# Proprioceptive Neuromuscular Facilitation (PNF) Stretches (Stretching of the hamstrings is used in these examples)

The Hamstrings work as a pair with the Quadriceps

There are 3 hamstring muscles you must know:



Rectus Femoris



The quadriceps consist of four individual muscles; **rectus femoris**, vastus medialis, vastus lateralis, and vastus intermedius.

**Rectus Femoris**: The only muscle of the quadriceps to cross both the hip and knee joints. It assists in flexion at the hip joint (and extends the knee joint).

#### So this muscle pair will work to flex and extend the hip

There are many different variations of the PNF stretching. Sometimes it is referred to as Facilitated stretching, Contract-Relax (CR) stretching or Hold-Relax stretching. Post Isometric Relaxation (PIR) and Muscle Energy Technique (MET) are other variations of the PNF technique.

Remember that we talk about the target muscle as the one being stretched. The agonist is the muscle that causes movement (the prime mover) and the antagonist is the opposite muscle to the prime mover.

These are the terms used in this handout.

- 1. Contract-Relax Method CR
- 2. Hold-Relax Method HR
- 3. Agonist-Contract Method AC
- 4. Contract-Relax-Agonist-Contract Method CRAC

(you may see other terminology in other texts – but just take your time and read through the methodology and you will work it out!)

### CR – contract relax

The muscle **being stretched** (aka the target muscle) performs an **isotonic** contraction as part of this method.

The instructor assists the client's leg into a supine hamstring stretch position and proceeds as follows

- 1. Take the leg to where the client feels tension in the hamstring (so the leg is assisted upwards into hip flexion assisting the action of the hip flexors)
- 2. The client then performs a contraction with the **hamstring** pushing against the instructor **who allows the leg to move downwards** (moving the leg through hip extension). This should be done over a period of 10 seconds. Client breathes in to prepare and exhales during this isotonic contraction of the hamstring
- 3. At the end of the isotonic contraction the client breathes out as the instructor assists the leg upwards to achieve a deeper hamstring stretch. This deeper stretch can be held for up to 2 minutes
- 4. Repeat for 3 5 times

The isotonic contraction of the target muscle (hamstrings) should be done at 75% + of maximum. The theory is that the GTO in the target muscle detects this build up of tension and invokes the autogenic inhibition response. This should "switch off" the target muscle (the hamstrings) thus facilitating a greater stretch during point 3 above.

### HR – hold relax

This is similar to the Contract Relax version – and in many texts it will actually be called CR because the target muscle is still contracting but it's an isometric contraction rather than isotonic contraction

The instructor assists the client's leg into a supine hamstring stretch position and applies a gentle pressure / support to ensure the stretch is effective. However instead of enabling an isotonic contraction of the target muscle (as in CR) the instructor **resists** any movement

causing an **isometric contraction** of the target muscle

- 1. After assuming an initial passive stretch, the muscle being stretched is isometrically contracted for 10-15 seconds against resistance applied by the instructor
- 2. The muscle is very briefly relaxed and then immediately subjected to a passive stretch assisted by the instructor.
- 3. This passive stretch is held for 10-15 seconds.
- 4. The muscle is then completely relaxed for 20 seconds before performing another round

This PNF is perhaps the most commonly used version. It is simple to explain and administer. It can also be self-administered

## AC – Agonist contract

Involves a contraction of the **opposite muscle** (or group) prior to stretching the targeted muscle/s.

The instructor assists the client's leg into a supine hamstring stretch position and proceeds as follows:

- 1. Take the leg to where the client feels tension in the hamstring (so the leg is assisted upwards into hip flexion). Hold for about 10 seconds
- 2. The instructor asks the client to try and move their "toes to their nose" and to pull the leg away from the support. This means that the hip flexors/quads are the agonists producing hip flexion and reciprocal inhibition says that the hamstrings must therefore switch off and relax.
- 3. The client should maintain this agonist effort for 10 seconds. The leg might move towards the client's face a little or a lot.
- 4. After the 10 seconds the instructor immediately steps in to take up the slack and hopefully supports the client's leg in a deeper stretch position.

#### Repeat 3 – 5 times or until there is no increase in ROM

NB don't let the client's leg drop back from any improvement in ROM after the agonistic contraction.

## CRAC

A combination of CR/HR and AC.

#### Remember - the target muscle/muscle group is the one being stretched.

- 1. Stretch the targeted muscle to the limit of normal range of motion.
- Contract the target muscle group for 5 10 seconds while the instructor (or immovable object such as a band) applies sufficient resistance to inhibit any movement. This will be an isometric contraction and should in theory invoke autogenic inhibition as a result in the increase in tension in the GTOs.
- 3. Briefly relax the targeted muscle group (no more than 5 seconds).
- Contract the muscle **opposite to the targeted muscle** group for 5 10 seconds. This means that the agonist is contracting. Remember that reciprocal inhibition says that if the agonist is working then the antagonist must be relaxing.
- The instructor then passively stretches the target muscle group again by applying a controlled, deeper stretch for about 20 – 30 seconds into a greater range of motion.

Relax the muscle for approximately 30 seconds before repeating the above process 2 or 3 more times.