards midline of body at 10 – 30% of strength for 3 - 5 seconds

**8. PNF Reciprocal Inhibition** – Contract opposing muscles (lats and rotator cuff muscles) by moving arms away from midline to focus muscle for 30 seconds.

- Repeat all steps 2 – 3 more times or repeat stretching steps 2 – 3 more times

**9. PNF Dynamic Stretch** – explore different range of motions by moving circularly and rotate into different positions





# SECTION 10

## Programming Principles

### Elements of fitness

Training all elements of fitness is important because it helps ensure that the body can perform at its best in all activities. Training all elements of fitness helps to improve overall physical health, strength, and performance. It also helps to reduce the risk of injury by ensuring that the body is conditioned and prepared for physical activity.

1. Cardiovascular conditioning – strengthen heart and lungs to improve body’s ability to utilize oxygen by delivering oxygen to cells
2. Muscular Strength - amount of force a muscle or muscle group can exert against a resistance. It is related to muscular endurance, which is the ability of a muscle or muscle group to exert force over a period.
3. Muscular Endurance - ability of a muscle or muscle group to continuously exert force or resist fatigue over a period. It is the ability of a muscle to contract repeatedly against resistance without fatiguing.
4. Flexibility - ability to move or be moved freely and easily. It is a physical attribute that involves the ability to move joints and muscles through the full range of motion.
5. Body Composition - refers to the ratio of fat mass to lean body mass in the human body. It is used to measure and assess various health conditions and can be used to measure overall health and fitness.

### Principles of Fitness

#### 1. F.I.T.T. Principle

**Frequency** - number of times per week that an exercise is performed. For example, if someone follows the F.I.T.T. principle of exercising 5 times per week, their frequency would be 5.

- Intensity - level of effort or difficulty of a physical activity. It is typically expressed as a percentage of your maximum capacity, or as a rating of perceived exertion (RPE).
- Time – how long the exercise is done. Example 60 seconds
- Type – what exercise is executed. Leg Press for leg strength

**2. Overload Principle** - the body must be pushed beyond its current limits by gradually increasing the intensity and/or duration of exercise. This will cause the body to adapt and become stronger, resulting in improved fitness.

**3. Progression Principle** - exercise intensity, duration and frequency should be gradually increased over time. This is done to ensure that the body is not over-stressed and that any benefits from the exercise are gradually built up over time.

**4. Specificity Principle** - the type of physical activity is specific to the goals you want to achieve. Exercises you do should be tailored to the physical changes you want to make.

When starting any fitness program, it is paramount to identify precautions, contraindications as well as goals of client. Interviewing the client prior to beginning a program with help to determine the needs of the client

### **1. Use a PAR-Q**

A self-screening tool used to assess an individual's current level of physical activity and potential risk for injury or adverse health effects due to exercise. The questionnaire consists of seven questions related to medical conditions and medications that may predispose an individual to injury or adverse health effects due to exercise.

### **2. Goals of client:**

- Start by understanding the goals of client
- Consider what you want to achieve, such as improving your strength, increasing your aerobic capacity, or losing weight, improving posture, etc
- Understand client's stress level, sleep habits, job, recreation, experience with fitness and stretching

### **3. Assess current fitness level:**

- Assess current fitness level by taking measurements such as body fat percentage, blood pressure, or resting heart rate.
- Assess both static and dynamic posture.
- Create a baseline to measure progress
- Understand client's abilities

### **4. Develop an exercise plan:**

- Develop an exercise plan that will help you reach your goal.
- Consider activities such as strength training, balance, coordination, aerobic exercise, and flexibility
- Make sure to include rest days in your plan

### **5. Track progress:**

- Track your progress by recording your workouts, taking measurements when necessary and assessing posture, regularly.
- Maintain good rapport and open discussion with clients to obtain accurate information
- This will help clients stay motivated and will give you an idea of how close you are to reaching your goal

### **6. Adjust program to achieve goal**

- Increase the intensity of your workouts/stretching, add new exercises or new stretches
- Make other changes to help you reach your goal

## Precautions

- Seniors
- Hypertension
- Osteo or Rheumatoid Arthritis or rheumatoid conditions
- Neuromuscular or Joint Disorders
- Fibromyalgia and other chronic pain disorders
- Pregnant women

## Contraindications

- Acute injury or impairment, muscle tear, strain
- Recent surgery without doctor's approval
- Osteoporosis

## Personalized Stretching Program – F.I.I.T.

**1. Tissue tension** - the amount of tension in the muscles and connective tissues (like tendons, ligaments, and fascia) during a stretching or flexibility exercise. It is the sensation of tightness or resistance that is felt when the muscles and connective tissues are stretched. This tension is important to create a safe and effective stretching experience, as it helps to prepare the body for the exercise and enables the muscles and connective tissues to adapt and become more flexible over time.

