ACTIVE ISOLATED STRETCHING
The Neck & Shoulder
Instructor: Dr. Ben E. Benjamin
What Is It?
- **Active**: The client moves
- **Isolated**: Works the distal, proximal, and belly separately
- **Stretching/Strengthening**

Why does stretching come first?
In order to build strength in a full range of motion, you need to have a full range of motion first.

Components of Flexibility
There are four components of flexibility:

1. **Muscle stretch**: resting length of the muscle fibers
2. **Joint ROM**: depends on structure and any damage to the joint and surrounding ligaments
   - Each joint is constructed to allow for a particular range of motion.
   - What counts as full range of motion (optimal flexibility) depends on the joint, the direction you’re trying to move, and the person’s musculoskeletal structure.
   - Examples: Neck flexion 90º, side flexion 60º; Hip medial rotation 90º, extension of hip joint 30º
3. **Tissue damage**: any damage to the joint, muscle, or connective tissue
4. **Ligament laxity/length** (Example: hyperextended knees)

AIS addresses the first three: stretches the muscles, increases range of motions of joints, and it also strengthens tendons and ligaments but does not change the laxity.

The Role of Fascia
- Fascia is a complex, interconnected fibrous matrix that runs throughout the entire body — surrounding not only our muscles, tendons, ligaments, bones, and joints, but also the sensory organs of the nervous system, blood vessels, and lymph channels.

Over time, AIS work can remodel fascia that has become distorted due to injury, aging, physiological imbalances, or other factors. AIS helps to break down scar tissue in fascial sheaths and reduces the risk of future fascial strains.

Dangers of Stretching Improperly
When performed improperly, stretching can exacerbate the very condition it was originally intended to ameliorate, leading to:
- muscle tears and strains - ligament and tendon injuries - damage to joints - decreased flexibility
- chronic soreness and lactic acid buildup in muscles
Common Mistakes in Stretching

Done too fast or held too long
- Embedded in our tissues are safeguards.
- To prevent tearing, there are Golgi tendons and spindle fiber organs.
- Spindle fiber organs determine the resting tensional length of the muscle, acting as a “thermostat” for tension within the muscle.
- Stretch that’s too fast or too long leads to muscle contraction.

No warm-up
- Collagen fibers are the filaments in connective tissue.
- Extremely strong when hydrated, a collagen fiber can be stretched up to 1.7 times its resting length.
- However, it will rupture if stretched to this same length if not warmed up.

Benefits of Stretching Properly
- enhanced health of the muscles, tendons, ligaments, fascia, and joints
- restored mobility (increasing flexibility and strength, along with reduced muscular tension, can reverse the primary characteristic of aging: joint and muscle immobility)
- reduced risk of muscle spasms, strains, and tears
- decreased vulnerability to injury (strong flexible muscle resists stress better than strong inflexible muscle)

Principles of Efficient Stretching

Principle #1: Prolonged or forceful stretching is counterproductive.
After about 2 seconds, a muscle contracts defensively in response to a stretch that is forceful enough to injure it. (This action is known as the myotatic or stretch reflex.) AIS avoids this problem by stretching gently for no more than 2 seconds.

Principle #2: Active movement facilitates stretching.
Sherrington’s Law of reciprocal inhibition in muscular contraction states that when a muscle on one side of a joint is contracted, the muscle on the opposite side of the joint is sent a neurological signal to relax or release. AIS incorporates this principle by having the person actively initiate all movements.

Principle #3: Muscles are more efficiently stretched when they are at rest or relaxed
Momentary rest between stretches is as important as the stretch itself. It reduces fatigue and enhances blood flow to resupply oxygen and nutrition and eliminate waste products. In AIS, there is a momentary pause after each stretch.

Principle #4: Regular breathing increases oxygenation
Increased oxygenation of the blood helps deliver nutrition to the muscles and improves waste removal. When oxygen is lacking anaerobic metabolism occurs, converting glucose to lactic acid, which promotes fatigue. In AIS, we coordinate each stretch with an exhalation.
**Principle #5: Flexibility is specific**
Flexibility is most efficiently maximized by identifying and then isolating which part of which muscle is inflexible. AIS stretches are designed to stretch the distal and proximal ends of a muscle separately. In addition, they use 45° rotations in both directions to maximize the stretching of all the different muscle fibers.

**Principle #6: Specific movement establishes specific neuromuscular pathways**
Repetition of specific movements creates new neuromuscular patterns, essentially rewiring the neuromuscular system. In this way, AIS stimulates neurogenesis — the development of new neurons — and improves the functioning of existing neurons.

