

Stretching

The Mind: New Lessons on the Old Art of Stretching

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It is something we do every day with our athletes. It is a necessity to our sport. For rhythmic gymnasts, it is the cornerstone of their lives. Because it is a daily activity, it can easily become mundane, overlooked, and sloppy. Revamping your stretching program, analyzing the details, and setting goals for your gym are all important. This is especially true right now, around peak season for our competitive athletes. The force and output demands are high, so let's keep the muscles happy! We will cover some anatomy, explanation of stretching and flexibility from a kinesiology perspective, crush some bad habits, and hopefully give some guidance as to how to implement these new ideas in to your program today.

The last point is the most important. Ten people can tell you completely different ways to stretch the hamstrings, and the most important, is what most properly stretches your athletes for body posture, demand of sport/trick and personal need. The true definition of flexibility is: range of motion in a joint or combination of joints (1).

What We are Stretching

Let's go over some anatomy and kinesiology first, to better understand what the muscle feels inside! Muscles are made up of thousands of strands of "spaghetti." Each separate noodle is made up of thousands



This is an example of a bad split technique with hips turned out.



This is an example of good technique, aligning the hips properly and stretching without force.

This article is not just for the Elite coaches. In fact, the younger the coaches who understand this information, the better training will be for the future of our athletes. If we introduce and educate our young athletes to proper techniques, it will carry them through and potentially avoid picking up bad habits. As well, to the higher level coaches, remember, there is always something new to learn. Stretching is a topic that so many people have covered. Karate, Pilates, judo, yoga, ballet, etc, have all contributed to how gymnasts and coaches train and stretch. The best compilation of stretches will consider the following things:

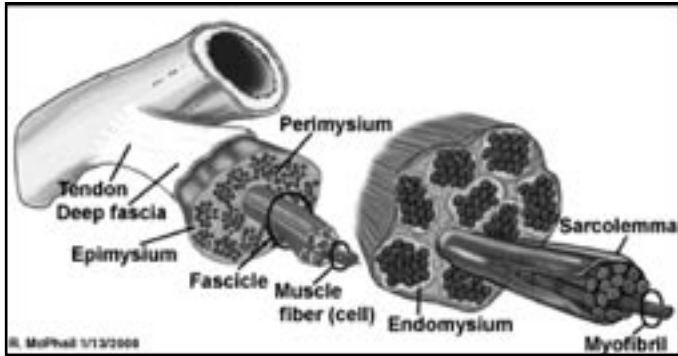
1. Age of the athlete
2. Experience of the athlete
3. Current level
4. training schedule
5. tricks/demand of sport

of intertwined "noodles." Within each of these are tiny motor units, made up of materials called actin and myosin, which are important for sensing stretch quality and quantity. The big noodles are bound, then, by material called fascia, which is similar to cellophane. It keeps everything in place, yet allows it to conform, stretch, and move. When there are adhesences, or scar tissue, it can be that the fascia is stuck to the muscle, stuck to neighboring fascia, skin, or even the muscles have scarring within.

Muscles, at the most microscopic level, are able to shorten and lengthen because of overlap. They, therefore, have limits of shortening and limits of lengthening. Shortening beyond body preparation causes cramping and contracture, and stretching without available range, in the worst case scenario, creates tears of the muscles or even a tear of the muscle off of the bone where the tendon inserts (avulsion fracture). These injuries take a long time to recover from, and if not treated properly, will be chronic injuries, and effect neighboring muscle groups and body posture because of adaptation.