### **2. Frequency of stretch**

- Sessions per week based on needs of client
- Repetitions per stretch based on needs of client

**3. Intensity of stretch** - determined by how far the muscle is stretched and how intensely the stretch is held. Understanding 1st and 2nd point of tension of each area being stretched

**4. Time of stretch** (duration) – decrease or increase duration of stretch

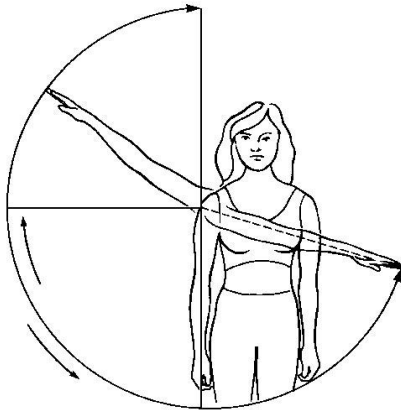
**5. Type of stretch** – chosen based on goals of client and determines the intensity and direction of the stretch, which can help ensure that the muscle is stretched safely and effectively. For example, static stretching is best for increasing flexibility, while dynamic stretching is best for increasing range of motion and muscular power. Knowing which type of stretch to use can help maximize the benefits of stretching for client

## Stretch Program

- Assessment
- Assisted Stretching
- Self-Stretching w/Myofascial Release

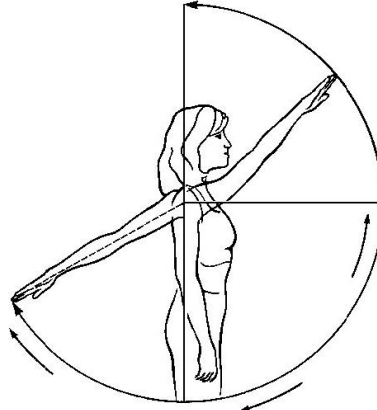