**Principle #7: A gentle assist facilitates increased flexibility**
Another factor that stimulates neurogenesis is actively going beyond a person’s normal capacity. Gentle assists challenge the tissue, facilitating neurological development and enabling a gradual increase in flexibility. People who have degenerative neuromuscular conditions such as multiple sclerosis or polio are generally not encouraged to move beyond their comfort level — which means there’s no opportunity for them to restore lost functioning. AIS uses a gentle assist with every stretch to challenge the muscle slightly beyond the person’s level of comfort.

**Principle #8: A muscle’s ability to withstand a stretch and tensile force is important for injury prevention.**
To injure a normal muscle, the muscle must either be stretched beyond its capacity or subjected to a load that is too great for it to bear. A strong muscle can absorb greater amounts of force and a fully flexible muscle can lengthen and absorb force before failure or injury occurs. In AIS, we build both strength and flexibility so that there are no longer any weak links.

**Principle #9: Flexibility and strength are interdependent.**
Flexibility without strength and strength without flexibility are both inefficient and increase the vulnerability to injury and dysfunction. Typically people are weakest at the end of their range of motion. AIS develops strength within the optimal range of motion.

**Principle #10: Muscle extensibility increases with body temperature. (from DeLee research 2003)**
The basic, ground substance of connective tissue is hyaluronic acid — a highly viscous substance that binds and lubricates the collagen, elastin, and muscle fibers. It has the consistency of Vaseline at room temperature when the muscles are “cold,” and as the temperature of the muscle increases it becomes more malleable and fluid. This is why warming up is important in order to maximize flexibility before any strenuous activity. By combining active movement with stretching in AIS, the muscles quickly become very warm.

**Principle #11: To prevent injury, minimal force should be used during stretching.**
Laboratory studies show that most muscle injuries occur when more than 70% of maximal sustainable force is used. The same research showed that 50% or less of maximal force should be used to prevent injury. AIS always uses 50% or less of maximal force.

**Principle #12: Placing tension throughout ligaments and tendons increases their strength**
The way to strengthen tendons and ligaments is to put tension through them. Brief, repeated stretches put a tensile force through these structures and increase their strength. (In contrast, prolonged stretching can lead to injury; tendons and ligaments are not elastic, and therefore when you stretch them, you damage their integrity and structure.) AIS uses only brief, repeated stretches, strengthening these structures without straining them.
Active Isolated Stretching is based on these 12 physiological principles.

Summary of Physiological Principles of AIS
- Active initiation of movement by the agonist produces a relaxation of the antagonist.
- Slow gentle repetitions promote new neuromuscular pathways.
- Repeated gentle stretching pumps blood in and out of muscle tissue, maximizing relaxation.
- At the end of the person’s active motion, a gentle assist is provided to potentiate the muscle’s range of motion.
- Each stretch is held for no more than two seconds only, releasing before the stretch reflex contracts the stretching muscle.

Things to Pay Attention To
- Active: the client initiates each movement
- Assist at the end, not the beginning of the motion
- Touch gently without gripping
- Work slowly — don’t rush
- Find the way to move your body efficiently without strain
- Check in with the client frequently about any discomfort and respond appropriately
- Pay attention to the physical personal boundaries while you work
- Be sure the client breathes out during each stretch and in during recovery
- Breathe with the client to remind them occasionally
- Count two seconds at a medium speed: 1, 2, 3 — not too fast or too slow
- Identify the stretch barrier or end feel at the person’s limit
- Gently go 2° or 3° beyond the person’s end feel each time
- Strive to identify end feel appropriate for the person you are working with
- Find pressure that is in resonance with that person: not too much or too little
- Work the angles at 45°
- Perform 8 to 10 repetitions of each stretch

Effects of AIS on Different Musculoskeletal Structures
- **Muscles:** Stretch
- **Tendons:** Put tension through them to strengthen them
- **Ligaments:** Put tension through them to strengthen them
- **Joints:** Mobilize joints through their full range of motion. These carefully graded motions reduce scar tissue.
Things to Remember

- **First, second, and third stretch.** When you do the first stretch movement, do it very gently. You are essentially indicating to the person what you’re going to be doing and setting up the neurological pattern. In the second stretch, go to the barrier or end feel, which indicates the person’s flexibility limit at that moment. This will be your starting point as you move forward. In the third stretch, begin assisting the person two or three degrees beyond where they can move actively. As you continue, you will be able to gently assist them two or three degrees further with each repetition.

- **Active initiation.** Remember to have the client initiate each movement. People will often forget and let you lift them, particularly if you start by taking their weight rather than allowing them to move. Remember that AIS works best if the client is moving actively, since this automatically relaxes the opposing muscle(s).

