

HIP JOINT PERFORMANCE

Excerpt from
NEUROMECHANICS
LOWER EXTREMITY MODULE
Level I

CONNECTION – INTER – CONNECTION
INCREASE CAPACITY

A different perspective of the movements you teach

THE INTERCONNECTED SYSTEM

INTERCONNECTED SYSTEM

GLOBAL CORE:

Consists of the following bony segments and the soft tissue that acts upon them:

- 1) Spine
- 2) Ribs
- 3) Sternum
- 4) Pelvis
- 5) Femur on Pelvis
- 6) Scapula on Thorax

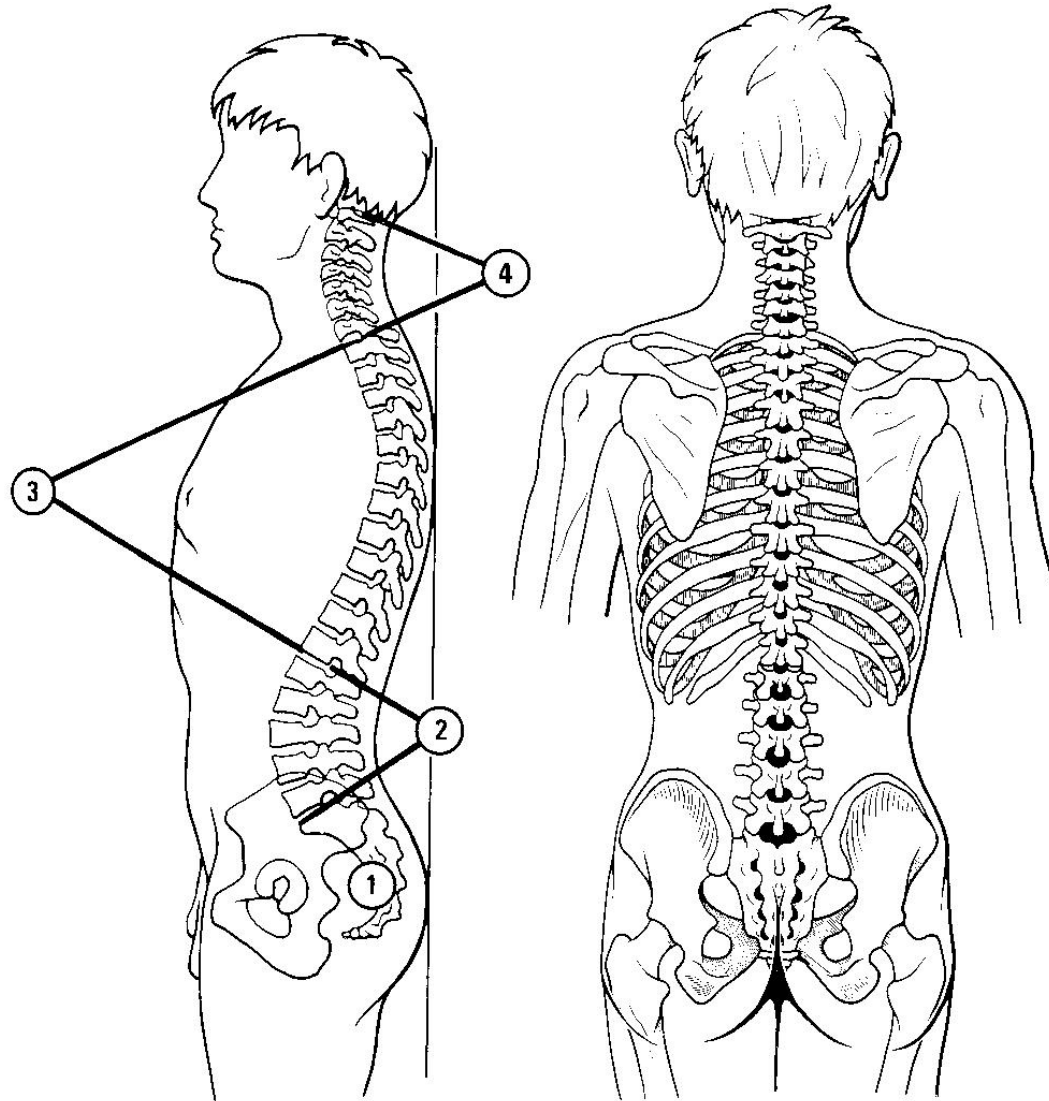
