

FUNCTIONAL ANATOMY AND PHYSIOLOGY

Shanti Yoga School
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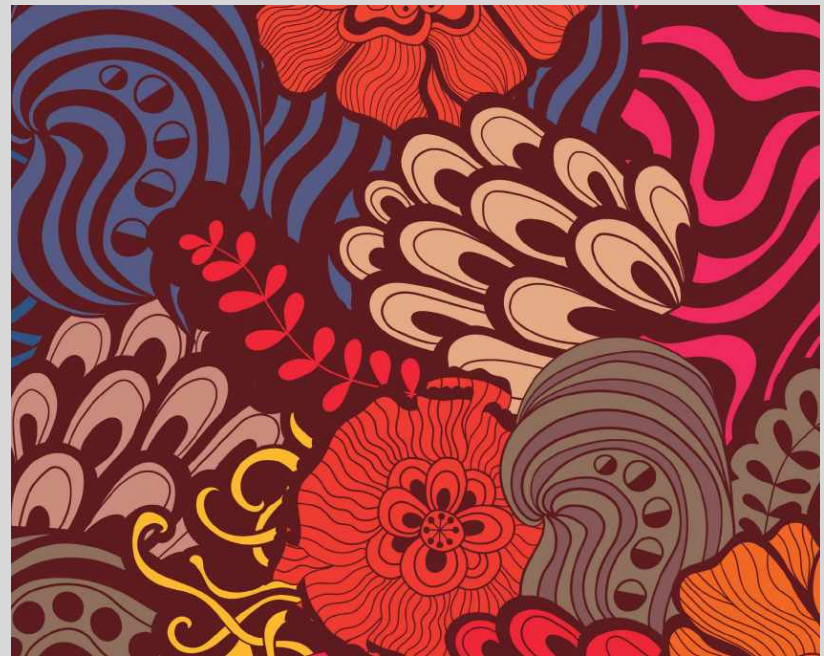


Disclosures

None

Goals and Objectives

- Planes of Movement
- Descriptors of Movement
- Hip Positions and Pelvic Tilt
- Muscles Contractions
- Neuromuscular System
- Release Valves and Counter Poses



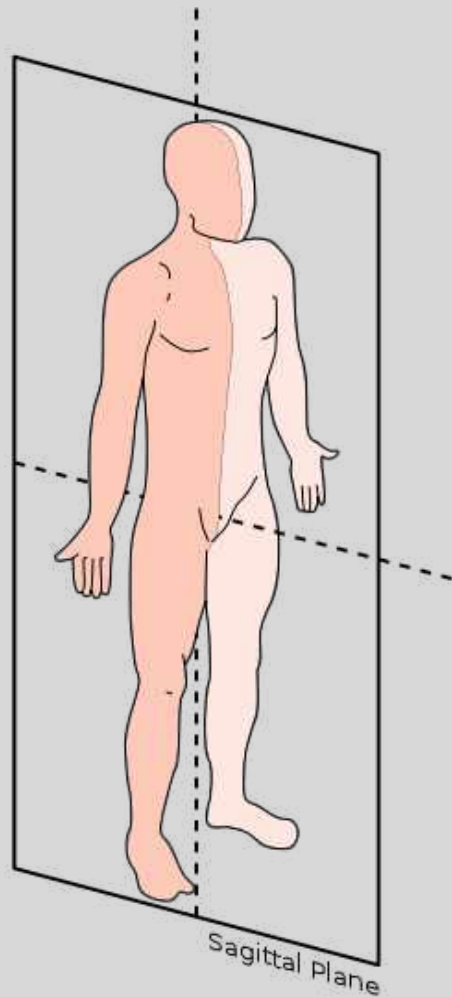


Planes of Movement

Planes of Movement

SAGITTAL

- Divides body into left and right (medial and lateral)
- Forward bends and backbends