- **Client comfort.** Make sure your clients understand that AIS should not be painful. Many people come in thinking that they’re supposed to tolerate a certain amount of pain; they may have a “grin and bear it” mentality, believing that the more an exercise hurts, the more effective it will be. As you begin working with a client, check in frequently to see how they are tolerating the work. Don’t be a nuisance, but speak up any time you suspect the person might be uncomfortable. When a client does report some discomfort, respond immediately and adjust what you’re doing. That gives the person a clear message that you are interested in and pay attention to what they say. After the first few sessions, as you get to know the client and understand their physical limitations, you will not need to do this as often.

- **Breathing.** Be sure the client breathes out during each stretch and in during each recovery. An important function of AIS work is to help oxygenate the body, including the blood, muscles, and fascia. Ideally, you want to teach diaphragmatic breathing to the client. Find gentle ways to remind the client to breathe while you are working. One way to do this is to breathe audibly with the client from time to time. (Just be sure to tell the person in advance that you’ll be doing that.) Alternatively, you can simply say, “Breathe out” during a stretch, and “Breathe in” during the recovery movement. Most people are not used to breathing very deeply, and some may experience temporary adverse physical reactions — including dizziness, lightheadedness, tingling sensations, or even a sense of paralysis in the hands or feet — as they start taking fuller breaths. Tell your clients to let you know if they begin to feel uncomfortable or dizzy. If this occurs, have the person breathe normally for a while and then try again, breathing a little less deeply. Over time these sensations will likely disappear as their body acclimates to a higher concentration of oxygen.

- **Duration of each stretch.** Find your own way to be sure you’re holding each stretch for approximately two seconds. You can do the traditional counting of 1-1000, 2-1000, or you can count a moderately paced 1, 2, 3. Sometimes therapists get forgetful about this important part of the work and either work too fast, holding for a second or less, or work too slow and keep the stretch going for 5 or 6 seconds. Remind yourself frequently to keep the tempo at the right speed. Stay connected with the person; sometimes the count may be less than two seconds, such as in cases of injury or disease where some muscles are in spasm or there is spasticity present (e.g., MS, traumatic brain injury, Parkinson’s, stroke, etc).

- **Repetitions.** The general rule is to do between 6 and 10 repetitions of each stretch, but there is room for variation. Be flexible in your thinking. For movements on which a client is quite flexible, you might do only 4 or 5. For movements that are very restricted, you might do 12. If one side is tighter than the other, you might do both sides and then come back to the tighter side for a second set of repetitions. Use your own clinical judgment, bearing in mind that the goal is to increase flexibility by performing many repetitions at different angles.
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Shoulder Stretching Protocol

1. Horizontal
2. Hyper extension
3. Horizontal clap in back
4. Triceps
5. Rotations
6. Adduction
7. Elevation

1. Horizontal Abduction: pectoralis major and minor, subscapularis, anterior joint capsule

Warm up circles

Horizontal Abduction at 90°

Horizontal abduction at 135° (position over elbow)

Horizontal abduction at 90° (hands folded behind the neck): pectoralis minor
2. **Hyper-extension Single Arms**: biceps, pectoralis major and minor, anterior deltoid, supraspinatus

- Straight back, thumb up
- Straight back, palm up
- Straight back, palm down
- Straight back, rotate thumb down

3. **Hyper-extension both arms**: biceps, pectoralis major and minor, anterior deltoid, supraspinatus

- Hands clasped and turned out 90°
- Both hands parallel back and up
- Horizontal abduction — posterior (clap in back) 195°
4. Rotation

**External Rotation**: subscapularis, pectoralis major, latissimus dorsi, and teres major

With the upper arm at 95° sitting

**Internal Rotation**: infraspinatus, supraspinatus, and teres minor

With the upper arm at 95° sitting

5. Horizontal Flexion (adduction): infraspinatus, teres minor, trapezius, rhomboid major and minor

Thumb up  Palm up  Palm down  Thumb down
6. Triceps Stretch: triceps, serratus anterior and the anterior joint capsule

With arm parallel

With elbow to the side

7. Forward Elevation: triceps, posterior deltoid and anterior serratus

Straight arm

Sideward elevation thumb up

Thumb down
Neck Stretching Protocol

Neck Sitting

Anterior semicircles (warm-up)

Cervical flexion

Cervical flexion at 45° rotation

Cervical anterior oblique (flexion): Rotate neck 45°, left ear to left chest 45°

Cervical lateral flexion 45–60°

Cervical hyper-extension (elbows on knees) 50°

Cervical posterior oblique extension (elbows on knees), ear to same side medial border 45°

Cervical rotation 90°