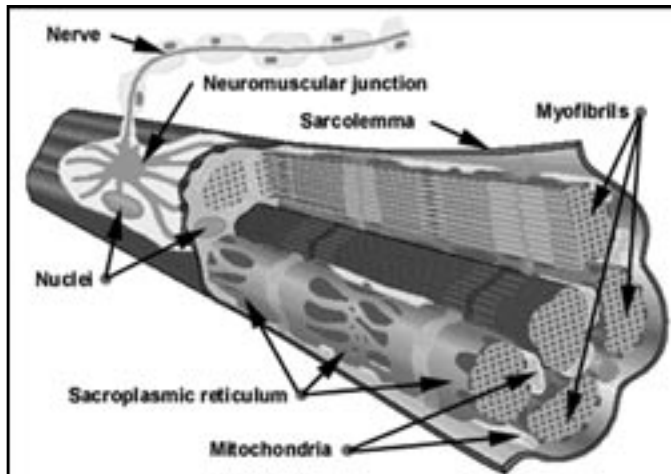
Advanced Stretch as a Reflex

Plyometrics is a lecture in and of itself. The short definition is activity that takes advantage of the stretch reflex for more power production. It involves a pre-stretch with force immediately before a high power muscle contraction. Examples of this are that you can jump higher, using your quads, when you start from a bent knee position than you can a small bent knee position. You can jump even higher using plyometrics by jumping off of a 6" platform, landing and taking off again. When a muscle is stretched, just like shooting a rubber band, it can produce more power.



Preventing Injury

The last idea that I want to explain to you is that of body protective mechanisms. Muscles have small sensors in them, set by the body, to determine comfort level of stretch. A good example is a circuit breaker, which when there is too much to handle, turns off. Well, your muscles do not turn off, they try to "fight back," anticipating what would happen if they don't (i.e. tearing or injury). The reason that injuries such as tears happen when the muscle is not properly stretched often is because undo stress and outside demands were



placed on the muscle too quickly, and the "knee jerk" reaction was to tighten, to fight back, and a tight muscle that is stretched with force that it cannot handle tears (in other words, the outside force wins).

Order of Activity

Muscles are made up of fibers of collagen, which become more elastic when heated. Warming up muscles through getting blood flowing in the body (general aerobics, increasing heart rate) should precede all activity. Too many times have I walked in to a meet in Chicago

in February, kids sit down on the floor, and bounce right into splitz. Without giving muscles time to relax and warm up, the results will be sub par.

The order of stretching should be warmth (general warm-up), static preparation (long stretching, 45 seconds), the ballistic (standing kicks for the hamstrings), and the force and velocity demands in ballistic (kicking faster, harder, switching directions quicker). The example for the calf muscles would be gentle jogging, calf stretching bent knee and straight knee, for 45 seconds each, then single jumping, followed by deep jumps (landings), and then plyometrics last.

Common Misconceptions

L The more force I apply to the muscle, the muscle will stretch. This is most commonly seen as sitting on the child in center splitz to the point of pain, or pushing them down in left leg splitz. There are actually two parts to why this is a bad idea. First, when force is placed on the muscle, it senses too much stretch, and that it cannot handle it, and will begin to fight back, or "re-cross" the fibers, reducing the length, and therefore reducing the ability to relax and produce overall lengthening. Second, from a psychological perspective of the athlete, when they feel that they are being pushed, the brain knows that the next thing to feel is stretch, and very soon after that is pain. So, they brace themselves by consciously tightening the muscle, which, in addition to the first explaining, produces no results. This is called anticipatory isometric bracing.

B The second is bouncing. The coach thinks, if I bounce them down, I will just get them there faster, or they will eventually "let up" trying to resist me, and just miraculously "get" splitz. Wrong again. Bouncing causes the muscle to have that stretch reflex that I mentioned before, and then the muscle is in a constant state of defensiveness, and complete relaxation cannot be reached. Not to mention, the muscle may tear.

E Stretch until you feel it, then you are done. Actually, it takes at least 45 seconds for a muscle to completely relax and begin the "adaptation" phase, meaning long term change for your athlete. If you stretch the hamstring for 20 seconds, likely it is more flexible for the next hour than it was before the stretch, but there is probably no long term effect, which is eventually what we want for the health of our athletes.

