

TO STRETCH OR NOT TO STRETCH

By

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Over the past few years there have been many debates on how athletes should warm up and stretch prior to activity. The original school of thought was a light jog followed by static stretching. The reasoning behind this is a stretched muscle has less chance of being injured and is therefore ready for activity. Through the increased range of motion acquired through acute static stretching, it was believed an athlete would then improve performance on the field. In reality, these athletes were decreasing their performance. In their study on World Class Rugby Players, Fletcher and Jones stated, **”when stretching a muscle statically, the amount of force that could be generated from the muscle to the skeletal system is actually reduced through neural inhibition and decreased muscle-tendon compliance. This change in muscle-tendon compliance leads to a decrease in the musculotendinous unit’s (MTU) ability to store elastic energy, thus decreasing speed and power.”** In other words, if an athlete performs static stretching on the active muscles prior to activity, the body’s ability to store elastic energy is decreased, leading to a marked decrease in performance. This has been shown recently in numerous studies. Below are excerpts from 5 of these studies:

1. **The Effect of Different Warm-up Stretch Protocols on 20 Meter Sprint Performance in Trained Rugby Union Players** Fletcher Lain, Jones Bethan, Journal of Strength and Conditioning Research, 2004, 18(4), 885-888

- It was concluded that static stretching as part of a warm-up may decrease short sprint performance, whereas active dynamic stretching seems to increase 20m sprint performance.
- Recent research has highlighted that far from helping athletes, passive stretching may inhibit performance by reducing power output. The most widely held rationale for this decrement in performance is that passive stretching causes the musculotendinous unit (MTU) to become more compliant, reducing force development by decreasing MTU stiffness. This reduction in MTU stiffness leads to acute neural inhibition and a decrease in the neural drive to muscles, resulting in a reduction in power output.
- The active component of a warm-up, designed to increase core temperature, blood flow, and prepare the body for exercise, has long been shown to benefit performance.

Below is a corresponding chart of the results of the 20m sprint performances with and without static stretching. Notice the decrease in performance of the PSS group and ASST group Pre stretch vs Post stretch.

TABLE 1. Mean +/- SD pre-and post stretch sprint times

| Group | Mean Pre stretch (sec) | Mean Post stretch (sec) |
|-------------|------------------------|-------------------------|
| PSS (n=28) | 3.23 +/- 0.17 | 3.27 +/- 0.17 |
| ADS (n =22) | 3.24 +/- 0.2 | 3.18 +/- 0.18 |
| ASST (n=24) | 3.24 +/- 0.18 | 3.29 +/- 0.2 |
| SDS (n=23) | 3.25 +/- 0.22 | 3.22 +/- 0.21 |

PSS (Passive static Stretch)

ADS (Active dynamic Stretch)

ASST (Active Static Stretch)

SDS (Static Dynamic Stretch)

2. Should Static Stretching Be Used during a Warm up for Strength and Power Activities? Young Warren, Behm David, NSCA Volume 24, Number 6, pages 33-37

- Although static stretching has been found to be effective in causing an acute increase in the ROM of a joint, research indicating that static stretching can also produce a significant acute decrement, of approximately 5-30%, in strength and power production of the stretched muscle groups has accumulated. These findings have led some researchers to recommend against the practice of stretching before strength or power activities.
- Substantial evidence is now available to state that static stretching can impair strength and power performance, although the duration of the impairment, the exact stretching protocols, and the physiological mechanisms are not yet known.
- This study supports previous research and indicates that in more realistic athletic warm-up conditions, as little as 2 minutes of static stretching per muscle group can impair power performance.

3. Effect of Warm up and Flexibility Treatments on Vertical Jump Performance J. Brian Church, Wiggins Mathew, Moode Michael, Journal of S and C Research 2001 15(3) 332-336

- A post hoc analysis revealed decreased vertical jump performances for the PNF treatment group. Based on the results of this study, performing PNF before a vertical jump test would be detrimental to performance.

4. **Effects of Static Stretching for 30 Seconds and Dynamic Stretching on Leg Extension Power** Yamaguchi Taichi, Ishii Kojiro, Journal of Strength and Conditioning Research, 2005 19(3), 677-683

- Leg extension power after **dynamic stretching (2022.3W)** was significantly greater than after **non stretching (1784.8W)** and **static stretching (1788.5W)**.

5. **Effects of Differential Stretching Protocols During Warm-up on High-Speed Capacities in Professional Soccer Players** Little Thomas, Williams Alun G, Journal of Strength and Conditioning Research, 2006 20(1), 203-207

- 18 professional soccer players were tested for countermovement vertical jump, stationary 10-m sprint, flying 20-m sprint, and agility performance after different warm-ups consisting of static stretching, dynamic stretching, or no stretching.