INTERCONNECTED SYSTEM

WHAT ABOUT THE CERVICAL SPINE??

EXTREMITY VS. CORE??

CORE vs. GLOBAL CORE

INTERCONNECTED SYSTEM GLOBAL CORE



DETERMINING MUSCLE FUNCTION

To determine muscle function, must know:

A. Axis of motion

B. Line of Force (muscle)

C. Joint capabilities

– predetermined by shape of joint surface

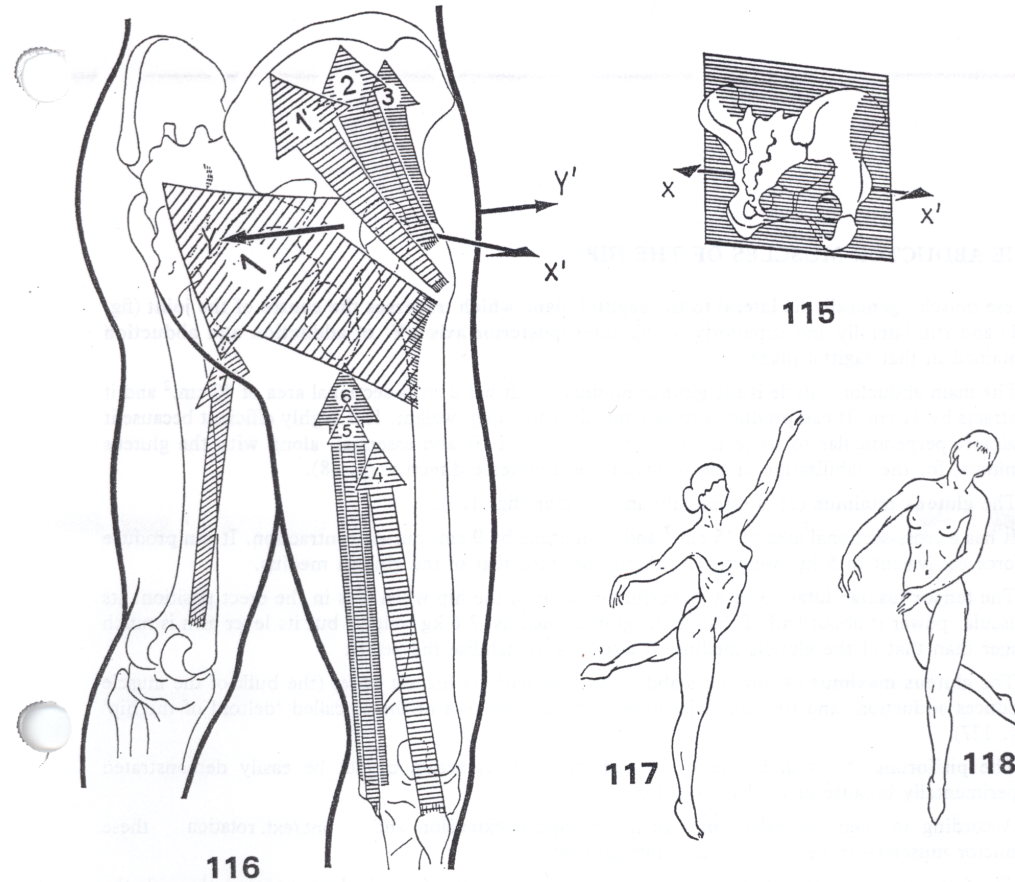
A. Axis of Motion

A. AXIS OF MOTION

- Point at which *rotatory* motion can occur
- Always perpendicular to plane of motion

