Strength & Flexibility Training

In Yoga

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 !

Meaning:

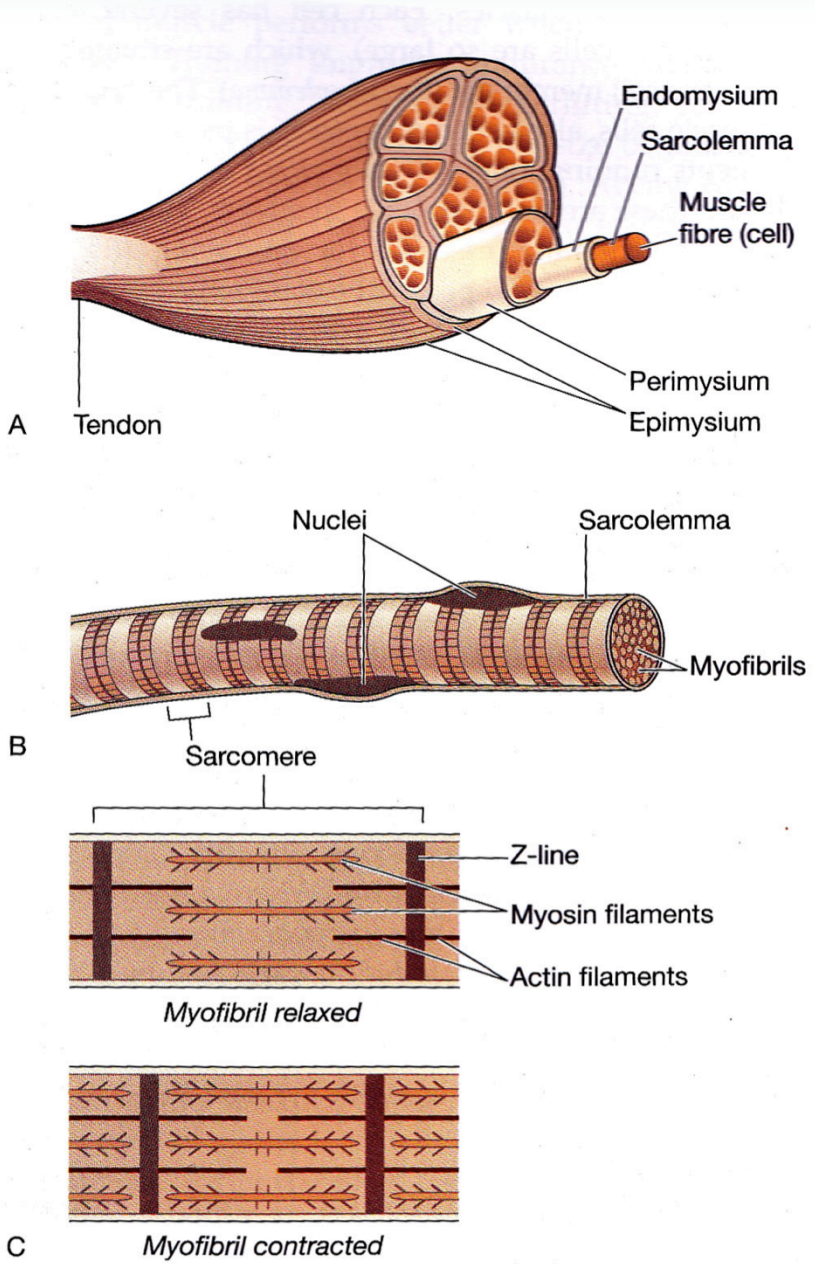
Students must look inwardly and with your guidance practice with integrity. They must always:

- 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

Sliding filament mechanism

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**.



