

BLOCK REVIEW

What is fitness?

Is your physiology compatible to survive the stressors of your environment

Barefoot running and the minimalist movement

Lieberman (Harvard anthropologist)

Evolutionary adaptation (Outrun prey)

Humans are capable of walking, running and jogging

McDougall

Minimalist vs. Maximalist (in regard to gait)

'Natural' environment; our environment is altered for human convenience

There is no 'good' or 'bad' shoe

Specificity of Adaptation

Pronated gait corrected by shoe

What is pronation? (Inward rotation)

What is supination? (Outward rotation)

What are the two joints of the ankle?

Talocrural (hinge) and subtalar joint (Gyroscope)

Katy Bowan (MS Biomechanics)

Orcas; Flaccid Fin Syndrome

conditional; specificity of adaptation

Nature and the modern environment

(Barefoot running)

(No good shoe)

Wolff's law— Progressive overload fights atrophy and muscle degeneration in space

Swimming doesn't help osteoporosis

Kyphosis, the subclavian artery and brachial plexus

When stabilizing a joint, it transfers the stress to a nearby body (Eliminate mobility from one joint transfers stress to another)

le: Vertebral fusion

le: Knee brace and hip pain (compensation)

Anatomical Planes:

Sagittal

Frontal

Transverse

Biomechanics

Torque

Work: Force x displacement x angle

Power: Work divided by time

Statics: Systems with motion

Dynamic: Systems that involve acceleration

Kinetics: Causes of motion

Kinematics: The motion themselves

Levers:

First Class: Fulcrum between force and load

Second Class: Fulcrum, load, force (Mechanical advantage)

Third Class: Fulcrum, force, load (most common)

Fleshy attachment (Epi and peri and continuous) vs fibrous attachment (tendon)

Myotendinous junction

Common for injury

Distal

Variable resistance: Longer moment arm means heavier load

Location of Insertion and the Force-Speed tradeoff

Biomechanical Factors in Human Strength

1. Neural recruitment
2. Muscle CSA
3. Arrangement of fiber
4. Muscle length
5. Joint angle
6. Muscle contraction velocity
7. Strength to Mass ratio
8. Body size
9. Physiology explanations (Cross-Bridge Cycling)

Spinal compression

Increase IAP

Thoracic:Lumbar joint compression

Weightlifting belt

Injuries

Oddson

Pain is conscious and unconscious

Rewiring after injury

Specificity for adaptation

Altered neural recruitment changes gross kinematics

Sacromerogenesis

Sarcomerolysis

Titin

Actin (thin)

Myosin (thick)

Nebulin (Actin)

Alpha-actin

Troponin Complex

C, A, I

Tropomyosin

Type I, Type IIa, Type IIX

(Myosin heavy chain, myosin light chain)