**Proprioceptive Neuro-muscular Facilitation Stretching**

Progression on passive stretching.

Stretch is held

Muscle is contracted isometrically between 6-10 seconds

Relaxes and contracts again- will usually go further now.

CRAC- contract, relax, antagonist, contract

**Three stages:-**

1. Athlete and partner assume position for stretch, partner extends the body limb until muscle is stretched and tension is felt.
2. The athlete then contracts the stretched muscle isometrically for 5-6 seconds and the partner must inhibit all movement.
3. The muscle group is relaxed, then immediately and cautiously pushed past its normal range of movement for about 6 seconds.

Allow 30 seconds recovery before repeating the procedure 2-4 times.

**Exam Question**

**Explain how PNF stretching may be used to increase flexibility.**

1. May work with partner
2. Isometric contraction is held
3. Inhibits stretch reflex
4. Removes role of muscle spindles
5. Allows greater subsequent stretch/ CRAC
6. Increased range of motion.

**Explain the Role of the Golgi Tendon Organ in PNF stretching**

* GTO measures how much tension is being placed on a tendon
* When activated the GTO relaxes the muscle associated with the tendon
* Muscle is contracted (1st part of stretch) GTO activated to allow bit of movement.
* Muscle is contracted in an already stretched state the GTO is activated more (almost overrides the stretch reflex)
* When the contraction is finished, the muscle is unresponsive to any further stretch
* This allows the limb to be moved past its normal range of movement.
* Trains stretch receptor cells.

**Physiology of PNF stretching**

* The mechanism for PNF stretching relies effectively on being able to switch off protective muscle sensors, proprioceptor cells.
* Within muscle cells are muscle spindles that assess how fast and how far a particular muscle is being stretched. When activated this spindle produces a stretch reflex that results in the muscle contracting to prevent the joint from overstretching.
* A second sensor is involved in PNF stretching, the Golgi Tendon Organ which measures how much tension is being placed on a particular tendon.
* When the Golgi Tendon Organ is activated then it relaxes the muscle associated with the tendon.
* When the muscle is contracted (whilst in a stretched state) the tension generated by the contraction activates the golgi tendon organ.
* Voluntary contraction during a particular stretch raises tension on the muscle, switching on the golgi tendon organs more than just stretching. When the contraction phase finishes, the muscle is more unresponsive from contracting against the following passive stretch.
* PNF stretching takes advantage of this muscle "vulnerability" by utilising the time immediately after the isometric contraction to train the receptor cells to the new (and hopefully) increased range of motion of the joint. This is what the passive stretch after the contraction achieves.