Three Basic Types of Muscle Contractions

1) **Isometric Contraction**
   - No visible movement at joint (static) – Ex. lifting an immovable object
   - No change in muscle length

2) **Concentric Contraction**
   - Shortening of muscle fibers
   - Visible movement at joint (dynamic) Ex: Biceps muscle shorten during a bicep curl

3) **Eccentric Contractions**
   - Lengthening of muscle fibers
   - Visible movement at a joint (dynamic) Ex. Releasing the weight

Four Strength Training Contractions/Techniques

1) **Isometric Exercise**
   - No visible movement at joint (static)
   - Increase strength at one joint angle.
   - **Examples:** Planks, arm holds
   - **Purpose:** Generally for rehabilitation or core strengthening, isolating specific muscle groups.
   - **Limitation:** Strengthens only at one joint angle.

2) **Isotonic Exercise**
   - Controlled shortening (concentric) and lengthening (eccentric) contractions of muscle fibers (dynamic)
   - Uneven force throughout range of motion
   - **Examples:** Dumbbells, push-ups, chin-ups, etc.
   - **Purpose:** Affordable Muscular strength and endurance gains
   - **Limitation:** Force changes throughout the range of motion (ROM), Exercise may not fully strengthen each muscle group.
3) **Isokinetic Exercise**
   - Muscular contractions at a constant speed (dynamic)
   - High (max) resistance at all joint angles
   - Maximal Strengthening occurs at all joint angles

   - **Examples:** Cybex machine
   - **Purpose:** Rehabilitation, Research
   - **Limitation:** Very Expensive!

4) **Plyometric Exercise**
   - A high speed concentric contraction performed repeatedly from a stretched (i.e. eccentric) position.

   - **Examples:** Jump Squats, Jump Lunges, Hurdle Jumps, etc.
   - **Purpose:** Strength gains, trains fast twitch fibers, increase foot speed, increase agility, etc.
   - **Limitation:** Not for beginners & risk of injury due to high forces!