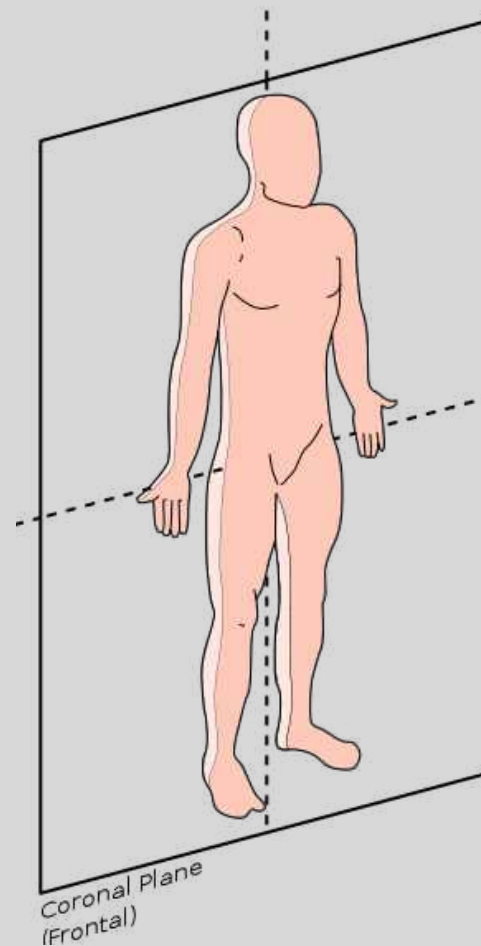
Examples:

- **Forward fold**
- **Chair**
- **Garland (Malasana)**
- **Staff**
- **Mountain**
- **Upward Bow**
- **Camel**

Planes of Movement

FRONTAL

- Divides body into front and back (anterior and posterior)
- Side bends



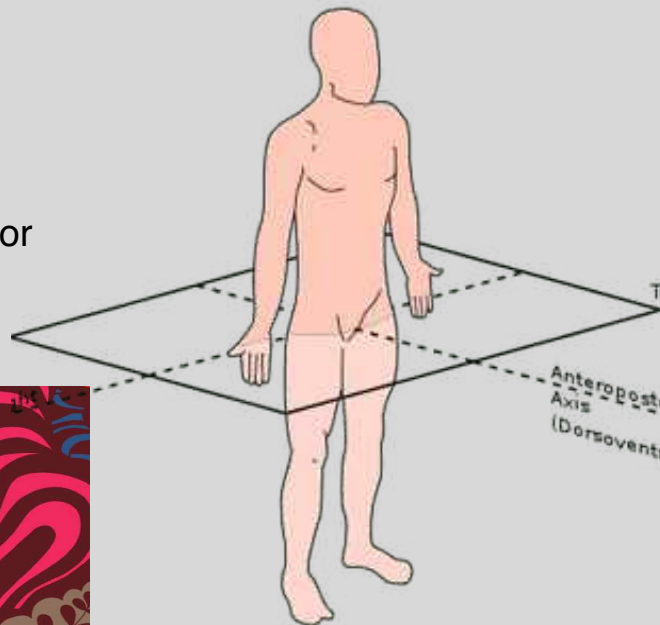
Examples:

- **Mountain**
- **Five Pointed Star**
- **Triangle**
- **Warrior II**
- **Extended Side Angle**
- **Gate Pose**

Planes of Movement

TRANSVERSE

- Divides body into top and bottom (superior and inferior)
- Twists



Examples:

- Seated Twist
- Revolved Triangle
- Revolved Side Angle
- Marichi's Pose



Quiz

What plane does each of these postures represent?