# APPENDIX I

## Planes of Movement



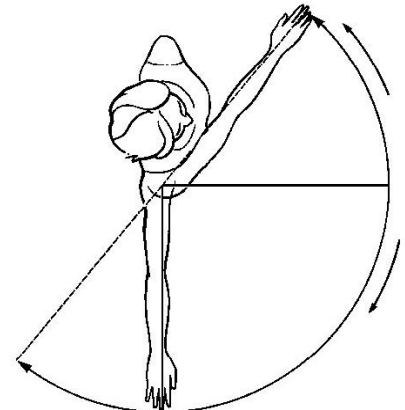
Plane: **Frontal**

Movement: **Shoulder Abduction/ Adduction**



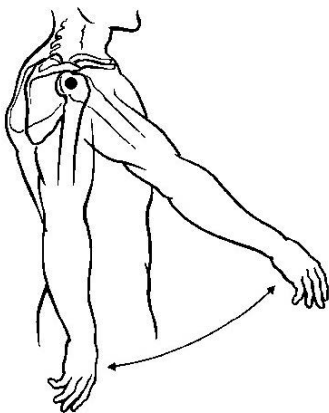
Plane: **Sagittal**

Movement: **Shoulder Flexion/ Extension**



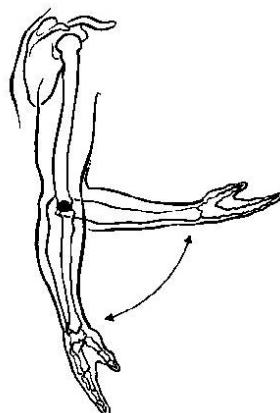
Plane: **Transverse**

Movement: **Shoulder Horizontal Flexion**



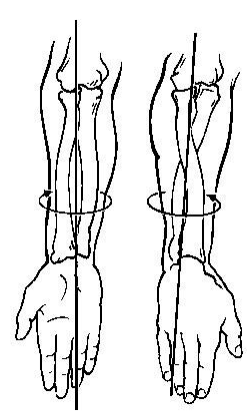
Plane: **Sagittal**

Movement: **Shoulder Extension**



Plane: **Sagittal**

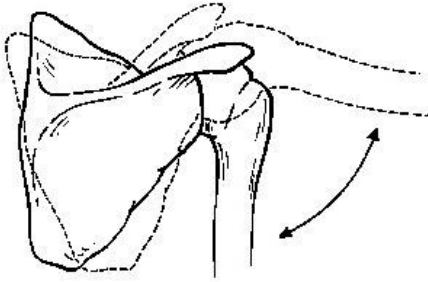
