

Advanced Hold-Relax Stretching by Patrick Moore

Definitions:

- **Stretching:** to lengthen a muscle using an outside force. When resistance is felt, presumably because the muscle is tense, more force is applied to overcome the tension and lengthen the muscle more. The hope of stretching is that the muscle will remain longer, even after the force is removed. However, because muscle length is completely determined by how much electricity the brain is sending to that muscle, any technique that hopes to leave muscles long must convince the brain to reduce contraction. Does forcing the muscle to lengthen past its resistance, convince the brain to reduce its electric signal to the muscle?
- **Muscle length:** the actual length of the muscle, end to end, which could be measured in inches. When a muscle is short, its free bone is in a position closer to its stable bone. For example, hamstrings is short when the tibia is closer to the ischial tuberosity, and because of the design of the joint, the knee will be bent.
- **Contraction:** the muscle is a machine like an electric motor. When electricity is supplied, the motor works. When more electricity is supplied, the motor works harder. Muscles shorten, or contract, only when the brain tells them to. The nerves are the wires that bring electricity from the brain to the muscle. When the hamstrings is given electricity, this shortens it and bends the knee.
- **Muscle tension:** When a muscle is given the electricity to contract, it attempts to shorten. If it can't shorten, it will be tense. The muscle is trying to shorten but it can't. For example, if the person is standing, and the brain is telling the hamstrings to shorten, but the quads are also being told to shorten to hold the person upright, the hamstrings will become tense.
- **Guarding:** the muscle is sent electricity, day and night, 24/7. Guarding maintains muscle contraction even when the person consciously wishes to relax. Guarding arises from parts of the brain that are not under conscious control. For example, if the ankle ligament has been injured and hurts, the calf muscles will be guarded as a primitive survival reaction to protect the ankle from further separation. Guarding arises whenever the brain interprets that the person is not safe, including physical, mental and emotional safety.
- **ROM: Range of Motion.** Each joint has a range that it can move. The range can be described in degrees of a circle. For example, the joint between C1 and C2 allows forty five degrees of rotation to each side, for a total ROM of 90°. Other joints are described in relation to nearby bones. For example, the knee can bend only until the heel bumps into the glutes, and no further. In this position the hamstrings would be short, and the quads would be long. If you are the one moving another person's limb through a Range of Motion, you are simultaneously lengthening one muscle and shortening its antagonist.
- **Hold-relax stretching:** You choose a muscle to lengthen. You begin to move a limb through its ROM in the direction that lengthens that muscle. Unlike regular stretching, you
 - stop moving the limb as soon as you feel the first hint of resistance.
 - Here you "hold" the limb steady and
 - verbally command the person to contract her muscle while you hold it from moving.
 - You keep the limb steady during the 5-10 second contraction (isotonic and isomorphic). Then you
 - verbally command the person to relax.
 - Wait until you feel the resistance subside, then
 - you move the limb so that her muscle is a bit longer.
 - You stop moving as soon as you feel the next hint of resistance, and repeat.

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- There are several names for hold relax stretching: Muscle Energy Technique (MET), and Proprioceptive Neuromuscular Facilitation (PNF), are two names that cover the same techniques.
 - Two ways to do a hold-relax stretch: a) the muscle that the recipient contracts is the same muscle you hope to lengthen, b) the muscle she contracts is the antagonist to the muscle you hope to lengthen.
- Proprioceptors: There are two nerves attaching the brain to each muscle. Motor nerves send electricity from the brain to the muscle, to excite contraction. Sensory nerves send proprioceptive information back to the brain. Proprioception is a sixth sense that is often included in the fifth sense of touch, but it really is not touch. Proprioception senses the angles of the joints (positions), which direction they are moving in time, and the acceleration of this movement. For example if someone tosses you a large black plastic ball five times then sneaks in a bowling ball, you won't be fooled: in milliseconds your proprioceptors will gauge the mass of the bowling ball because your proprioceptors notice a different acceleration and position in your joints, and quickly you'll get electricity to antagonist muscles to drop the ball and move out of the way (for the purposes of this paper spinal ganglia are considered part of the brain). The brain places a very high priority on proprioceptive information not only to keep ligaments from tearing, but for the safety and survival of the person or animal. Positions of limbs, movement and acceleration must be known with pinpoint accuracy if the person or animal is to hunt, fight, or run away from danger. This is why such a high priority is put on sports in our culture, to keep proprioception sharp.
- Proprioceptors influence contraction: The brain bases it's contraction on the proprioception it is receiving. The brain can make snap decisions to give zero contraction, 100% contraction, or any range between, based on what it hears from the proprioceptors.
- Guarding and Proprioception: When the brain has decided to guard a muscle, it keeps sending electricity to that muscle night and day. How much electricity does it send? Guarded muscles are not contracting 100%, but maybe 30%. And the brain maintains this same number night and day. If more stress arrives, the number may go up to 35% and stay at that number, or if the person has a good day the contraction may go down to 25%. The way the brain keeps the motor signal at the same percent for hours or days at a time is that it depends on the proprioceptors to tell it the amount of muscle tension.
- Annulospiral Receptors: Annulospiral receptors are the proprioceptors in muscles. They are basically a little spring scale. At the grocery store they used to have spring scales hanging up near the vegetables, so you could weigh your veggies before you buy them. The weight of the veggies stretched the spring and the dial indicator curled clockwise to 1 pound 7 ounces. Annulospiral receptors have an actual spring inside. When the muscle is under more tension, it sends a louder signal back to the brain, and when the muscle is under less tension, it sends a quieter signal.
- How It Works: You've told her to contract her muscle. While she is contracting, her muscle fibers are under a lot more tension than they were. She holds this for many seconds. The brain is hearing a constant loud signal, which doesn't make sense. So after five seconds, the brain begins to *adapt* to the signal. This is like when you come from a quiet room into a noisy room and you decide to turn down the volume knob on the stereo. This is called *reducing the signal gain*. Then when you command the person to "relax," and wait a moment, during this time the brain is waiting to hear the proprioceptors, so it knows how

