Strength & Flexibility Training

What is Flexibility?
Flexibility is the range of motion (R.O.M.) possible at a joint so by increasing flexibility we are increasing the range of movement possible at a joint.

Factors limiting flexibility include:

- the type of joint - some joints simply aren't meant to be flexible
- bony structures which limit movement – natural limitation differs from person to person
- muscle mass such as increased through weight training, obesity
- elasticity of muscle tissue, scaring makes tissue very inflexible
- the inelasticity of tendons and ligaments
- the stage in the recovery process of a joint or muscle injury
- the temperature of the joint and associated tissues
- the time of day - prime time is 2:30pm-4pm and the greatest resistance is in the early morning
- age – as we age we generally become less flexible
- gender - females are generally more flexible than males
- genetics – we have different bone structures!
- time spent practicing
- clothing restrictions !

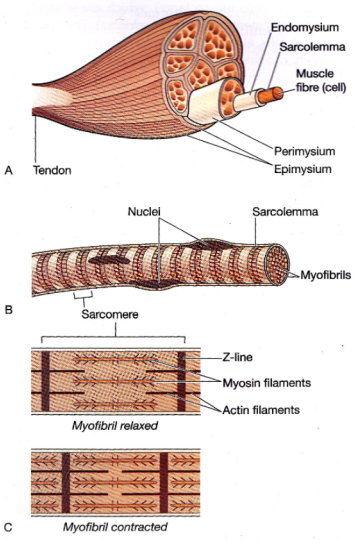
Therefore……

Students must look inwardly and with your guidance practice with integrity. Generally they must always:

- Warm up well
- Experience all stretches at the belly of the muscle never at the joints
- Acknowledge structural limitations experienced in the direction they are moving towards
- Align well using modifications or alternatives as needed
- Work with a smooth easy breath as a feedback tool

The Mechanisms for Stretching

Remember when a muscle receives a signal from the brain telling it to contract then the actin filaments are pulled along the myosin filaments by electro-chemical activity. As the filaments slide along each other the muscle is shortened, this is called the sliding filament mechanism.



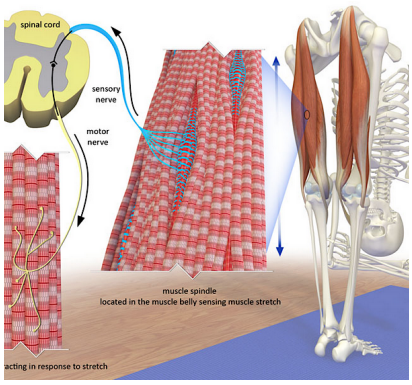
Each nerve ending from a motor nerve stimulates a single muscle fibre or a group of a few muscle fibres. The muscle fibre or fibres can either be in a state of on or off meaning a muscle can be partially contracted by activating just a few motor units or fully contracted by activating all motor units. This is the all or nothing principle.
There are three types of proprioceptors, i.e. specialized nerve endings relaying information regarding the movement of the body.

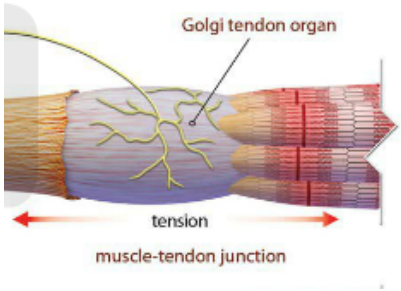
- Muscle spindles within the muscles themselves
- Golgi tendon organs located within the tendons
- Pacinian corpuscles located near the golgi

All of these are stretch receptors monitoring muscle length and pressure.

Two of the stretch receptors:

Muscles Spindles Golgi tendon organ





These three stretch types of stretch receptors mean we find there are three kinds of mechanisms we can utilise, which are:

1) Myotatic Reflex or Stretch Reflex
Here sudden movement initiates the stretch reflex to avoid injury so if we move slowly & hold a stretch this reflex relaxes & muscles lengthen. [used in passive stretch & part of PNF]
2) Reciprocal Inhibition
Here as we contract the agonist, i.e. the muscle making the movement, the antagonist relaxes. [used in active stretch]
3) Inverse Myotatic Reflex or Lengthening Reaction
Here at our furthest ROM the golgi tendon organ overides the stretch reflex & to avoid injury tells the muscle to relax & lengthen. [used in isometric stretch & part of PNF]

We can see how how these three mechanisms are used within asana by exploring six flexibility methods…..

1) Ballistic stretching

- Here we use momentum to force the body beyond its normal ROM. **This is not recommended** as it can cause injury & the stretch reflex is initiated creating contraction rather than lengthening e.g. no flapping butterfly!

2) Dynamic stretching

- Slow gentle movements taking you to your full ROM. Often used in yoga warm ups.

Fewer done at full ROM is better than many repetitions when tired as this can lead to reduced flexibility where the muscles set at a reduced length

3) Passive stretching

- This is where we adopt a static position and stay stretching in a relaxed manner **without making any contribution to the effort of holding the position**. The stretch is 'held' by another part of our body or by the floor, wall etc.
- As we hold the stretch the stretch reflex relaxes and muscles lengthen; this can include connective tissues (ligaments & tendons) to some degree.

4) Active Stretching

This where we adopt a static position and hold it using the strength of the agonist muscles, i.e. we are **contributing to the effort of the hold without any outside support.** The tension created by the agonists helps to relax the antagonist, the muscles being stretched. i.e. reciprocal inhibition.

Many yoga asana are active stretches where we strengthen the agonist as we stretch the antagonist using reciprocal inhibition.

5) Isometric stretching

This type of stretching is where we hold a static stretch at full ROM, and then **contract the stretched muscles** against some form of immovable resistance. So now the golgi tendon organ overides the stretch reflex. This creates strength as well as flexibility.

1. Contract hamstrings as press heel to bar, i.e. against resistance

2. Turn trunk away from resistance as contract chest & arm muscles

6) Proprioceptive Neuromuscular Facilitation (P.N.F.)

This is a **combination of passive & isometric stretching** which usually requires a partner. There are several techniques where a muscle group is passively stretched then contracts isometrically at full ROM against resistance whilst stretched, then is passively stretched again at a new ROM.

Hold-relax method

- Initial passive stretch at first ROM for 10 seconds [myotatic reflex /stretch reflex]
- Stretched muscle isometrically contracts for 6 seconds [inverse myotatic reflex/lengthening action]
- Relax muscle briefly for 3 seconds
- Immediately new passive stretch at new ROM for 10 seconds [myotatic reflex /stretch reflex]
- Muscle relaxed for at least 20 seconds
- Repeat once more - there are no further gains by doing more than two repetitions.

In PNF we gain the benefits of isometric stretching where the inverse myotatic reflex is activated but also when moving to a passive stretch because the golgi tendon organs have been activated there is less contraction as we move to the new point of resistance & also some muscle fibres are fatigued making it harder for the muscles to contract or resist the new passive stretch.

Note for Isometric & PNF Stretches:

- They are contraindicated for children because they are still developing bone structure
- We should wait for at least 36 hours before using Isometric or PNF techniques again on a particular muscle.
- They are not recommended for those who are inexperienced, especially when working in partners!
- It is difficult to incorporate good breathing when working with these techniques but we must consciously try to do so!

Bibliography

Images from:

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