

Lecture 7

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Orderly Recruitment: Size Principle and its Applications

- Higher type I better at marathons (aerobic)
- Higher type II (and lower type I) will be better in power lifting (explosive muscle recruitment/power exertion)
- Henneman's size principle
 - o (Denny-Brown, D. and Pennybacker, J. [1938])
 - Fibrillation and fasciculation in voluntary muscle
 - "orderly recruitment"
 - o First rep bad; second rep good
- Body would rather use type I than type II because I is reliable and steady whereas II is fast but high in energy consumption
- Particular motor units will fire with higher or lower thresholds based on AP (based on task)
 - o Upholds specificity of adaptation [at a precise level]
- P.A.P. (post activation potentiation -- squat heavy then able to jump higher)
 - o Better trained, better PAP
- Best way to achieve max motor unit activation is MVC (maximal voluntary contraction)
 - o "lift heavy stuff"
- Problem -->
 - o recruitment is based on need
 - o Needs is based on intensity
 - o Intensity involves a lot
- Size Principle is not based (strictly) on load
 - o Based *mostly* on load, but those mechanoreceptors crunch a lot of data:
 - Amount of force
 - Duration of tension
 - Speed of contraction
 - Angles, muscle length, etc.
 - o May be possible to recruit nearly all of its motor units using a

- load that's just 30% of one's maximum strength (depending on the muscle and the characteristics of the load
- In other muscles, it may require as much as 90% of one's maximum strength to achieve full recruitment