Movement: **Elbow Flexion**



Plane: **Transverse**

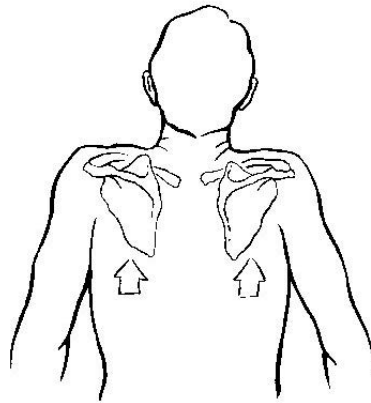
Movement: **Internal Rotation**





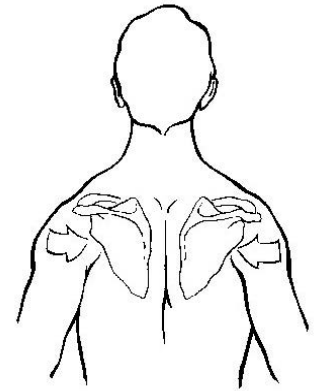
Plane: **Frontal**

Movement: **Shoulder Abduction**



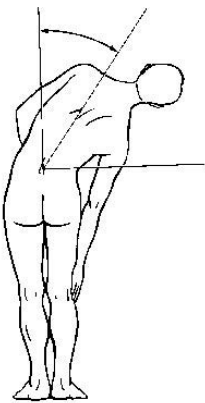
Plane: **Frontal**

Movement: **Scapular Elevation**



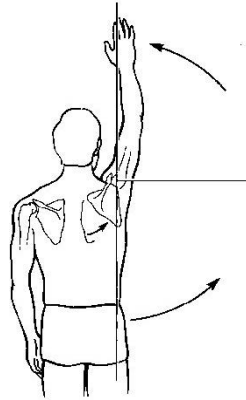
Plane: **Frontal**

Movement: **Scapular Retraction**



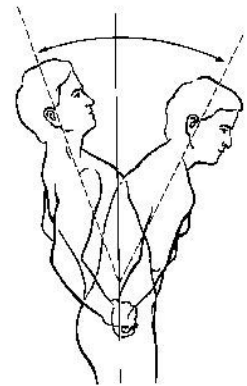
Plane: **Frontal**

Movement: **Lateral Flexion**



