TRAINSMARTER

TO STRETCH OR NOT TO STRETCH?

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Stretching is an activity that is traditionally performed at the beginning of a training session or at the end and like it says on the tin: "stretches the muscles". Quite often I hear my clients tell me that they do not stretch enough, need to do more stretching and other comments like this. On the other end of the spectrum, clients often complain that no matter how much stretching they do, they never seem to increase their flexibility.

There is a lot of contradicting evidence in the literature regarding stretching – is it beneficial? does it improve my recovery or even my performance? And will it reduce my risk of injury? This article aims to answer some of these questions and provide an explanation as to the effects of stretching and also a strategy to help you incorporate stretching into your training routine.

In last month's issue we talked about the RAMP method of performance preparation where the 'M' stands for mobilize. Mobility training is very important in the warm up phase in order to prepare not only the muscle tissue but also the joints for the activity ahead. By mobilizing our joints, we are increasing compliance of the muscle and other soft tissue around the joint in preparation for more arduous activity. In line with the RAMP method, mobility training should be accompanied by activation (that's the 'A' from RAMP if you missed last month's issue) of the muscles around the joints as well; after all, these muscles are going to be required to perform some heavy work on completion of the warm up phase! Activation of muscles involved contractions of the fibres that make up the muscle tissue resulting in a shortening of the muscle in order to produce movement. Traditional stretching exercises have involved holding a muscle and joint at a new and further range and holding it there sometimes for up to 30 seconds. However, this seems

KEY POINT 1: A stretch does not have to be painful to be effective

Pain or the feeling of a "stretch" is a nervous system response. If the nervous system isn't responding, it means that it isn't concerned for the safety of the muscle during this movement and will allow you to increase the muscle fibre lengths therefore reshaping the muscle tissue.

contradictory to the activation of muscles in preparation for performance and recent research has suggested that stretching a muscle prior to activity may actually reduce muscle performance and also increase demands upon the muscle itself due to increased joint mobility – two factors that could lead to injury! This makes good sense, because a stretched muscle like an elastic band becomes weaker and has a reduced capacity to stabilize a joint, absorb energy and generate new forces.

KEY POINT 2:
Mobility through muscle activation whilst maintaining joint stability and appropriate neural firing patterns will prepare the body for optimal performance

When we hold stretches for a prolonged period with the aim of increasing joint mobility, we often feel a tightness or burning sensation deep within the area being stretched. This is the nervous tissues protective mechanism responding to the stretch in order to prevent you from stretching outside of your safe parameters and possibly injuring the muscle further. With this in mind, further stretching may lead to an increased burning sensation (that you thought was a good stretch on the muscle!) resulting in increased sensitivity of the protective mechanism and not an effective improvement in joint range of movement.

ACTIVE STRETCHING

So, it is clear that holding a stretch before activity does not make sense! However, we still want to expose our muscles to the range of movement that they will be expected to perform during the subsequent activity whilst maintaining good joint stability and muscle activation. Performing ACTIVE STRETCHING techniques has shown to improve performance and also reduce injury rates therefore should be included in a warm up prior to activity. Active stretching can be combined with activation of muscles by performing mobility drills through a progressive range of movement working towards specific movements that will be performed in the activity later. This will contribute to increased muscle temperature and compliance, allow the muscle and joint to work through a functional range of movement together and activate neural tissue which will increase the muscle firing rate and contribute to optimal performance. By slowly bringing muscle and joint stretches on through active movements, the nervous system will become conditioned to the movements and allow you to reach new ranges of movement without the burning (protective) sensation thereby improving joint and muscle flexibility.

So far, we have discussed how to stretch a muscle and how to train the nervous system in order to increase joint range of movement whilst maintaining stability and activation of the joints. You can see

that this is far superior and safer than stretching and holding this position in order to increase range of movement. But this doesn't answer the question on how we can physically increase the length of a muscle. *So now we get all physiological!!* Like an elastic band, when you release a stretch on the muscle, it returns to its original length, so in order to gain a training adaptation in terms of muscle length, we need to expose the muscle to **load**. Muscle tissue is made up from many muscle fibres and these fibres are made up from sarcomeres which are arranged in series (see picture). In order to increase the length of the muscle tissue, we need to increase the number of sarcomeres which will make the muscle longer. The opposite also applies. For example, when we immobilize a joint after injury, the joint and muscle tissue is not exposed to load and therefore sarcomeres are lost resulting in a physically shortened muscle that needs rehabilitation. So how do we load muscle to encourage sarcomere growth?