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much electricity to send the muscle. But the brain has turned down the volume, so it will think the muscle is under less tension. With less proprioceptive complaints heard, the brain thinks it is safe to reduce the guarding. The brain will turn down its motor signal to match the quieter proprioceptive signal.

- Hold-relax stretching aims to reduce the amount of electricity the brain sends to a tense muscle.
- Relaxation: occurs when the brain decides to send less electricity to the muscles.
 - If you want people to relax, you must provide proprioception the brain will interpret as safe.
- High Feedback: Feedback is when you respond to what you are feeling, and the person responds to your response. In normal stretching, it becomes obvious when the muscle begins resisting, because you have to adjust your stance to push harder. In hold-relax stretching you need to be far more sensitive. You can do hold-relax stretching today and have some positive benefit. But only after practicing for weeks on lots of people and lots of limbs will you achieve the sensitivity to be really effective. High Feedback means you are highly sensitive to the tiniest contraction you feel as you move through ROM. You sense where the *first hint* of muscle guarding begins and stop there. Feedback means you act on what you feel, by stopping before you then the person's barrier. The person then trusts you more, and gives you more influence over her muscles. So you are even more effective and the person relaxes more and more in a feedback loop.
 - early sensitivity: the sense that you are coming near to the easy motion barrier. Muscle resistance is not suddenly "on" but grows in a curve. When you are more aware of resistance, you feel it earlier.
 - pre-sensitivity You may even develop a 7th sense, where you don't actually feel the guarding yet but you are pretty sure it would start if you went another inch, so you stop *before* the first hint of guarding.
- Low Acceleration: Acceleration is when you increase or decrease speed. High acceleration triggers the brain to fight/flight state, when you will have no influence over relaxation. We begin all movements slowly. We don't stop suddenly but gradually slowly decrease motion. Transitions must be ultra slow.
- Easy Motion Barrier: Moving a person's limb through its ROM, the easy motion barrier is the first hint of muscle guarding, the point in the range where the first resistance is felt. It's called a barrier because the tension is trying to prevent you from going further.
 - If you pass the Easy Motion Barrier, the proprioceptors begin to report increased tension to the brain. What do you think the brain will do? It was already tensing the area and now there is increased tension...
 - Stop at the easy motion barrier. When you are doing it correctly, the recipient will often say, "You can stretch me farther," or "I can go a lot farther than that." This is because she is in the habit of pushing past her resistance. You felt it before she did. So you answer, "This is where your first hint of muscle guarding occurs." She will say, "Really? I don't feel myself resisting you." You reply, "That's because muscle guarding is not a conscious process. If it were, you wouldn't need me, you could just tell your muscles to relax."
 - the Easy Motion Barrier is also called the Subtle Motion Barrier, or Pathological Motion Barrier.

