

ANATOMY CLASS #6

INTRODUCTION TO THE MYO-FASCIAL SYSTEM

INTRO TO MUSCLES: THE TRAIN STATION STOPS



WHY ARE MUSCLES IMPORTANT TO KNOW?

- It's a language of parts. Knowing the parts makes it easier to then integrate back into the whole. "It's not enough to say that *everything's connected*". You've gotta learn the parts. (anatomy trains, 3rd edition)

3 TYPES OF MUSCLE TISSUE IN THE HUMAN BODY

- **Smooth Muscle:** found in internal organs. acts involuntarily.
Example: small & large intestines
- **Cardiac Muscle:** only found in the heart muscle. acts involuntarily.
allows the heart to beat without fatigue.
- **Skeletal Muscle Tissues:** What you think of when you picture “muscles”. Generally, has a *muscle belly* and attaches to bone through a *tendon* at each end. Every muscle must cross at least one *joint space* (to create movement.) Moves both voluntarily and involuntarily.

HOW MUSCLES “WORK”

- **Prime Mover/Agonist:** the main muscle involved in creating an action.
- **Antagonist:** the muscle(s) that must relax (on the opposite “side”)
- **Synergist:** helper muscles. In truth, no muscle acts alone. These muscles help stabilize and distribute strain.

Remember: this is not a whole body (systems) approach, it is a part-by-part approach that is incredibly helpful, but limited.

TYPES OF MUSCULAR CONTRACTION

Page 52, Yoga Anatomy Coloring Book

- **Eccentric**
 - “Muscle Fiber lengthens; the joint moves against gravity; resistance is greater than force; the insertion site moves farther away from the insertion site, but the muscles still works to resist gravity”
- **Concentric**
 - “Muscle Fibers shorten; force is greater than resistance; insertion site moves closer to the origin site.
- **Isometric**
 - Tension is increased, but muscle fibers neither shorten nor lengthen, there is no movement; force is equal to resistance

7 TYPES OF STRETCHING

http://web.mit.edu/tkd/stretch/stretching_4.html

1. ballistic stretching
2. **dynamic** stretching
3. **active** stretching
4. *passive* (or relaxed) stretching
5. *static* stretching
6. isometric stretching
7. PNF stretching

1. BALLISTIC STRETCHING

Ballistic stretching uses the momentum of a moving body or a limb in an attempt to force it beyond its normal range of motion. This is stretching, or "warming up", by bouncing into (or out of) a stretched position, using the stretched muscles as a spring which pulls you out of the stretched position. (e.g. bouncing down repeatedly to touch your toes.)

2. DYNAMIC STRETCHING

Dynamic stretching, according to Kurz, "involves moving parts of your body and gradually increasing reach, speed of movement, or both." Do not confuse dynamic stretching with ballistic stretching! Dynamic stretching consists of controlled leg and arm swings that take you (gently!) to the limits of your range of motion. Ballistic stretches involve trying to force a part of the body *beyond* its range of motion. In dynamic stretches, there are no bounces or "jerky" movements. An example of dynamic stretching would be slow, controlled leg swings, arm swings, or torso twists.

3. ACTIVE STRETCHING

Active stretching is also referred to as *static-active stretching*. An active stretch is one where you assume a position and then hold it there with no assistance other than using the strength of your agonist muscles (see section [Cooperating Muscle Groups](#)). For example, bringing your leg up high and then holding it there without anything (other than your leg muscles themselves) to keep the leg in that extended position. The tension of the agonists in an active stretch helps to relax the muscles being stretched (the antagonists) by reciprocal inhibition (see section [Reciprocal Inhibition](#)). Active stretching increases active flexibility and strengthens the agonistic muscles. Active stretches are usually quite difficult to hold and maintain for more than 10 seconds and rarely need to be held any longer than 15 seconds.

Many of the movements (or stretches) found in various forms of yoga are active stretches.