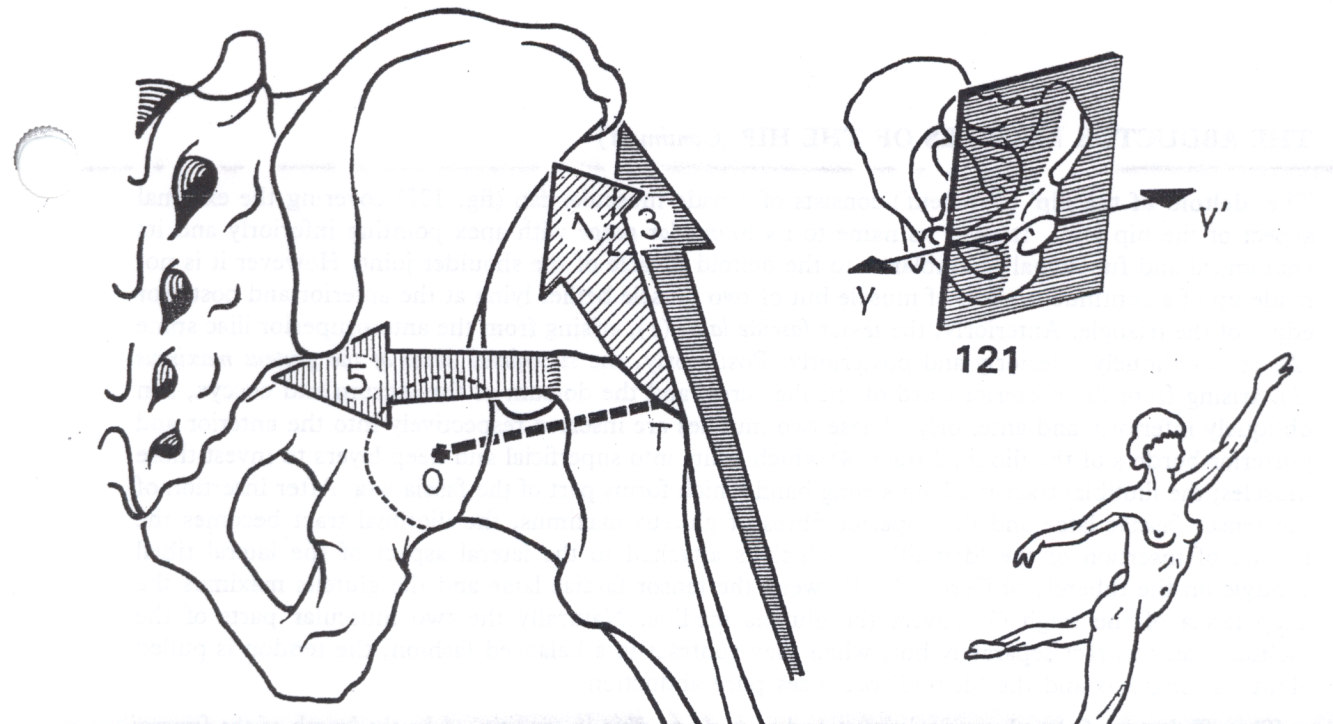
A. Axis of Motion

Mechanical Axis of Flexion/Extension



A. Axis of Motion

Mechanical Axis of Abduction/Adduction



A. Axis of Motion

Mechanical Axis of Rotation

- MA lies from femoral head to heel of foot with contact
- Femur and tibia move as a unit with foot contact
- MA falls from femoral head to center of mass of leg with leg free



