Muscle Contractions

Static vs Dynamic:

Static Contractions

- ** no visible movement occurs**
- muscle force is equal to load
- eg. Holding something without moving it, pulling an immovable object, postural muscle
- maximal static contractions occur in sports like Judo, wrestling and gymnastics

Dynamic Contractions

- ** visible movement of the load**
- muscle forces change while the load is moved
- Eccentric dynamic contraction - muscle lengthens during force production
- Concentric dynamic contraction – muscle shortens during force production

Types of Strength Training Contractions

1. Isometric (Static)
    - No visible movement of joint
    - Increased strength at one joint angle
    - Examples: planks, arm holds
    - Purpose: rehab or core strength
    - Limitation: strengthens at only one joint angle

2. Isotonic (Dynamic)
    - Controlled shortening or lengthening of muscle fibres
    - Uneven force throughout ROM
    - Examples: dumbbells, push-ups
    - Purpose: affordable muscular strength and endurance gains
    - Limitation: force changes throughout ROM

3. Isokinetic
    - Muscular contraction at a constant speed (dynamic)
    - Force (max resistance) is constant throughout the range of motion (ROM)
    - Maximal strengthening occurs at all joint angles
    - Examples: Cybex machine
    - Purpose: rehab and research
    - Limitation: very expensive

4. Plyometric
    - Combines a rapid eccentric contraction followed by a quick concentric contraction done repeatedly
    - The reflex causes a greater muscle contraction
    - <u>Examples</u>: jump squats, jump lunges
    - <u>Purpose</u>: increased strength gains, fast twitch fibre training, increase foot speed, increased agility

- Limitation: not for beginners, increased risk of injury due to high forces