O Oversplitz, over the river, over the chairs, etc. People are getting creative with this last habit, from mat stations, to folding chairs, to stall bars. The bottom line is that 180 degrees is 180 degrees, no matter whether flat, tipped upwards, suspended in air, etc. If the muscle does not want to stretch, it will not. Splitz stretches the hamstring of the front leg and the quad/hip flexor group of the back leg. It does not change when you put the heel on a chair. Just square the hips, let them use lifts (parallettes) under the arms for proper posture, and work on getting to 180 degrees first.

G Get down, no matter what. This misnomer is about quality over quantity, and the simple concept of muscle memory. Muscles have many fibers which pull in different degrees depending on the placement of the joints around it. For instance, you can stretch the hamstrings by placing your leg on a two foot high surface in front of you. You can haphazardly place the leg up there with rounded back, turned out hips and leg for a general stretch, which may also incorporate inner thigh/adductors, low back, etc. Or, you can completely square your hips, bottom leg, extend your spine and center your leg. This will create a stretch pattern, or posture, that

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mimics sport demand (i.e. split position in ar, or in handstand). If we train and stretch “unsquared,” then, when the body is in a pressure situation, that is where it will revert to. Changing these bad habits takes months, if not years. So, train the way you will compete. If the athlete cannot get down in a split position to 180 degrees, bring the floor to the athlete (i.e. hands on blocks, parallettes), allowing the athlete to practice good form while stretching.

Advanced and Focused

We will now touch on a concept known as proprioceptive neuromuscular facilitation, or PNF. This requires one-on-one attention to your athletes, as well as in-depth training for your individual athletes if they will be facilitators. The parameters that will be discussed are strict time frames to be followed. So, if you have a bunch of chatterboxes in your group with low attention spans, consider having these exercises be coach-assisted.

To understand PNF, you must first understand a few things. First, most muscles in the body have a partner, an opposite, or an antagonist. The bicep has a tricep. The quad has a hamstring. The calf has an anterior tibialis. The abdominals have the back extensors. Only one of these muscles can be activated in the pair at one time. When the bicep is firing the tricep needs to be in relaxation state in order to allow the fibers to contract, the range of motion (ROM) to occur, and to not hinder speed or velocity production in regards to torque. This is a requirement for any movement to occur. Now that we know that, the second concept is that when the agonist (working muscle) is contracted, the antagonist is more relaxed. To take advantage of this, PNF has a 4-6 second contraction of the muscle (the hip flexors) in order to relax out the hamstrings. Then, this is followed by a relaxation of the contraction, and a static stretch for 10-12 seconds of the antagonist (the hamstrings), taking advantage of the previous ultra-relaxation!

A similar concept can also be applied when stretching the hamstring. You can contract and stretch the same muscle in a cycle as well. Contracting the hamstring in near maximal contraction, hold for 4-6 seconds, then immediately go in to complete relaxation. At this very juncture of contract to relax, the stretch is added, more ROM is moved, and the “slack” is taken up in the muscle. The idea behind this is simple: after contraction, the muscle is tired. It is vulnerable

to sneak-up stretch, as long as it is gentle (just take up the slack). Forcing will open you up to a reflex protective contraction, which we talked about earlier, which defeats the purpose. As an example, lay on your back, both legs extended. Have a partner, with straight leg and square hips; bring your leg into flexion, creating a hamstring stretch. Now, have the partner maintain position, while you produce an isometric (non-moving) force. The two of you will essentially “match” each other in strength so that no movement occurs. Hold for 4-6 seconds. Now, the facilitator immediately, yet slowly and gently, takes up the “slack” of the hamstring (simply an inch or so) until resistance is felt or a stretch is felt. Hold for 10-12 seconds, and repeat 3 more times.

This type of stretching can be done with splitz (contract into the floor without moving), with calf stretching (let the calf hang over the edge of a stair, then gently activate and release) and with quadriceps. Be careful to adhere closely to the gentleness of the rules to avoid injury.

I hope that you have some good ideas to give stretching a fresh start in your gym, and also to concentrate on it as much as it demands. Stretching is a large part of injury prevention, and can save your athletes months of rehabilitation.

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