



## Orthopedic Massage Essentials

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### An Alternative Approach to Stretching

Clinicians, athletes and rehabilitation specialists advocate stretching as a means for injury prevention and treatment. The primary purpose of any stretching technique is to enhance pliability and flexibility in the soft tissues. It is also routinely incorporated with massage in the treatment of pain and injury conditions. There are many different stretching techniques, which all fall into one of three primary categories: static, ballistic or active-assisted stretching.

Static stretching is the most common. In static stretching, you bring the target muscle into a lengthened position and hold it there until you have achieved the desired stretch. The ideal length of time to hold a static stretch is debated in the literature and the results appear inconclusive. Somewhere around 15 to 20 seconds is a common time frame that achieves good clinical results.

Ballistic stretching is used most commonly in the athletic environment. During a ballistic stretch, you bob or bounce into a stretch to encourage tissue elongation in the muscle. Ballistic stretching works by using the momentum of the moving limb to extend past the initial limitation of range of motion. Many people oppose the use of ballistic stretching because the rapid elongation of muscle tissue in the bouncing motion can activate the stretch reflex, which would be counterproductive to stretching.

In active-assisted stretching, the client actively engages a specific muscle contraction prior to, or during, the stretching procedure. There is a variety of active-assisted techniques and they go by different names such as PNF, muscle-energy technique, active isolated stretching or facilitated stretching. There are slight variations in each of these methods, but they are all based on the neurological principles of post-isometric relaxation (PIR) and reciprocal inhibition. Experiments that compare active-assisted methods with static or ballistic

stretching show the greatest range of motion gains with active-assisted methods.

Immediately following an isometric contraction, there is an increased degree of relaxation in that same muscle. This immediate reduction in neurological activity is called the post-isometric relaxation (PIR). The methods of active-assisted stretching use the window of reduced neurological activity during the PIR to engage a stretch of the target muscle after it has isometrically contracted. Stretching during the PIR is more effective than stretching without the prior isometric contraction.

The other neurological principle that is of important in active-assisted stretching methods is reciprocal inhibition. When an agonist (target) muscle contracts, there is a neurological inhibition of its antagonist (opposite) muscle. The reduction in neurological activity in the antagonist muscle is called reciprocal inhibition. Because reciprocal inhibition decreases neurological activity in muscles opposite the ones being contracted, it is helpful to use during stretching procedures. Stretching of the target muscle is enhanced when its opposite muscle is contracted at the same time (Fig. 1).

The various techniques of active-assisted stretching advocate different lengths of time to hold the isometric contraction prior to stretch. Initial research has indicated that a relatively short period of nonmaximal isometric contraction (about 3 seconds) seems most effective for holding the contraction prior to stretch.<sup>1</sup> These methods also vary in the length of time that the stretch is held. A study investigating active-assisted stretching compared stretch duration times of 3 seconds and 30 seconds and found no significant difference in the outcomes between the two time periods.<sup>2</sup> More research is needed to determine the ideal stretching method(s). It may turn out that the optimum stretching method depends on the situation in which it is being used.

### **Effective Stretching Procedures**

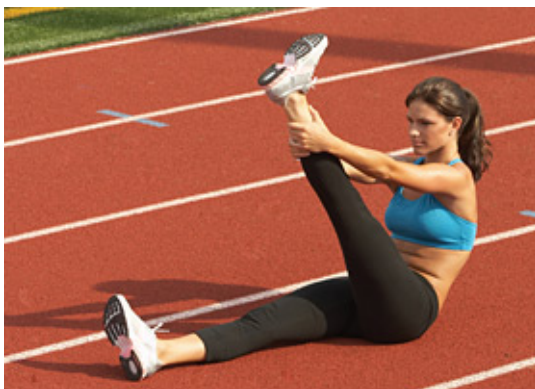


Figure 1: Hamstring stretching with reciprocal inhibition.

During this hamstring stretch the practitioner will engage the hip flexors concentrically by attempting to further flex the hip. Engaging the hip flexors causes reciprocal inhibition of the hamstring group (the target muscle to be stretched). Each of the stretching procedures mentioned above must take into account the biomechanical and neurological properties of the myofascial unit. Therefore, all stretching procedures engage two primary components: the physical stretch of muscle and connective tissue (mechanical effects) as well as the reduction in neurological resistance to stretch (neuromuscular effects).

Fascia is interwoven throughout muscles in an extensive network. It has viscous properties that respond better to slow, sustained tensile loads and resist rapid elongation.<sup>3</sup> The process of connective tissue gradually lengthening when a sustained stretch is applied to it is called *creep*. The extensive fascial network running through all muscles suggests greater benefit for longer-duration stretching methods to take advantage of connective-tissue creep.

The neurological resistance to stretch is primarily governed by a specialized proprioceptor called the *muscle spindle*. It is responsive to both the rate of muscle stretching and the amount of stretch in the tissue. If the muscle is stretched too fast or too far, the muscle spindle sends signals to the central nervous system and an immediate muscle contraction is engaged to prevent overstretching. This immediate muscle contraction is called the *myotatic* (or stretch) reflex. Stretching procedures attempt to minimize any recruitment of the stretch reflex.

### **An Alternative Method**

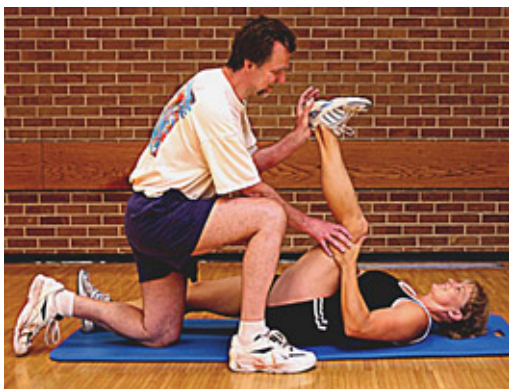


Figure 2: Enhancing a hamstring stretch. The practitioner uses one hand to hold the limb in the stretched position and the other hand applies the fascial elongation technique to the target muscle group (hamstrings).

(Photo courtesy of Bob McAtee) Manual-therapy practitioners have been excited by recent research studies enhancing our understanding of the physiological properties of fascia. We have recently learned that fascia

contains contractile cells and is capable of releasing its contraction and further elongating when a prolonged tensile load is applied to it.<sup>4</sup> Armed with this new understanding, we can use the physiological properties of fascia to enhance stretching procedures. Combining active-assisted stretching methods with fascial-elongation methods would address both the neuromuscular and connective-tissue components of the stretching process.

Consider hamstring stretching as an example of how this works. Engage the hamstrings in a short 3-second nonmaximal contraction. Release the contraction and bring the hamstrings into a stretched position (Fig. 2). Have the individual attempt to further stretch the hamstrings by attempting to flex the hip as far as possible (as they did in Fig. 1). This movement engages the reciprocal inhibition process and encourages further lengthening. While this position is held, apply a myofascial-stretch technique (with the hand or back side of the fist) to the hamstrings and hold it for about 30 to 60 seconds. Holding the myofascial stretch encourages relaxation of the fascial contractile cells and enhances connective tissue creep.

Both the neuromuscular and connective-tissue components of the stretch are emphasized by combining these myofascial and active-assisted stretching techniques. I have found this stretching method helpful with a number of chronically tight muscles. In the future, it will be valuable to perform comparative studies with this and other stretching techniques to find out which ones are most effective under various clinical circumstances.

### *References*

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