2 - HUMAN MOVEMENT SCIENCE

PLANES OF MOTION & JOINT MOTION

Sagittal — forward & back, plane splits body into left / right
Frontal — side to side, front & back halves
Transverse — around, rotational
Joint Motion — movement in a plane is running perpindicular to that plane

Flexion — angle decrease
extension — angle increase
abduction — movement away from midline
adduction — toward midline

Gait cycle — helps show how joints & muscles are interdependent & effect each other

MUSCLE ACTION SPECTRUM

Eccentric — tension while lengthening, exert less force than force placed on it
Isometric — Contraction w/o lengthening or retracting
Concentric — exert more force than force placed on it

} muscle action spectrum

SCIENCE OF MOVEMENT

Length-tension relationship — resting length of muscle and amount of tension muscle can produce at this length
Force Couple — synergistic force production of muscle around the joint.
Ex) standing requires glutes and hamstrings
Arthrokinematics — joint motion

The musculoskeletal system is a huge series of levers to produce force

First class — R↓ E↑ F — ← seesaw, head nod
Second class — R↓ E↑ F — ← wheelbarrow, calf raise
Third class — E↑ R↓ F — ← bicep curl

Functional Anatomy

Agonists prime mover
Antagonists opposition
Synergists assits prime movers
Stabilizers stabilize body
Local Musculoskeletal System
- Joint support & stabilization
- near joints
- not just core
- ex: rotator cuff

Global Musculoskeletal System
- movement & superficial
- typically larger,
- responsible for overcoming force & absorbing force

Subsystems

Force couples of Global Musculoskeletal system

Deep Longitudinal
- Stabilize body from the ground up
- Force transmission from foot to trunk
- Predominantly control ground reaction forces during gait

Posterior Oblique
- distribute transverse forces through rotational movements

Anterior Oblique
- transverse similar to posterior oblique but front
- stabilize LPH complex

Lateral
- Stability in single leg movements

All work together for accel., deccel., dynamically stabilizing

Motor Behavior

- Response to stimuli

- structures & mechanisms to gather sensory info internally and externally to produce a motor response
- Sensory information: stimuli received by sensory receptors to determine location & position
- Proprioception: neural input to CNS

MOTOR LEARNING

- how movements are learned and retained for future
- Internal feedback: force couple, arthrokinematics, etc
- External feedback: mirrors & professional

Corrective exercises can be live into anything