FLEXIBILTY

What:

- measure of ROM of a joint → static and dynamic aspects
- **Static flexibility:** range during a held, passive movement
- **Dynamic flexibility:** ROM during a forceful, dynamic movement → requires voluntary muscular action

Factors affecting

1- Joint structure
2- Age
3- Gender
4- Muscle bulk
5- Activity level
6- Elasticity vs plasticity
7- Connective tissue
8- Training with limited ROM

Why is it important

1- ↑ ROM
2- ↑ Joint mobility
3- ↑ Stretch tolerance
4- Positional and technical demands
5- Force development
6- Too low or too much flexibility→ higher risk of injury → cannot absorb energy
7- ↓ acute force/power production

Stretching and injury prevention

- Explosive skills sport: stretching → ↓strength and power
- They require stiffer MTU so tendon can absorb more energy → stretching done in separate stretching
- Slow SSC movement sports: no compliant tendon needed → on influence on injury prevention
- Stretching does NOT affect overuse injury cases
- *EG: FIFA 11+ evidence suggests reduction in ASL injury occurrence (Soligard et al, 2008)*

How to measure:

- Standardisation of joint and surrounding joint positions
- Stabilise/standardise body position to reduce error
- Measurement of limb start and finish positions
- Determine range of motion in set plane

Measures of joint specific flexibility

1- **Hamstring:** passive straight leg raise
2- **Hip flexor:** modified Thomas test
3- Ankle dorsi flexion lunge (knee to wall)
4- **Hamstring lower back:** sit and reach

Types of stretching

1- **Static:** slow and constant held for 15-30 sec. Start in relaxing position, move through ROM until mild discomfort, hold and repeat on both sides
2- **Ballistic:** active efforts Eg- bouncing
3- **Dynamic:** functionally based stretch using sport specific movements. Use 5-10 reps ↑ROM with each rep and ↑ speed with each set
4- **PNF: most effective → due to reciprocal and autogenic inhibition**
   a) Hold-relax (Passive pre-stretch [10sec]
   b) Isometric hold [6 sec]
   c) Passive stretch [30 sec]
      Contract-relax (Passive pre-stretch [10 sec]
   d) Concentric action thru ROM, Passive stretch [30 sec]

When to stretch

- **Post exercise** → easier → ↑ body temperature
- Within 5-20 min
- ↓ DOMS
- **Sperate session:** after warm up to ↑ body temperature often used as a recovery session post-competition

Stretch Precautions

- ↓ intensity if pain or loss of sensation
- Careful with hyper mobile joints
- Avoid spinal combination movements EG- flexion and extension
- Stabilising joints active → protect other joints and unwanted movements

Example of training

1- 2/week for 5 weeks

2- Stretch before and after training

3- After warm-up: sport specific pre- training (8-12 min)

4- 5-10min after training: general stretch post (4-5 min) → no pain-mild discomfort

5- Longer the better → Eg- 3 x 30sec

6- Separate sessions for best results

How can stretching work

1- **Muscle spindles:** provide sensory information about changes in muscle length

2- **Golgi tendon organs (GTOs):** connect to muscle fibres near the musculo-tendinous junction and detect changes in tension

- **Autogenic inhibition:** occurs in same muscle under tension
- **Reciprocal inhibition:** relaxation in opposing muscle under tension