FIG.4

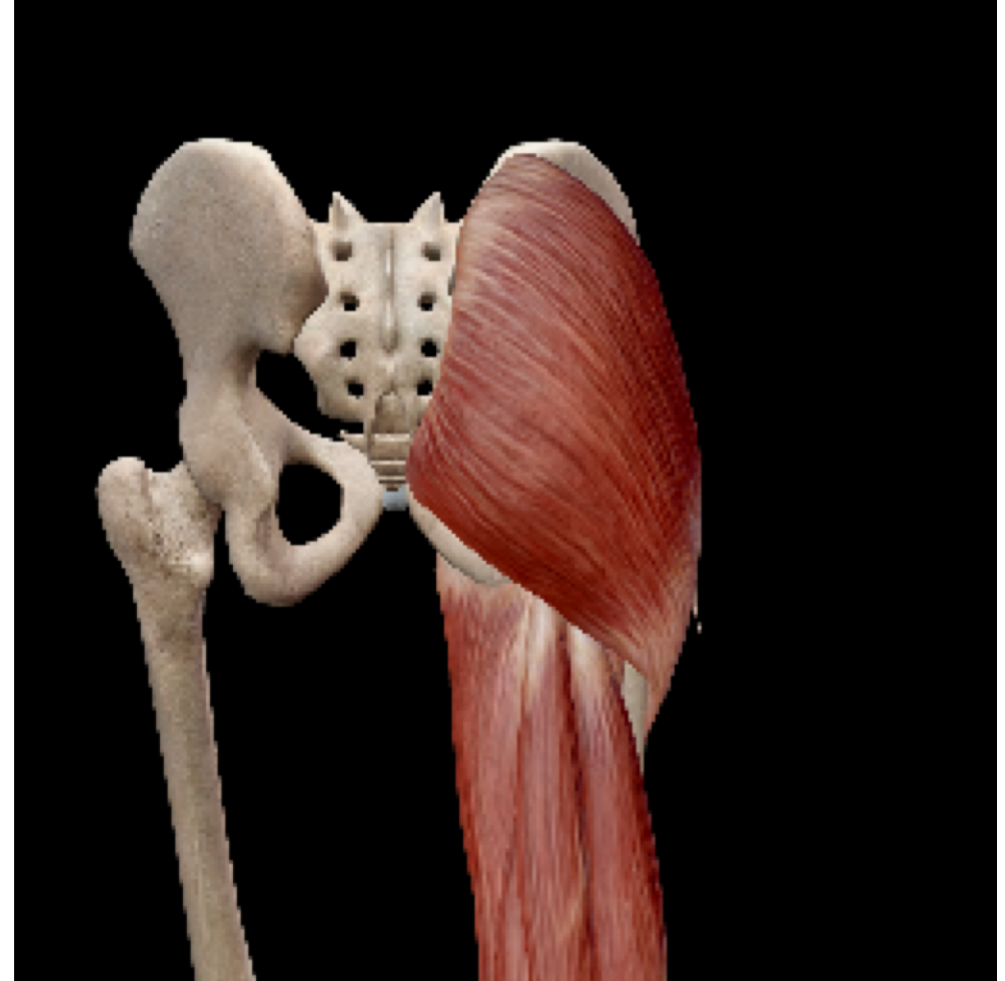
B. Line of Force

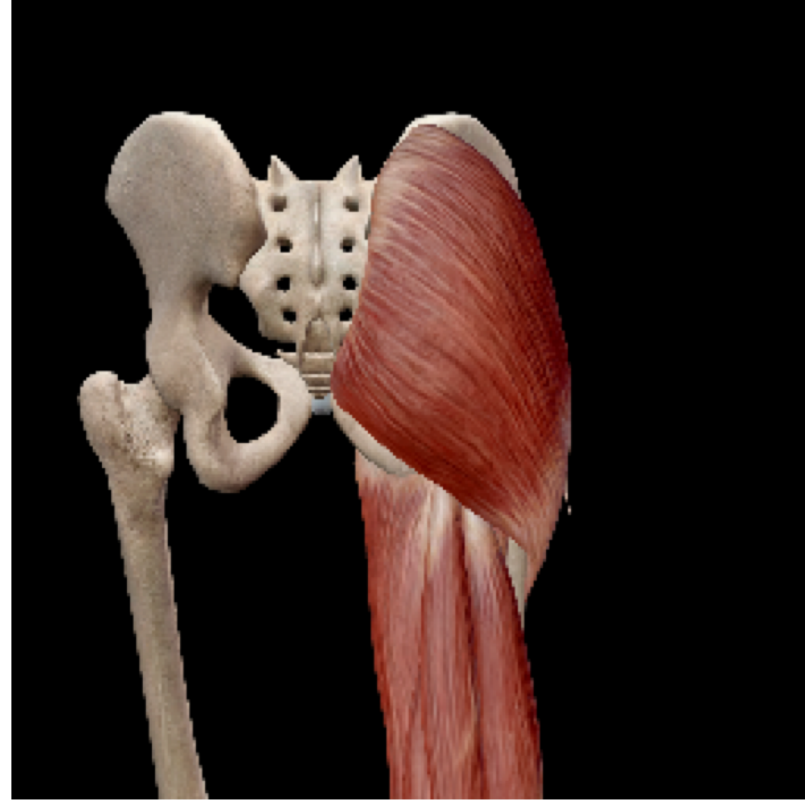
GLUTEUS MAXIMUS

- iliac

Origin: Posterior gluteal line and lateral crest of ilium

Insertion: Gluteal tuberosity of femur: approx. 2 inches





Lever vs. Moment Arm

Lever Arm (LA)

Distance from axis of rotation to the point of force application

Moment Arm (MA)

Shortest distance from the line of force to the axis of rotation

- MA is *always perpendicular* to the line of force running through the axis

LOWER EXTREMITY

NEUROMECHANICAL FUNCTION
PROFILE

MUSCLE PROFILING

- Role
- Dysfunction
- Connections
- ROM - Range of motion tests
- NMFR – NeuroMyoFascial Response tests

GLUTEUS MAXIMUS - ROLE

- Celebrity BadASS
- Hip, SI, Lumbar and knee stabilizer
- Influence on thorax and upper extremity via thoracolumbar fascia and opposite lat dorsi
- Torque generator for angular movement at hip
- Propulsor

GLUTEUS MAXIMUS - DYSFUNCTION

- Sitting
- Decrease stride length
- INHIBITION + INSTABILITY caused by other neuromechanical imbalances
 - weakness in deep rotators
 - pelvic floor
 - hip flexor tightness (but what is the cause?)