An increase in the number of sarcomeres in series (termed sarcomeregenesis) can be stimulated by the exposure to eccentric muscle contractions. This is the negative phase of a movement for example lowering your heels when returning from tip toes for the calf muscles or lowering the bar to your chest when performing bench press for the pectoral muscles. These movements are controlled by the muscle lengthening under tension and is the part of the movement that causes soreness in a muscle after training (commonly referred to as delayed onset muscle soreness or DOMS). So, for an adaptive lengthening of the hamstring muscles, the lowering phase of the stiff leg deadlift would focus an eccentric load on the muscle tissue and stimulate sarcomeregenesis if performed regularly over a period of time. It must also be noted that in order to gain adaptations, the appropriate load must be applied; eccentric contractions are able to generate much greater force than concentric contractions (the opposite part of the movement when you would be shortening a muscle under tension (i.e. raising onto tip toes for the calf or pushing the bar away during a bench press for the pectorals). So, for the eccentric contraction to be effective a heavy load must be applied, and the movement must be strict and controlled throughout the available range of movement.

WHOLE BODY MOBILITY

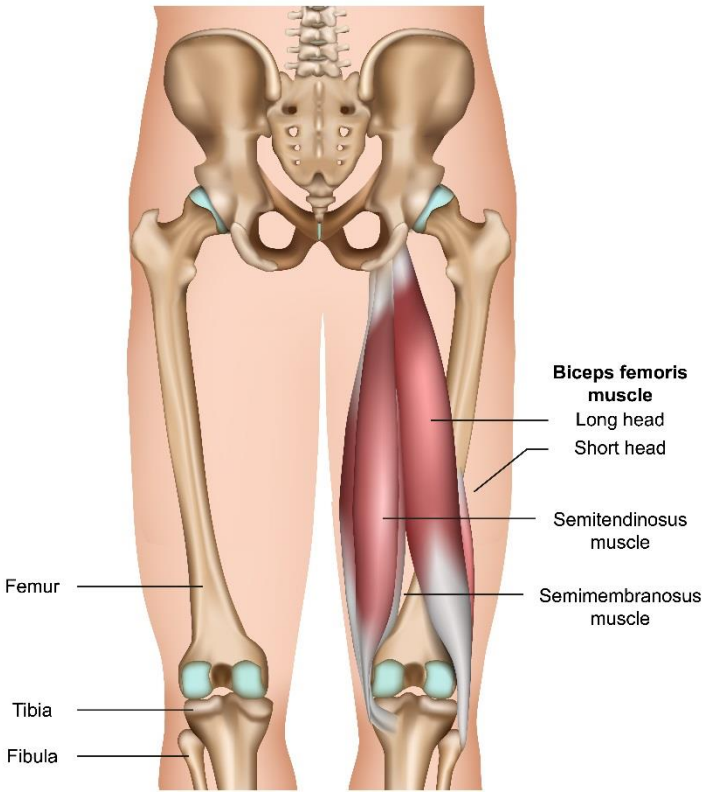
Although it is important to focus upon areas of stiffness, it is also a good idea to maintain whole body mobility on a regular basis. This will maintain optimal joint range of movements that will allow muscles to work effectively over the kinetic chain. Often, an injury in one body part can be as a result of stiffness or dysfunction at a point distal from the injury. Compensatory movement patterns as a result of this stiffness can lead to overload of other tissues that subsequently result in pain. To help you get on your way, I have devised a 4-minute whole body mobility program that can easily be incorporated as part of your RAMP warm up, cool down period or as part of training session focusing on mobility.

MUSCLE OF THE MONTH

HAMSTRINGS

German: *Hamme*, back of leg;

Latin, *Stringere*, to draw together



There are three hamstring muscles all working together to extend the hip and flex the knee. When running, an important role of the hamstring muscles is to slow down the action of the leg at the end of its forward swing. As they work over two joints, they are susceptible to injury: there are two common mechanisms by which the hamstrings become injured: firstly during high speed running when the hamstring contracts to slow down the swinging leg and secondly, overstretching the hamstrings whilst kicking a ball or other movements when the hamstrings are working hard at their end of range (i.e. stretched). Hamstring injuries can vary in intensity, location and degree of injury and many hamstring injuries often re-injure when returning to activity or sport. Therefore, if you suspect a hamstring injury, you are strongly advised to seek physiotherapy management before returning to play.

Strength training exercises for hamstrings can help to reduce the chances of injury and eccentric loading is very much advocated. Click here for a discussion on hamstring injuries and their prevention including some very effective exercise videos to prevent hamstring injuries.

Watch the videos for more exercise demonstrations and follow me on FB for more TRAINSMARTER content. Next month let's look at the ankle joint, proprioception and prevention of ankle injury.

Train Hard, Train SMART!