Descriptors of Movements

Abduction

Adduction

Flexion

Extension

Internal Rotation

External Rotation

Circumduction

Supination

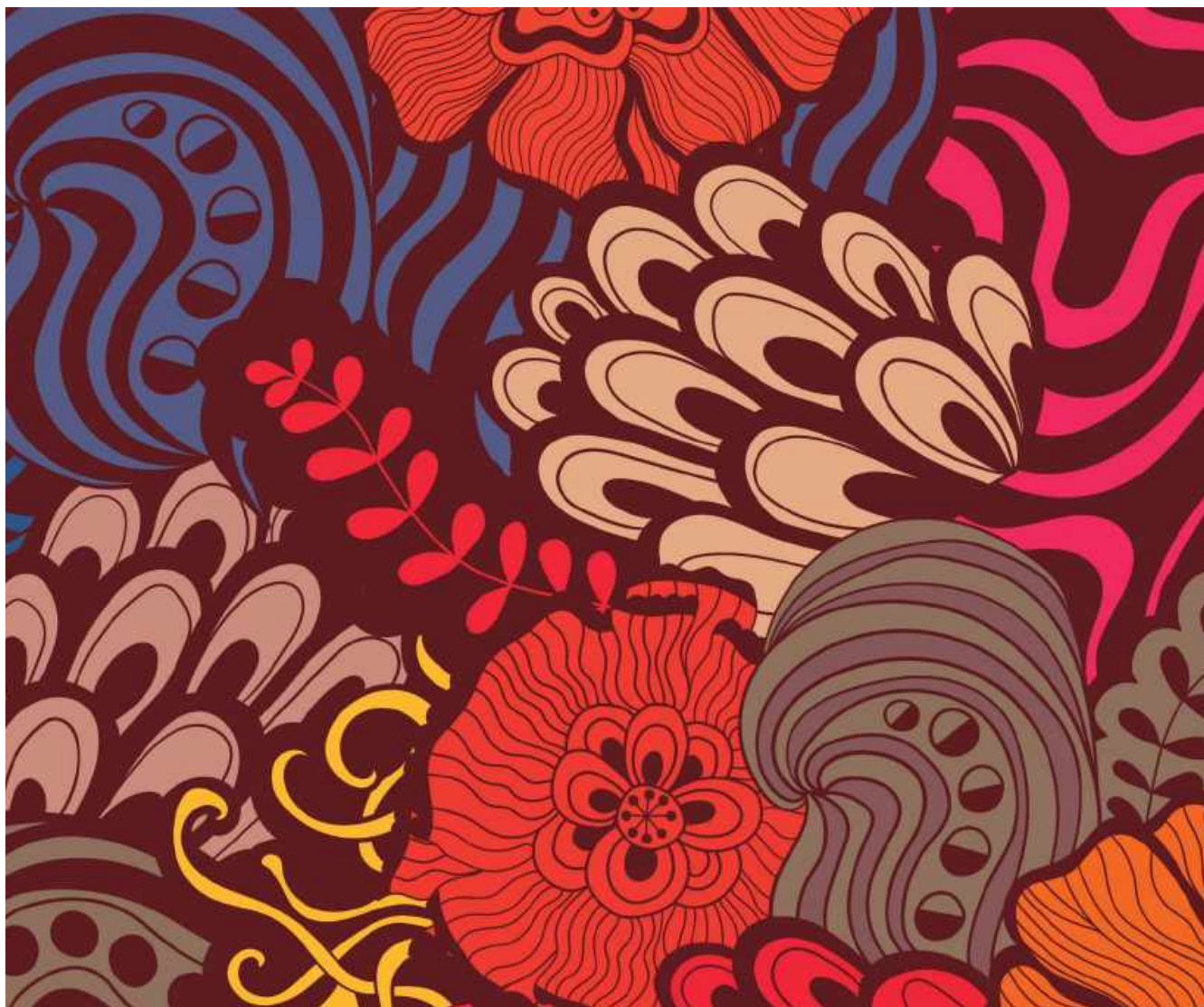
Pronation

Plantar Flexion

Dorsiflexion

Retraction

Protraction



Hip Positions and Pelvic Tilt

Open vs. Closed Hips

- **Hip Joint:** Femoroacetabular Joint = Ball and socket joint
- **Open Hip Postures:** External rotation of the hip joint
 - Ex: Pigeon, Warrior II, Goddess, Lotus, Triangle
- **Closed Hip Postures:** Neutral or internal rotation of hip joint
 - **EX:** Mountain, Warrior III, Crescent, Camel, Bridge
- What about poses like Warrior I and Tree?





Pelvic Tilt

- **Anteverion:** “Dog Tilt”- the pelvic brim moves anteriorly
 - “Pouring water out of the bowl”
- **Retroversion:** “Cat Tilt” – the pelvic brim moves posteriorly
 - “Holding the water in the bowl”
- **“Neti Neti”** – Sanskrit for “Not this, not this” or “Neither this, nor that”
 - Use this concept when in different postures to find comfort (Stirrha and Sukkha – will review more tomorrow)



Muscle Contractions

Musculoskeletal System Basics

- Network of bones, cartilage, ligaments, muscles and tendons that create movement
 - Ligaments: Connect bone to bone
 - Tendons: Connect muscle to bone
- Movement allowed depends on the type of joint (ie hinge vs. ball-and-socket)
- Caution: Ligaments, tendons, joint capsules, and bones are meant to provide stability, not increase flexibility (SYS page 70)
 - Focus on strength, then flexibility
 - Gains in flexibility should focus on muscles and surrounding fascia
 - Ballistic vs. Dynamic Stretching



Muscle Contractions

- Muscles Involved in Movement
 - **Agonist:** Prime mover
 - **Antagonist:** Opposes the action of the prime mover
 - **Synergist:** Secondary mover, helps the prime mover
- Types of Contractions
 - **Concentric:** Muscle working while shortening
 - **Eccentric:** Muscle working while lengthening
 - **Isometric:** Muscle working without changing length

