

Prof. Newman  
Summary

***Muscle Performance Facts [McMahon, Muscles, Reflexes and Locomotion, 1984]***

1. In shortening, the relationship between the Force and Velocity is (Hill's Curve - know this!!):

$$(T+a)(v+b) = (T_0+a)b \quad \text{Hyperbolic Form}$$

- muscles shorten more rapidly against light loads than they do against heavy ones
- muscles which are actively shortening can produce less force than those which contract isometrically.

2. There is a discontinuity in the slope of F-V curve at zero velocity.

3. Active muscle yields when the load exceeds about 1.8  $T_0$  ( $T_0$  - Tetanus tension).

4. Hill's observations of the Fenn effect give a linear relation between total rate of energy liberation and tension.

Fenn = muscle produces a certain extra heat when it shortens a given distance, whether shortening velocity is fast or slow.

5. Muscle shortening should be based on the relative motion of sliding filaments because:

- A. A-band width stays constant during stretch and shortening
- B. A-band disappears when myosin is dissolved away
- C. Actin filaments begin at Z-line, run through I-bands into A-band, but stop before reaching H-zone (muscle at rest length)
  - I-band is entirely actin filaments
  - H-zone is myosin filaments

6. Muscular energy liberation should be based on the splitting of a high-energy phosphate as actomyosin attachments separate.