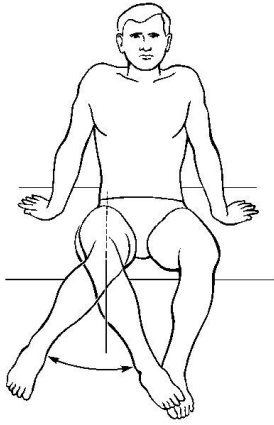
Plane: **Frontal**

Movement: **Scapular Upward Rotation**



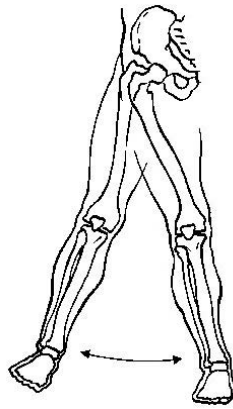
Plane: **Sagittal**

Movement: **Hip Flexion/Extension**



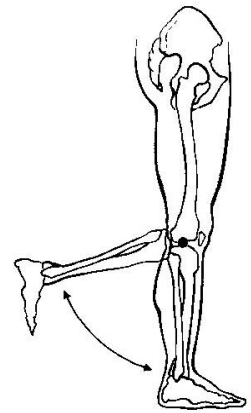
Plane: **Transverse**

Movement: **Hip Internal/ External Rotation**



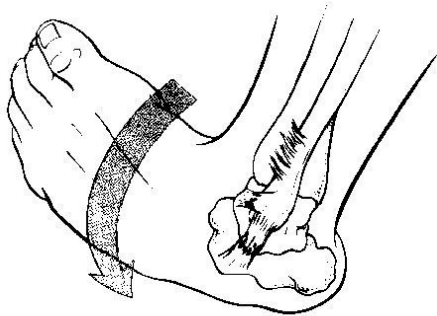
Plane: **Frontal**

Movement: **Hip Abduction**



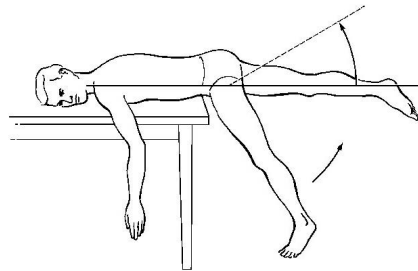
Plane: **Sagittal**

Movement: **Knee Flexion**