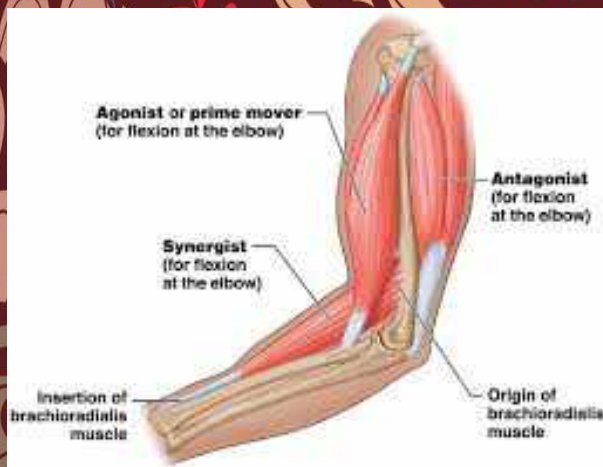
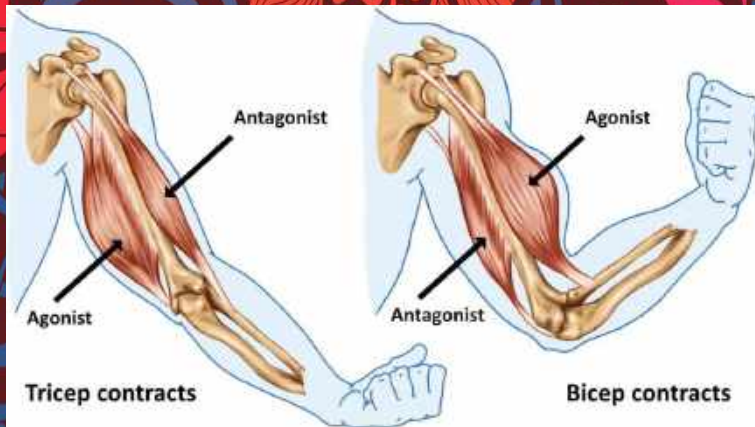


