Active Isolated Stretching (AIS) is recommended by many coaches and physical therapists. The basic principle is that if a muscle is stretched too far, too fast for too long, after about 3 seconds it will have a natural recoil action to prevent tearing. So the principle in AIS is to only hold the stretch for up to 2 seconds (you can do this by repeating the number by counting a hold with one-one, two-two etc.)

**Recommended websites:**
- [www.smartstretch.com](http://www.smartstretch.com) – excellent video demonstrations
- [www.whartonhealth.com](http://www.whartonhealth.com)
- [www.stretchingusa.com](http://www.stretchingusa.com)

**Hope on a Rope**

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The year was 1990; I was on a practicum placement at the University of Florida, working in the training room treating members of the swimming and track teams. Everything I knew to that time about stretching ‘went to the door’. As an athlete, I had always set aside ten to 15 minutes per day to stretch - but had always held a stretch for 20 seconds and up to a minute.

As I stretched, my muscles would often tremble, but I reasoned that if I held the stretch for long enough (a static stretch) the muscles would lengthen. Amazingly, it never registered with me that though I stretched regularly I never made any gains in flexibility. Sound familiar?

At the University of Florida, some of the elites followed a system that entailed holding a stretch for only two seconds, releasing, and repeating up to 12 times. They used ropes to assist the stretch.

I was intrigued, especially as these swimmers and track athletes were highly enthusiastic about the results of this system, ‘active isolated stretching’. Among the swimmers who endorsed active isolated stretching were Anthony Nesty from Surinam (the only black swimmer to win Olympic gold: 100m butterfly 1988) and Martin Zubero from Spain (the 1992 Olympic champion at 200m backstroke).

Runners Denis Mitchell, Mark Everett, Joetta Clark, and Jearl Miles, all Olympians, carried stretching ropes to use before and after workouts. Their enthusiasm for active isolated stretching (AIS) was enough of an endorsement for me. I was eager to learn more.

My fascination led me to the developer of AIS, Aaron Mattes, a kinesiotherapist who not only directed a highly successful physical therapy practice in Sarasota, Florida, but also studied and researched stretching for over 30 years and is a world renowned expert on flexibility.

A one-day visit to Aaron's clinic resulted in Aaron recognizing my intensity of interest in the science of stretching and an offer to 'take me under his wing' for a year at his clinic.

Ten years after my introduction to AIS, I can claim to be more flexible than at any time prior to that introduction. Though my professional involvement with elite athletes I have brought the techniques developed by Mattes to Olympic and world champions, many of whom previously knew little about stretching.

Now at competitions worldwide, the system termed active isolated stretching is preferred by most athletes. For instance, behind the glamour of the amazing Michael Johnson is a warm-up routine that has 40 minutes of isolated stretching as the main ingredient. Eighty percent of Michael's pre-race warm-up is done stretching on a treatment table - with very minimal running before going onto the start blocks.

To understand stretching, let us first examine 'static stretching'.

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ACTIVE ISOLATED STRETCHING (AIS)

In static stretching, the runner eases into a position and holds it for 30 to 60 seconds. Proponents argue that if you hold the stretch long enough the muscles will release and lengthen, and as there are no rapid movements, no soreness results. The idea is to promote flexibility through 'gradual adaptation'.

While static stretching is better than no stretching, it has its limitations, because muscles have an inherent 'stretch reflex' that is activated with a strong, rapid movement or indeed after three seconds of a stretch. The stretch reflex causes the muscle to tremble; the muscle actually fights the stretch. If you continue to hold the stretch it's like a tug of war - which invites muscle trauma. On study showed that static stretching produced soreness and high levels of creatine kinase (an enzyme associated with muscle damage).

Enter active isolated stretching (AIS). AIS accommodates a number of very important considerations. The body is put in the best anatomical position both to maximize an isolated stretch and to warrant safety. You hold each position for only two to three seconds; then you return to the start position and relax. The stretch is repeated eight to 12 times for optimal results. The benefit of repetitions is to increase blood flow oxygen, and nutrition to the muscle tissues. In effect, AIS is a warm-up in itself.