Plane: **Transverse**

Movement: **Ankle Supination**



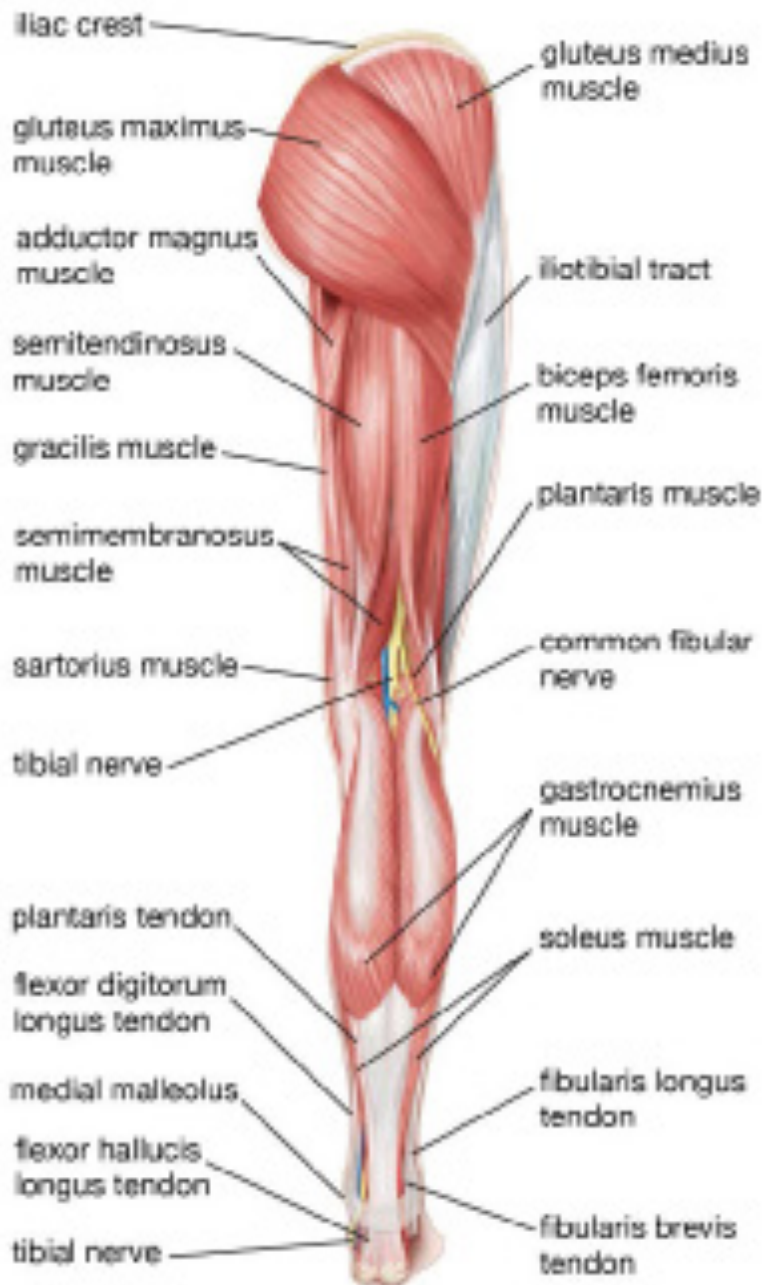
Plane: **Sagittal**

Movement: **Hip Extension**

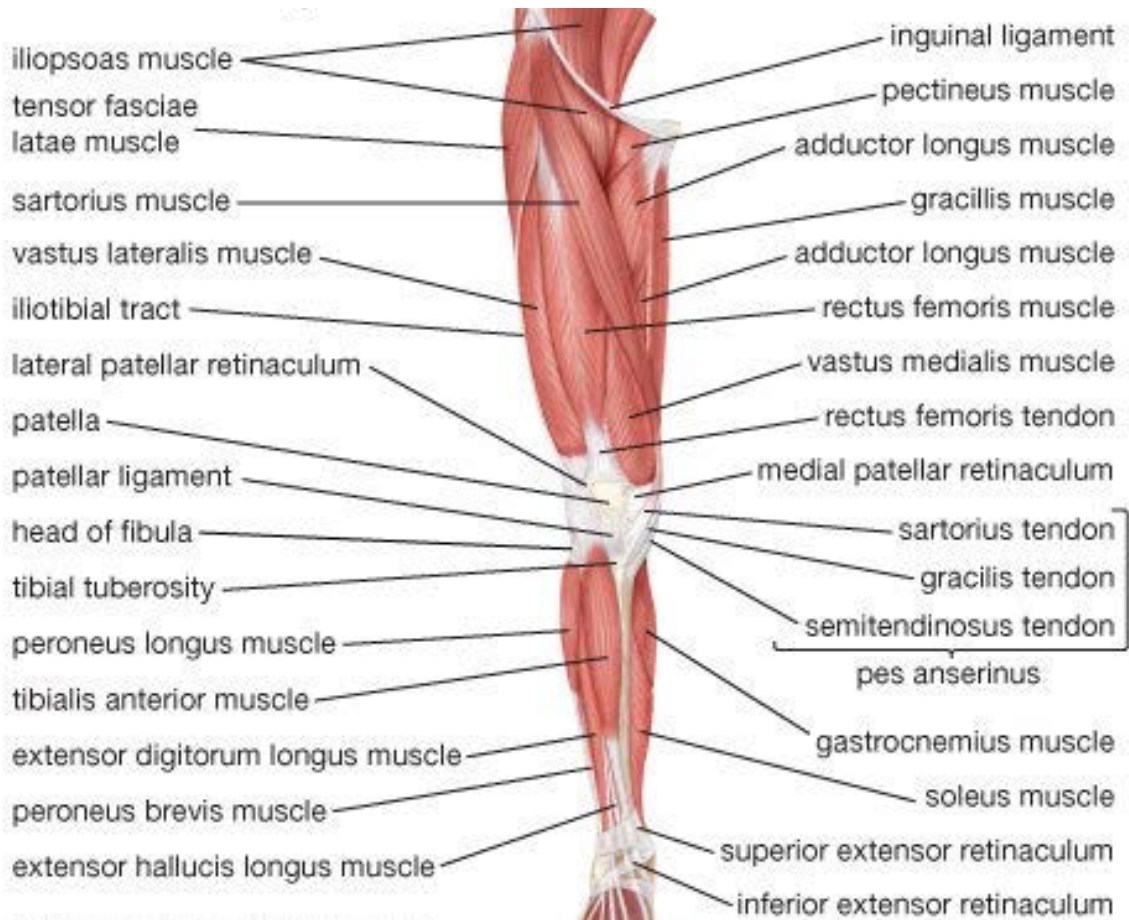
# APPENDIX II

## Muscle Anatomy

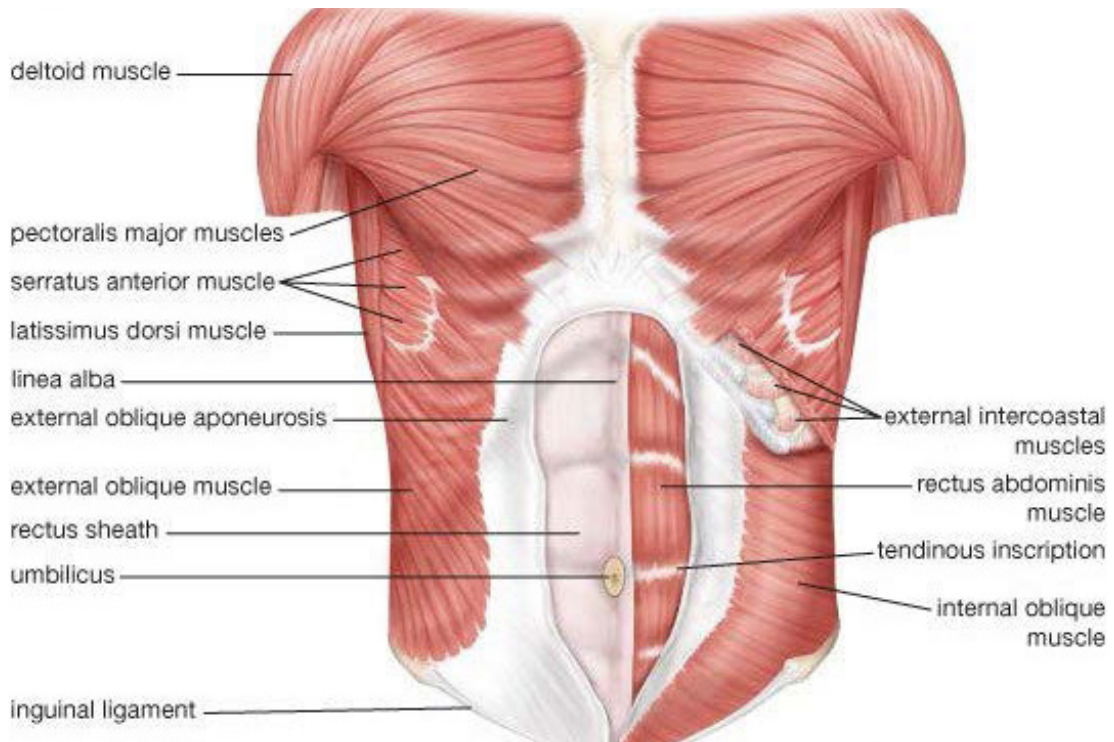
### Posterior View of the Leg



## Anterior View of the Leg

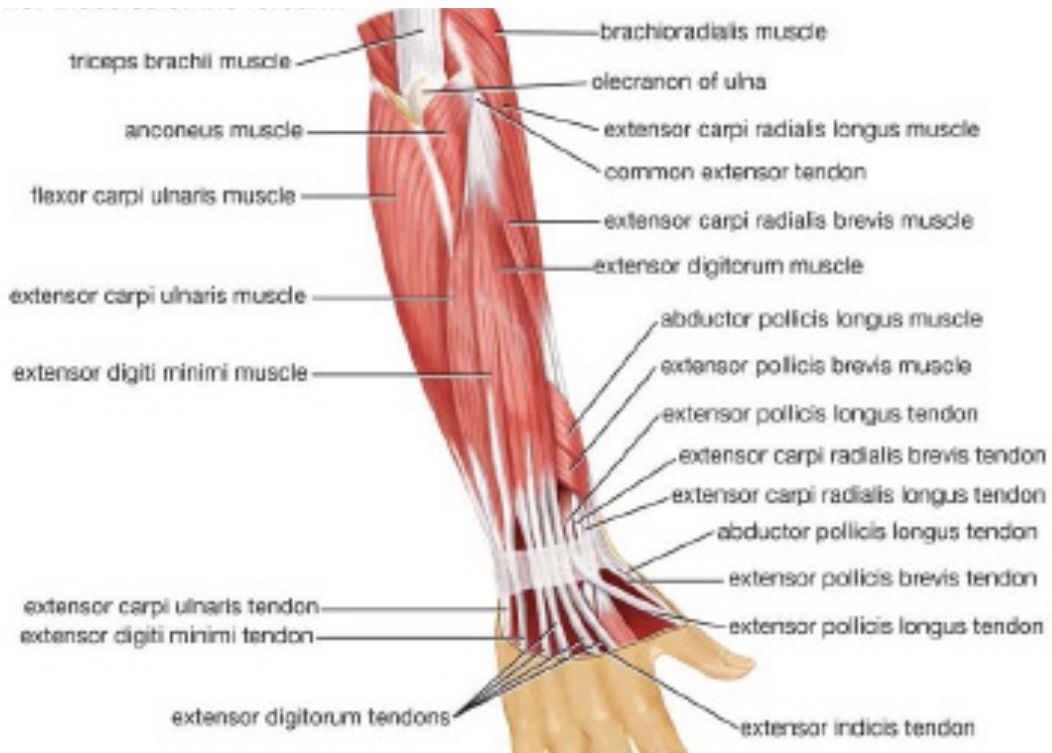


## Anterior View of the Core





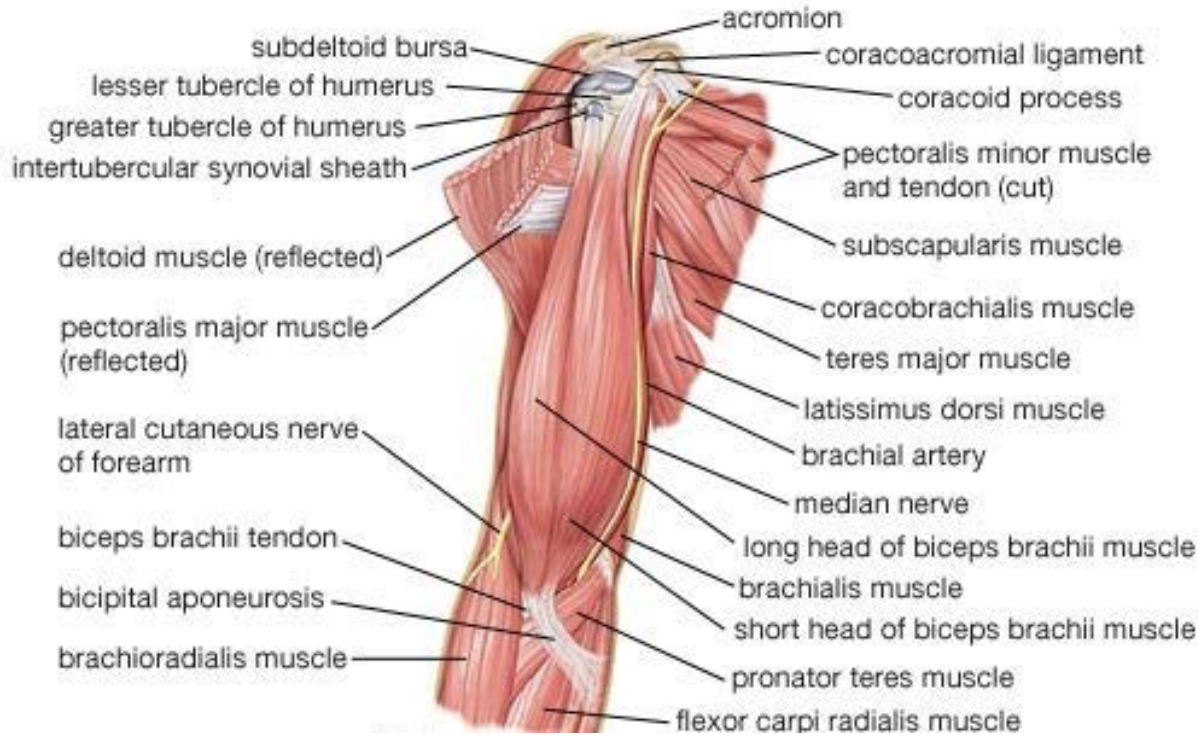
## Posterior View of the Forearm



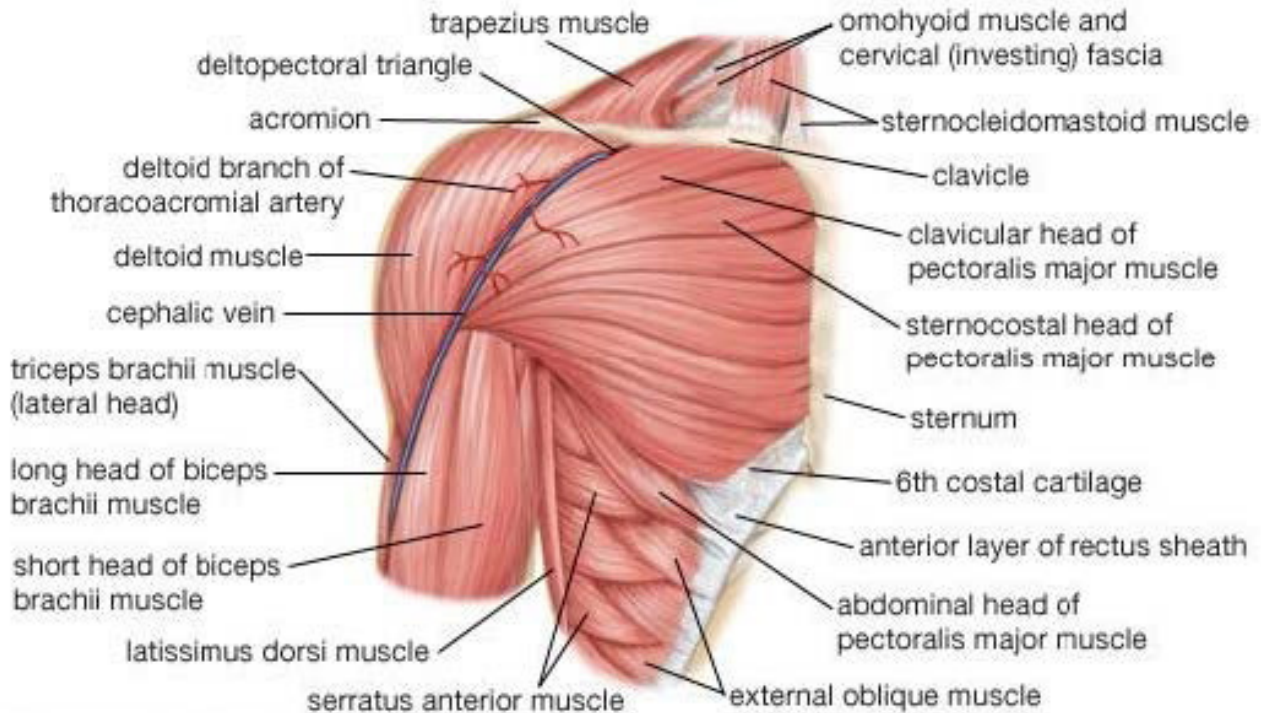