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- Clear Commands: barked orders, “Pull,” and “Relax.” You tell the person in advance what you are going to say, then you say them clearly and loudly. We will practice this in class.
- Unvarying Resistance: during the “hold” phase, her limb must be held perfectly still. If there is any movement or wobbling during the ten seconds, the hold-relax stretch is ruined. Wobbles will send varying proprioceptions to her brain, and her brain will keep listening to the variety without turning down the signal gain. You must find a position where you can be two or three times as strong and stable as you hold her limb immobile for ten seconds. If you cannot find such a position (try putting her on the floor), then command her to reduce her contraction by half, by a fourth, by a tenth of what she was previously doing. Holding the person steady is partly a matter of your strength, but more about your wise positioning and body mechanics so that you can remain stable.
- (Advanced) *Unwinding Muscle*. When you have practiced enough to have early- and pre-sensitivity and pre-sensitivity of muscle guarding, you can sense the boundary changing as you wait. The boundary will either be coming toward you or going away from you and you match this by moving the limb to stay on the safe side of the boundary.
- Never Stretch the Neck: the atlanto-axial joint between C1 and C2 can be damaged when the head is used to leverage the neck into flexion, extension, sidebending or rotation. I often see clients whose necks have been made worse by other practitioners. Also, never stretch your own neck.
- Never Stretch the Psoas, because during any stretch the seven joints between its origin and insertion are compressed at odd angles. You’re likely to compromise the lumbar facets, lumbo-sacral, sacro-iliac, pubic symphysis, or hip ball-and-socket joints. Also, never stretch your own psoas.
- Never Cross the Easy Motion Barrier.
- SOAP charting ROM gains:
 - check ROM at the beginning of the session. Before doing treatment, write down the ranges.
 - Think: which of these Ranges of Motion are less than normal? What muscles need to be longer? Once you are clear which muscles must be too short, then,
 - Do your hold-relax stretching and other treatment on the indicated muscles
 - recheck only those ROMs that were less than normal to see if they have improved. Write down the findings, whether they show change or not.
 - Discuss your findings with him. Does she have any theories why certain ROMs would remain guarded?
 - His homework: temporarily stopping certain exercises, activities, or stretches that may be triggering the brain to guard. Gentle exercises like walking, hiking, jogging (untimed, without counting miles), Tai Chi, Chi Gung, Kum Nye
 - Next session begin by reviewing the last sessions ROMs
- Normal ROM: Doctors, DO and DC have come up with agreed upon ranges. (See Warren Hammer’s *Functional Soft Tissue Examination*. There is a copy at the UA Medical Library.)
 - Unless you are an Olympic Gymnast, there is no healthy natural reason for muscles to be longer than normal ROM. Don’t just keep making a muscle longer and longer. This compromises her joint safety.
 - Hamstrings: supine, with hip flexed 90 degrees, knee should extend fully.

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- Shoulder medial rotation: prone or supine, with humerus at 90 degrees, medial rotation should go 90 degrees. If not, hold-relax stretches until medial rotation achieves 90 degrees (lengthens teres minor and infraspinatus.)
- Shoulder lateral rotation: prone or supine, with humerus at 90 degrees, lateral rotation should go 110 degrees. If not, hold-relax stretches until lateral rotation achieves 110 degrees (lengthens subscapularis)
- Hip medial rotation: in prone position, medial rotation (foot moves away from midline, foot comes toward yourself) should go 45 degrees. If not, hold-relax stretches until medial rotation achieves 45 degrees (lengthens piriformis, gemelli, obturators, quadratus femoris)
- Hip lateral rotation: in prone position, lateral rotation (across midline, foot goes away from yourself) should go 60 degrees. If not, hold-relax stretches until lateral rotation achieves 60 degrees (lengthens TFL)
- Some people are naturally more flexible. In this case, ALL their ROMs will be greater than normal by the same percent. For example, a yoga practitioner who has achieved 90 degrees of hip lateral rotation, allowing her to sit lotus, has not truly become more flexible because her medial hip rotation is 20 degrees. she has gained ROM in lateral rotation at the cost of medial rotation, which is not healthy or natural.
- Some people are naturally less flexible. In this case, ALL their ROMs will be less than normal by the same percent. For example, a gal comes in reporting tight glutes on one side. You check and find that medial rotation only 30 degrees on this side, which would normally indicate she needs treatment, since 45 degrees would be normal. However, you check her other hip and find she only has 30° on that side too. Hmm, maybe both glutes need treatment? However, before treating, you also check her lateral rotation, which should be 60° but it is only 40 degrees, on both sides. Since all four ROMs are equally short, (all 33% less than normal) you may assume this is normal *for her*. She *does not need to have her muscles lengthened*. Do massage/energy work instead.

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Name _____

Date _____

Subjective: "What is your chief complaint today?"

"What are the consequences of this complaint--
"Lost or inhibited functions?"

"Lost time at work or other appointments?"

"Brings attention to a certain body location?"

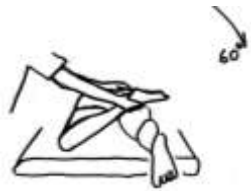
"Threatens future losses?"

Objective: ASSESSMENTS:

hard endfeel?
Pain?



Left hip medial



Left hip lateral



Rt hip lateral



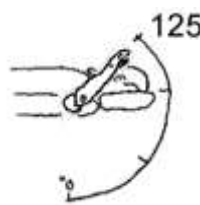
Rt medial



Left should med
in degrees: -----



Left Lateral



Right Lateral



Right Medial

After: What changes did you feel?

What do you **Plan** for homework and next treatment?