Results of the study in Chart format below

| Type of Stretching | Vertical Jump (cm) | Stationary 10m sprint (s) | Flying 20m sprint (s) | Agility (s) |
|--------------------|--------------------|---------------------------|-----------------------|-------------|
| Dynamic | 40.4 | 1.83 | 2.37 | 5.14 |
| Static | 39.4 | 1.85 | 2.37 | 5.22 |
| None | 40.6 | 1.87 | 2.41 | 5.20 |

- Dynamic stretching during the warm-up was most effective as preparation for subsequent high-speed performance.

There are many more articles and research studies that have been published in recent years stating these same results. **Dynamic stretching has become an important component to pre-activity warm-ups, while most static stretching should be performed at the end of a workout, practice, or game.** *I know this sounds contradictory, but there is one group of muscles that should be statically stretched pre activity...*

THE HIP FLEXORS: Iliacus, Psoas Major, and Psoas Minor.

- Produces hip flexion and external rotations
- Functions: Eccentrically decelerates femoral rotation at heel strike
- Eccentrically decelerates hip extension
- Assists in stabilizing the lumbar spine during functional movements

Why should an athlete statically stretch the hip flexors before activity???

If an athlete wants to run faster, accelerate better, or jump higher, they will need maximal activation of their gluteus maximus muscles. The glutes are one of the primary hip extensor muscles. Hip extension provides the propulsive force upward during jumping, or forward during sprinting and accelerating. **If the hip flexors are tight, they will inhibit the glutes from firing maximally. This is a phenomenon known as Reciprocal Inhibition.** In the NASM Performance Enhancement Specialist Certification Course, Clark states, “the reciprocal (opposite) muscle becomes tight and inhibits the prime mover (in this case the gluteus maximus) from firing properly, leading to faulty movement patterns, decreased performance, and injury.” **Keeping the hip flexors loose is of utmost importance to all athletes.**

FOAM ROLLING AND SELF-MYOFASCIAL RELEASE TECHNIQUES

At APECS we utilize the SUPERUPZ model of Myofascial Release Techniques and Reciprocal Muscle static stretching prior to activity. Once the body is warmed up and the core temperature is elevated, athletes will perform active release techniques on the reciprocal muscle of those most active during a particular exercise. If the athletes are performing acceleration or linear speed work, the glutes need to be firing maximally. With this knowledge, the athlete will perform active release work for about 1-4 minutes on the hip flexors and surrounding hip musculature, then statically stretch the muscle for approximately 1 minute. With these techniques alone, the SUPERUPZ program has added 1-2.5 inches to an athlete’s vertical leap in a matter of 5 minutes time and again, without any change in jumping mechanics. Just actively releasing the hips, allowing the glutes to fire maximally can produce amazing results both on and off the field.

According to Clark “Myofascial (active) release is the process of reducing the soft tissue tension to decrease pain and restore muscles to their normal length tension relationship. The body has two neural receptors located in skeletal muscle tissue. Muscle spindles which record muscle fiber length and rate of change, and Golgi Tendon Organs (GTO) which record changes in tension and rate of change.” Between these two receptors, the muscle tension and length are actively monitored at all times, especially during intense exercise. If the tension or length is altered too an extent, the body will protect itself decreasing neural input or signaling pain. Picture a piece of pizza dough with bumps in it. The fascia which

surrounds the muscle is the same. Clark also states “if there is too much tension, the muscle is not working at the proper length. The roller smoothes away any restrictions to the normal soft tissue length and flexibility. When muscles are in compromised positions, the body has a tendency to shut them down by decreasing the neural activation to prevent injury.” Like the pizza dough, these muscles need to be smoothed out and rolled back to proper working length. This is where the Biofoam roller comes in to play. It is specifically made to roll out the long, superficial muscles such as the Quadriceps, Glutes, and Hamstrings while the APECS 360 Ball is more appropriate for the smaller, deep rooted muscles such as the hip flexors and TFL.

RECOMMENDED WARM UP POST FOAM ROLL AND HIP FLEXOR STATIC STRETCH

DYNAMIC MOVEMENT PATTERNS

20yards form skipping down and back
20yards jogging down and back
20 yards high knees
20 yards butt kickers
20 yards back pedaling down and back
20 yards carioca down and back facing same direction
20 yards tin man
20 yards external/internal hip rotations
20 yards power skipping
20 yards reactive hops
20 yards bear crawl
20 yards zig zag $\frac{3}{4}$ sprints
20 yards full sprint

DYNAMIC STRETCHES

10-15 Forward backward inside leg pendulum swings
10-15 Forward backward butt kicker leg pendulum swings
10-15 side to side leg pendulum swings
10-15 lateral upper body rotations
10-15 lower upper body rotations
10-15 high upper body rotations
10-15 lateral arm swings
10-15 up down arm swings
10-15 waiter arm swings
10-15 press to row arm swings
10-15 shoulder rotations front and back
10-15 neck rotations
hand and foot shakes

NEUROMUSCULAR WARM UP EXERCISES

Body squats
Step forward lunges
Jump squats
Split squats
Agility ladder
4 points supermans
inchworm
4 point hip exercises
Burpees
Plank holds
Low back extensions
T pushups

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