

Muscle physiology

- ✓ **Muscle fibers:** Type I (slow), Type IIa (fast oxidative), Type IIx (fast glycolytic)
- ✓ **Sliding filament theory:** actin + myosin + ATP = contraction
- ✓ **All-or-none principle:** an activated motor unit's fibers all contract fully, or not at all
- ✓ **Motor unit recruitment:** size principle (small → large)

Bioenergetics

- ✓ **Phosphagen system:** 0–6 sec, anaerobic, CP + ATP
- ✓ **Glycolysis:** anaerobic, 6 sec–2 min, lactate as a byproduct
- ✓ **Oxidative system:** 2+ min, aerobic, fats + carbs
- ✓ Which system dominates depends on intensity & duration

Endocrine responses

- ✓ **Anabolic hormones:** testosterone, GH, IGF-1
- ✓ **Catabolic hormone:** cortisol (stress, tissue breakdown)
- ✓ **Acute response:** resistance training → ↑ anabolic hormones

Legal concepts

- ✓ **Negligence:** duty, breach, proximate cause, damages
- ✓ **Liability:** legal responsibility to protect athletes from harm
- ✓ Informed consent ≠ liability waiver

Neuromuscular adaptations

- ✓ Neural adaptations → early strength gains
- ✓ Rate coding, recruitment, and synchronization ↑ with training
- ✓ Myelination & motor unit efficiency improve with practice

Cardiorespiratory

- ✓ Stroke volume ↑ with training → ↑ cardiac output (Q)
- ✓ $\text{VO}_2 \text{ max}$ = maximum oxygen uptake capacity
- ✓ Lactate threshold ↑ with endurance training

Exercise technique

- ✓ **Squat:** neutral spine, knees track toes, thighs parallel
- ✓ **Deadlift:** hinge, flat back, bar close to shins
- ✓ **Power clean:** triple extension; catch on the front of the shoulders, elbows high
- ✓ **Snatch:** triple extension; catch overhead, elbows locked

Testing and evaluation

- ✓ **Validity:** measures what it's supposed to
- ✓ **Reliability:** consistency
- ✓ **Test order:** non-fatiguing → agility → max power & strength → sprint → muscular endurance → anaerobic capacity → aerobic capacity
- ✓ **1RM prediction:** $\text{weight} \times (1 + 0.0333 \times \text{reps})$