4. PASSIVE STRETCHING

Passive stretching is also referred to as *relaxed stretching*, and as *static-passive stretching*. A passive stretch is one where you assume a position and hold it with some other part of your body, or with the assistance of a partner or some other apparatus.

5. STATIC STRETCHING

Many people use the term "passive stretching" and "static stretching" interchangeably. However, there are a number of people who make a distinction between the two. According to *M. Alter*, *Static stretching* consists of stretching a muscle (or group of muscles) to its farthest point and then maintaining or holding that position, whereas *Passive stretching* consists of a relaxed person who is relaxed (passive) while some external force (either a person or an apparatus) brings the joint through its range of motion

6. ISOMETRIC STRETCHING

Isometric stretching is a type of static stretching (meaning it does not use motion) which involves the resistance of muscle groups through isometric contractions (tensing) of the stretched muscles (see section [Types of Muscle Contractions](#)). The use of isometric stretching is one of the fastest ways to develop increased static-passive flexibility and is much more effective than either passive stretching or active stretching alone. Isometric stretches also help to develop strength in the "tensed" muscles (which helps to develop static-active flexibility), and seems to decrease the amount of pain usually associated with stretching.

The most common ways to provide the needed resistance for an isometric stretch are to apply resistance manually to one's own limbs, to have a partner apply the resistance, or to use an apparatus such as a wall (or the floor) to provide resistance.

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7. PNF STRETCHING

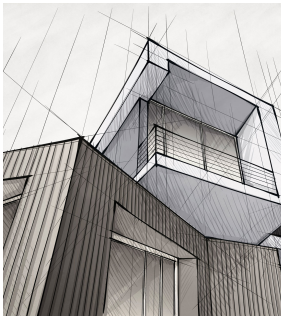
PNF stretching is currently the fastest and most effective way known to increase static-passive flexibility. PNF is an acronym for *proprioceptive neuromuscular facilitation*. It is not really a type of stretching but is a technique of combining **passive stretching** (see section [Passive Stretching](#)) and **isometric stretching** (see section [Isometric Stretching](#)) in order to achieve maximum static flexibility. Actually, the term PNF stretching is itself a misnomer. PNF was initially developed as a method of rehabilitating stroke victims. PNF refers to any of several *post-isometric relaxation* stretching techniques in which a muscle group is passively stretched, then contracts isometrically against resistance while in the stretched position, and then is passively stretched again through the resulting increased range of motion. PNF stretching usually employs the use of a partner to provide resistance against the isometric contraction and then later to passively take the joint through its increased range of motion. It may be performed, however, without a partner, although it is usually more effective with a partner's assistance.

QUICK EMBODIED REVIEW

1. ballistic stretching (*hamstrings*)
2. dynamic stretching (*leg swings/torso twists*)
3. active stretching ("active-static": *bring your leg up and hold it with only antagonist muscles*)
4. passive (or relaxed) stretching ("passive-static": *bring your arm across your body, and hold it using your other arm*)
5. static stretching (AIS: assisted stretching example)
6. isometric stretching (Hamstrings engaged for 5 sec, then relaxed)
7. PNF stretching: PNF refers to any of several *post-isometric relaxation* stretching techniques

WHAT ARE MUSCLES MADE OF?

- In reality, muscles are like an orange: multiple layers of skeletal muscle tissue are woven with fascia, nerves and blood vessels.
- "A broad sheet of fascia encases the whole fruit, deeper layers of fascia separate the organs into "wedges (the portions you eat after peeling) and, finally, a thin coating of tissue surrounds each individual, tiny "bud" of fruit." (*Trail guide to the body*, 4th edition, page 11)



LEARNING HOW TO READ A MUSCULOSKELETAL CHART

- Muscles on one side will be the "Superficial" layers, and "Deep" muscles on the other side. Tendons, Ligaments, and other connective tissue (fascia) structures are often located on a Skeletal Chart.
- Most musculoskeletal charts are of a male skeleton, and average male muscle sizes. This is the "Barbie" of the Anatomy world! Be Wary!