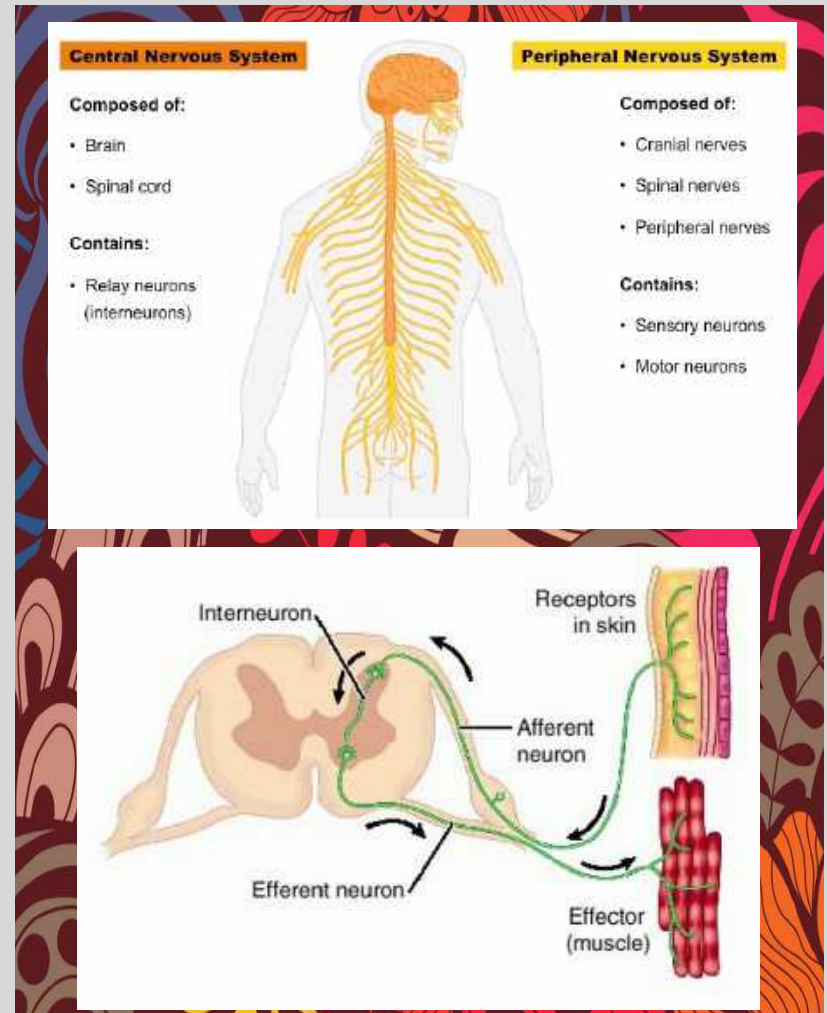
Figure 9.18. muscle contractions



Neuromuscular System

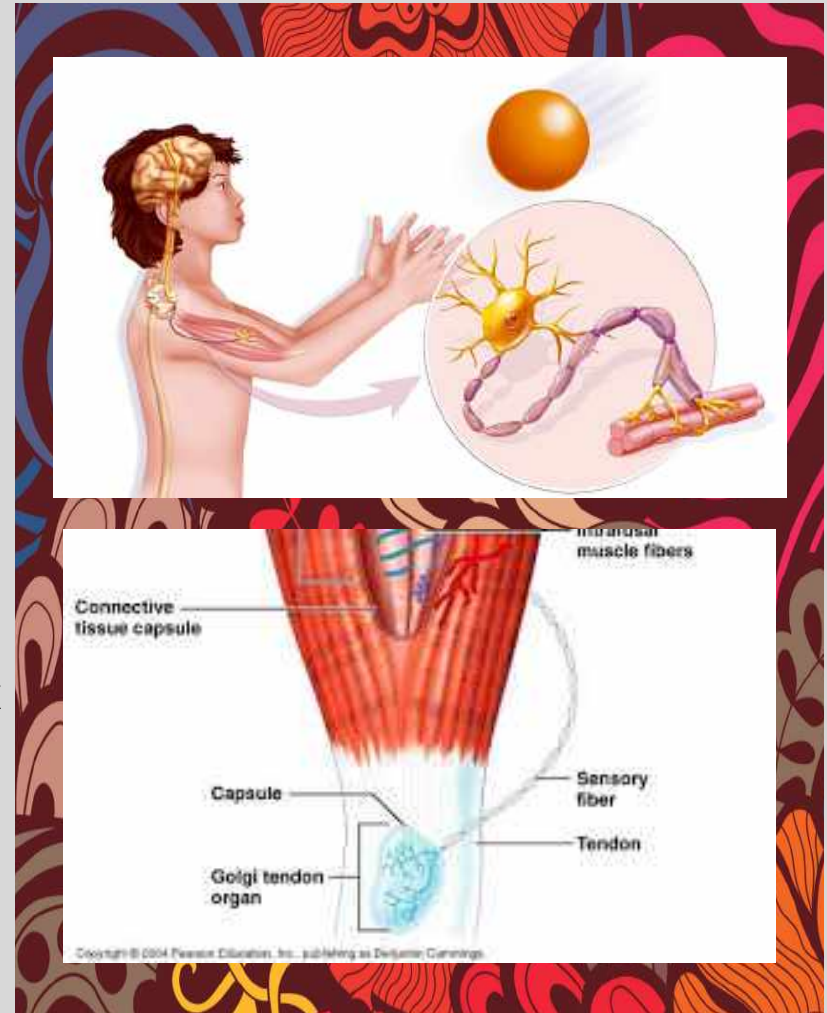
Neuromuscular System

- **Central Nervous System (CNS):** Brain and Spinal Cord
- **Peripheral Nervous System (PNS):** Nerves exiting spinal cord travel all throughout body
- **Types of Neurons:**
 - Motor Neurons: Carry signals from CNS to PNS
 - Sensory Neurons: Carry signals from PNS to CNS
 - Interneurons: Connect motor and sensory neurons