 - slump test - neurofascial chain
 - TLF Anchors

GLUTEUS MAXIMUS - DYSFUNCTION

SITTING

- Hip compression – inhibition
- SI stress – inhibition
- Lumbar compression - neural stress
- Hip flexor tightness
- Shortened position = ? Shortened muscle fibers
- Reciprical inhibition dysfunction from decreased G. Max activation
- Spinal posture inhibiting – TrA, LD, other spinal and sacral synergists

GLUTEUS MAXIMUS - CONNECTIONS

- TLF system
- MLT - fascial connection and synergist to ER - ER combined movement with hip E
- Deep rotators - hypertrophy which changes angle of pull - and synergist to ER - ER combined movement with hip E
- posterior G MED ?? any ER of hip - think about flexors and adductors
- Posterior pelvic rotators – RA, Pyramidalis, EO, IO, Hamstrings, Non dominant TrA
- Pelvic floor

GLUTEUS MAXIMUS - CONNECTIONS

OSTEOKINEMATICS

- Hip extension facilitated by Hip ABD, ER

ARTHROKINEMATIC

- Anterior translation of femoral head

GLUTEUS MAXIMUS - ROM

- Prone hip E - SLRE vs. (knee F 90)
- ER to bias iliac division
- ADD first to bias coccygeal division
- Prone knee F 90 – Glute Max contract with ER
- Prone knee F 90 – Glute Max contract with IR