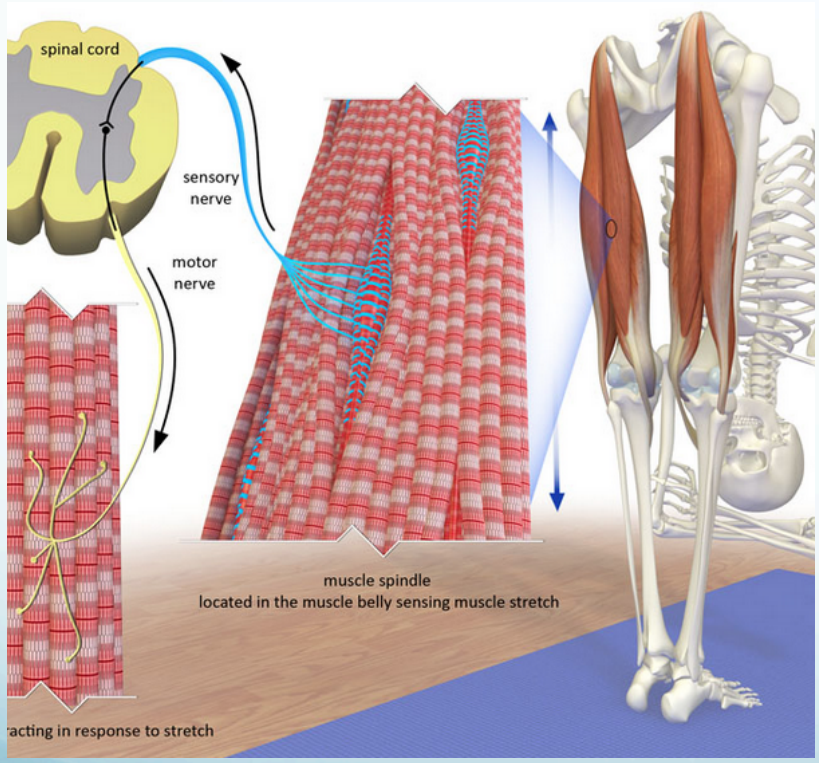
There are three types of proprioceptors, specialized nerve endings relaying information regarding the movement of the body

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

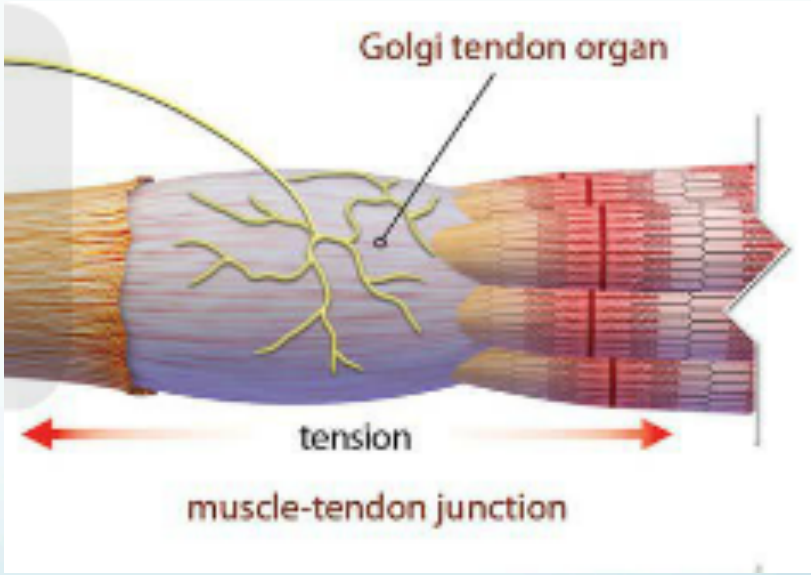
All of these are stretch receptors monitoring muscle length and pressure

Stretch receptors

Muscle spindles



Golgi tendon organ



The three mechanisms for stretching 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.

2) Inverse Myotatic Reflex or Lengthening Reaction

Here at our furthest ROM the golgi tendon organ overides the stretch reflex & tells the muscle to relax & lengthen.

3) Reciprocal Inhibition

Here as contract the agonist, i.e. the muscle making the movement, the antagonist relaxes.

We can see how how these three mechanisms are used within asana by exploring the 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.

2) Dynamic stretching

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

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. It creates strength as well as flexibility.

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

Turn trunk away from resistance as contract chest & arm muscles

Here we are activating the inverse myotatic reflex, i.e. the golgi tendon organ overides the stretch reflex; the muscle spindles become accustomed to a longer length meaning flexibility has increased. This method also incorporates more of the resting muscle fibres, where some contract & others lengthen meaning more of the muscle fibres become able to increase their length.

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.

i) Hold-relax method

- Initial passive stretch at first ROM
- Stretched muscle isometrically contracts for 7 to 15 seconds
- Relax muscle briefly for 3 seconds
- Immediately new passive stretch at new ROM for 10 to 15 seconds
- Muscle relaxed for at least 20 seconds

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.

ii) Hold-relax-contract method

- Initial passive stretch at first ROM
- Stretched muscle isometrically contracts for 7 to 15 seconds
- Immediately the antagonist isometrically contracts for 7 to 15 seconds
- Muscles relaxed for at least 20 seconds
- We can perform another PNF stretch i.e. no final passive stretch

This means there is no final passive stretch and for this reason some authorities believe this method is safer, being less likely to cause injury.

For PNF techniques, as for isometric stretching, we are developing strength as well as flexibility. It is reported that doing the PNF technique twice is enough and any more repetitions do not increase ROM.

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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