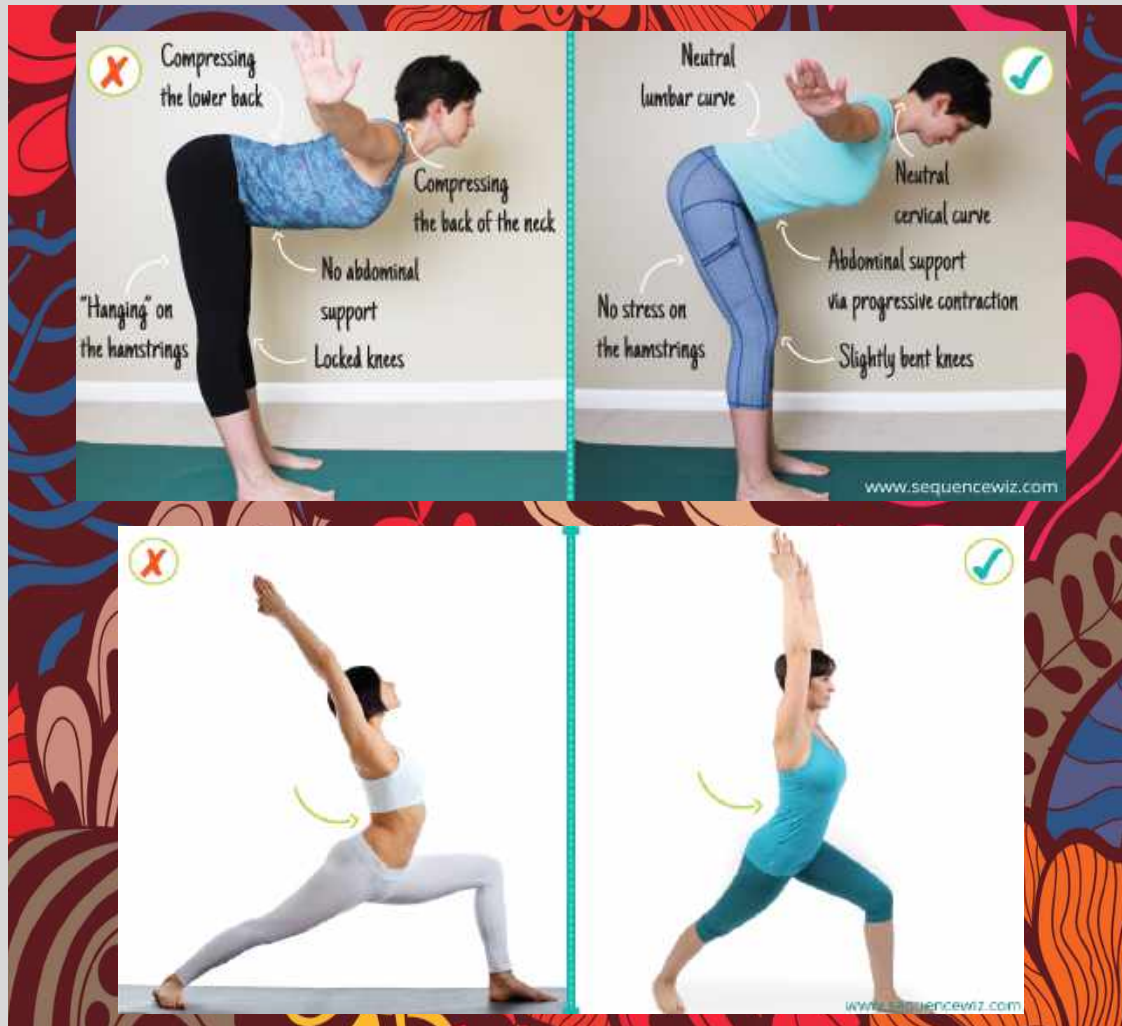
Neuromuscular System (continued)

- **Reflex Arc:** External stimuli → activates PNS → Sensory nerve sends message to CNS → Motor neuron sends message to muscles → Action
- **Regulatory Mechanisms**
 - Muscle Spindle: Receives info from muscle. Senses stretch and speed of stretch; sends a reflex arc to spinal cord not to stretch further once near endpoint
 - Golgi Tendon Organ: Receives input from tendon. Senses muscle tension on tendon; sends signal to decrease force exerted by muscle.





Release Valves and Counter Poses



Release Valves

- “Exit strategies” or unfavorable body movements to avoid working certain areas
 - Often subconscious
- Could include:
 - Relying on strong muscles instead of building new areas of stretch
 - Collapsing into the joints to get deeper into a pose (due to stiffness or hypermobility)
- Ex:
 - Rounding thoracic spine to get deeper in forward fold
 - Arching lower back in chair or swan dive
 - Sticking the chin up



Counter Poses

- Posture that helps neutralize the body after a particular pose
 - Especially helpful for postures that involve spine and pelvis
 - Often an opposing movement
- Child's Poses is considered a universal counterpose
- Examples:
 - Bridge or Upward Bow followed by knees to chest
 - Headstand followed by child's pose
 - Forward fold followed by spinal twist