## Anterior View of the Forearm



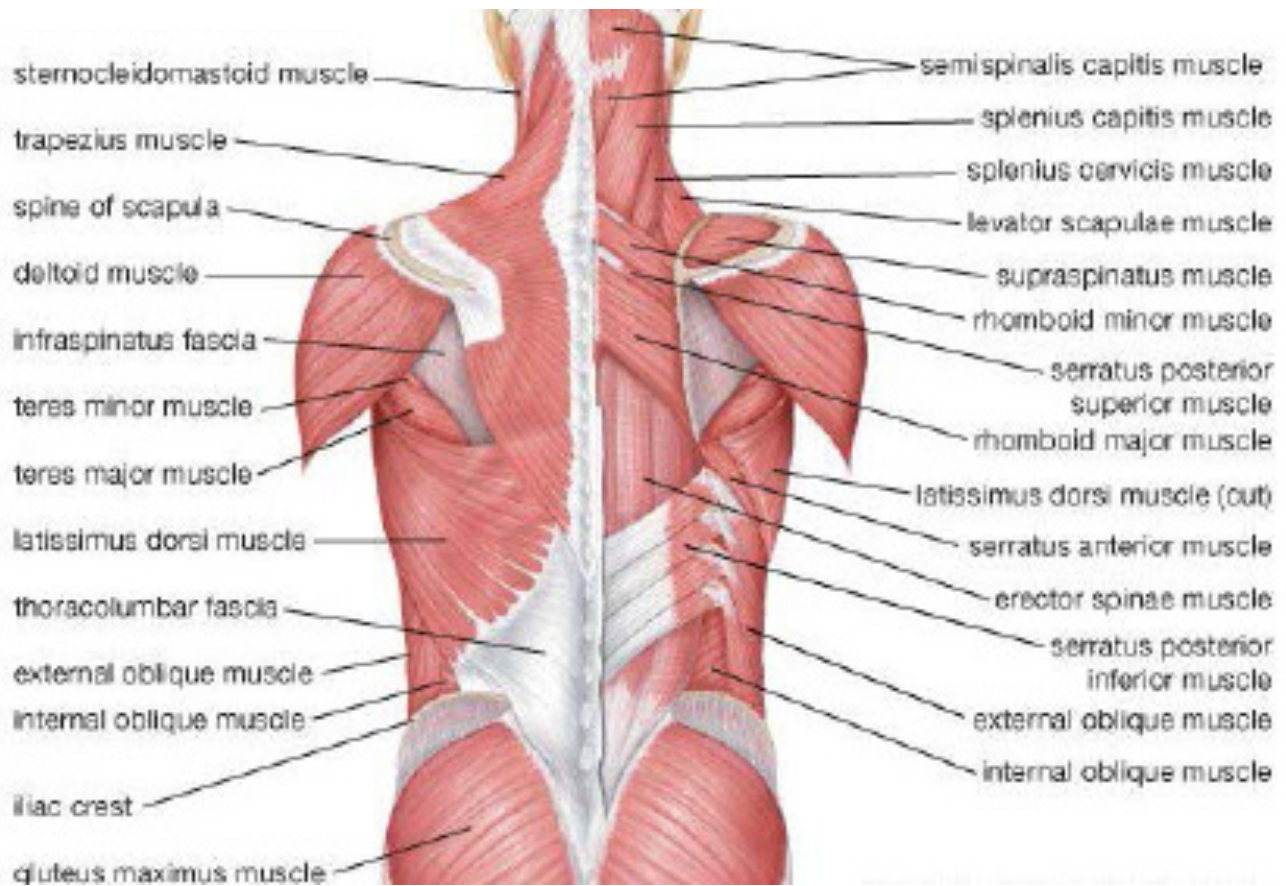
## Anterior View of the Upper Arm



## Anterior View of the Chest



# Posterior View of the Back







# APPENDIX III

## Sources

Stretching Flexibility Coach. (2021). National Academy of Sports Medicine.  
[https://nasmu.nasm.org/pluginfile.php/1069581/mod\\_scorm/content/7/s/1/o/1/a/2/p/1](https://nasmu.nasm.org/pluginfile.php/1069581/mod_scorm/content/7/s/1/o/1/a/2/p/1)

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