

## muscle physiology lecture 13




biomechanics - levers - a rigid bar that moves on a fixed point.

purpose - an absolute effort can move a heavier load and/or move a load farther or faster than it could without the lever.

Moment arm - perpendicular distance from an axis to the line of action of muscle force.

muscle force - the force generated by biomechanical activity in the muscle

load/resistive force - force generated

three classes of levers. class one -  class two -  class three - 

↑ force  
△ axis / fulcrum  
□ load

variable resistance: longer moment

↑ mechanical advantage

↑ mechanical disadvantage

arm (distance from fulcrum to load)

- moment of muscle (force) longer than that of load

- moment of muscle is short and load is long.

means a heavier load. most muscles actually function @ a mechanical disadvantage.

power is measured dynamically, strength is measured three ways: isometric force, isokinetic, isotonic

biomechanical factors in human strength

- neural recruitment (size of nerves, size principle, orderly recruitment)

- muscle cross section area (not volume) - strength from biological real estate

- arrangement of muscle fibers (different styles of muscles) determines how skeletal muscle produces force. parallel: weaker & faster. pennate: stronger & slower

- muscle length - amt that the sarcomere is stretched affects the proportion that actin & myosin filaments can interact. @ rest: actin & myosin cross-bridge binding.

stretched: fewer actin & myosin near each other so less potential cross-bridge sites.

contracted: actin filaments can overlap, lowers # of cross-bridge sites.

- joint angle - length tension relationship. having a patella lengthens a moment arm which increases the mechanical advantage. longer moment arm also means a heavier load.

- muscle contraction velocity - as velocity of contraction increases, the force a muscle can exert decreases.

- strength to mass ratio

- body size - body mass increases quicker than functional muscle mass does

- physiological explanations