Apart from the three-second limit, AIS is unique in that it uses the neuromuscular system via 'reciprocal innervation' and 'reciprocal inhibition' to maximize the stretch. In simple terms, when you do the hamstring stretch (Stretch No 2), the front of the thigh (quadriceps) lifts up the leg (reciprocal innervation). The quad as prime mover is activated, thus rendering the hamstring (its opposer) relaxed (reciprocal inhibition).

Therefore, the muscle you wish to stretch, the hamstring, is relaxed - and muscles stretch best when relaxed. By utilizing the prime mover, or opposing muscle group, you invoke the neuromuscular pathway to assist the stretch.

Secondly, while continuing the contraction, you use a rope to gently enhance the stretch. The important term here is to stretch gently and regularly; the cardinal rule of stretching remains unchanged: never force yourself beyond the point of light discomfort.

Stretching is not an instant solution to an injury problem, so take your time. The best results come from daily, gentle stretching. Muscles shorten, stiffen, or become tense from work, training, misuse, poor posture, gravity, and stress.

Athletes should always stretch prior to training to prepare muscles for the rigours of exercise and so prevent injuries. After training, stretch gently to regain some of the tissue extensibility lost through hard exercise/fatigue. One of the main characteristics associated with runners as they age is loss of range of motion. Stretching is the single most important thing you can do to keep your body limber.

The exercises on these pages are those I advise runners to do regularly. All movements should be repeated eight to 12 times.

The great Michael Johnson's warm-up routine includes 40 minutes of 'active isolated stretching' as its main ingredient.

Muscles stretched: low back and gluteus maximus

Lie on back with legs straight. Flex the exercising knee and pull it toward chest by contraction of hip flexor and abdominal muscles. Place hands behind thigh to prevent pressure on knee and provide assistance.
Muscles stretched: hamstrings
Lie on back with legs straight. Slowly lift one leg using quadriceps (front of thigh). Assist with rope at end of movement. Note: if you have a history of back injury, bend the non-exercising leg to stabilise the spine.

Muscles stretched: gluteus medius and minimus, lateral hip, piriformis
Lie on back with legs straight. Flex left knee at 90 degree and le and place rope around midfoot, clasping rope with opposite hand. Use left hand to stabilise thigh by clasping at knee. Contract abdominals and hip adductors to lift knee towards opposite shoulder. Assist with rope and outer hand.

Muscles stretched: external rotators of hip including piriformis, tensor fascia latae, and iliotibial band
Lie on back with left leg moved inward across centre line, foot pointed inward. Wrap rope around arch of right foot. With knee straight, contract quadriceps, upper hip, and abdominals to (1) lift leg toward chest (see pic) and (2) bring leg across hips.
ACTIVE ISOLATED STRETCHING (AIS)

Muscles stretched: rectus femoris
Lie on left side and bring both knees to chest. With the left hand grasp foot from outside. With right hand, grasp right ankle and extend right thigh back by contracting buttocks and hamstrings and, assisting with hand, heel should press into buttocks.

Muscles stretched: rectus femoris
Kneel down on left knee (place pillow or cushion under same knee). Moving forward onto flexed front leg (right) keep pelvis and back stable by contracting abdominals. As you move forward, contract buttocks and hamstrings to flex left heel to left buttock. Assist stretch with one or both hands, bringing heel to buttock as flexibility allows.

Muscles stretched: long adductors, longus, magnus, gracilis
Lie on back with legs extended and wrap rope around arch of left foot. Point left foot inward and lift leg to side by contracting outer thigh and hip muscles. Assist with rope, pulling outward.
ACTIVE ISOLATED STRETCHING (AIS)

Muscles stretched: short adductors, pectiniaus, adductor brevis, proximal and long adductors.
Sit with soles of feet placed together. Contract outside of hips, spreading thighs as far as possible. Use arms between knees to assist stretch at end of movement.

Muscles stretched: lower and deep calf including achilles tendon
Sit with right leg fully straight and left knee bent at 90 degrees. Wrap hands around balls of foot. Lift toes toward body, contracting shin muscles and assisting with pull from hands.

Muscles stretched: gastrocnemius
Sit with legs fully extended and about six inches apart. Loop rope around the ball of left foot. Straighten left knee and pull toes towards you by contracting shin muscles. Assist with rope. For deeper stretch, lean forward at trunk and allow foot to leave floor when pulled.

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