A MUSCLES NAME CAN GIVE YOU CLUES TO ITS SPECIFIC FEATURES.

The name reflects either:

- muscles shape (rhomboid),
- location (temporalis),
- fiber direction (external oblique),
- action (adductors) or
- attachment sites (coracobrachialis)*

FASCIA & CONNECTIVE TISSUE

FASCIA IS A TYPE OF CONNECTIVE TISSUE

- Connective tissue is the extracellular (living) matrix in which all your other systems resides. It provides structural, function, and defensive support to the body.
- Other kinds of connective tissue include tendons, ligaments, aponeuroses, and bones. Blood is also considered a connective tissue.
- From the enlightenment era until the early 20th century, connective tissues were "cut out" in clinical dissections to leave only the obvious structures like muscles, bones, ligaments, etc. The Field of fascial or "connected" anatomy is fairly new because of this...

WHAT'S THE DIFFERENCE BETWEEN MYOFASCIA AND OTHER KINDS OF CONNECTIVE TISSUE? (FASCIA)

- There are three classifications of Fascia (wikipedia, "Fascia")
 - Superficial Fascia
 - A slightly more fatty "plastic wrap" tissue surrounding the body
 - Visceral Fascia (or parietal)
 - Specialized Fascial Structures
 - Deep Fascia
 - "This is the dense fibrous connective tissue that interpenetrates and surrounds the muscles, bones, nerves and blood vessels of the body." Example: Thoracolumbar Fascia

WHAT IS FASCIA MADE OF?

- There are three main types of fiber that Connective Tissue is made of. Within that, collagen is the most predominant and versatile.

1. Collagen
2. Elastin
3. Reticulum

**The term "Fascia" in the medical field is used predominantly to refer to specific myoskeletal structures like the thoracolumbar fascia or the Iliotibial Band (IT Band). In anatomy trains, we use the term as a catch all term to speak about the whole "fascial net" or "connective tissue webbing"*

**Anatomy Trains, 3rd edition*

ANATOMY TRAINS: THE RAILROAD MAP

A CONNECTED ANATOMY

ANATOMY TRAINS® WITH TOM MYERS

- A systemic point of view offered as a supplement to standard anatomy.
- An Anatomy Trains (or Fascial Anatomy) perspective transcends and includes "Isolated Muscle Theory" (Anatomy Trains, Intro, second edition)
 - For example..."the *splenius capitus* [posterior neck muscle] still rotates the head and extends the neck, AND operates as a part of the *Spiral and Lateral Myofascial Chains*. (Anatomy Trains, 3rd edition)
- "The simplest way to describe the connections [between muscles, ligaments, and other mechanical fascial structures] is as a **geometric line of pull passing from one station to the next**. (muscles insertion and attachment)." or as a "plane of fascia especially the superficial layers and fascial "unitard".

WHY IS FASCIA RELEVANT TO MOVEMENT THERAPIES?

- Tension or relaxation in muscle tissue can effect the surrounding "plastic wrap casings" of the fascia. Fascia doesn't contract itself, but it can become stiff and taught overtime as a response to abuse, misuse, or underuse.
- A whole systems approach is desperately needed in Medicine. Manual and Movement Therapies have always impacted the fascia in a healing way, what's new is the map we have to talk about it.
- Human movement can't be summarized as simply the sum of all these little individual muscle actions. Fascial anatomy helps us begin to learn how compensation patterns work.
- Anatomy Trains® is not an established science. But it's helping to get new research that supports a whole systems view of the body.

HOMEWORK

- Yoga Anatomy Coloring Book - Section 3 (Pages 49-55)

Extra Fun:

* Interview with Katy Bowman 9-min video: https://www.youtube.com/watch?v=VH_js1wY8xE

* Exercise vs. Movement (Katy Bowman) 6 min video
<https://youtu.be/WVRg193Wa-M>

* 7 types of Stretching with Tom Myers: <https://www.yogajournal.com/video/types-of-stretch-science-of-stretch/>
