



- c] horizontal, or transverse - planes passing through the body at right angles to both the median and coronal planes; they divide the body into upper and lower portions
- d] sagittal - vertical planes passing through the body parallel to the median plane, but not passing through the midline; they divide the body into right and left portions

3. Direction

- a] medial - nearer or towards the median plane
- b] lateral - further from the median plane
- c] anterior or ventral - nearer to the front of the body
- d] posterior or dorsal - nearer to the back of the body
- e] superior or cephalic - nearer to the top of the head
- f] inferior or caudal - nearer to the bottom of the feet

- d] fossae, notches, grooves - depressions along bones
- e] foramina - holes in bones
- f] canals - tunnels in bones
- g] meatuses - canals which do not go clear through a bone
- h] heads; condyles - articular ends of bone
- i] epicondyles - elevations just proximal to condyles

B. Joints - connections in the skeleton between any of its rigid component parts - bones or cartilage

1. Fibrous - a joint united by fibrous connective tissue

- a] sutures - bones of the skull; allows little or no movement
  - 1] serrate - interlocking edges
  - 2] squamous - overlapping edges

- c] condyloid - similar to hinge joints, but ellipsoidal shaped joint surfaces permit more movement, generally in two planes, at right angles to each other (biaxial)
  - 1] knee joint
  - 2] wrist (radiocarpal) joint
  - 3] metacarpophalangeal joints
- d] pivot - permit movement in only one direction, but around a longitudinal axis related to the bone
  - 1] radioulnar joint
  - 2] atlantoaxial joint
- e] saddle - articular surfaces are concavoconvex in shape and movements are in two planes (biaxial)
  - 1] first carpometacarpal joint (of the thumb)
  - 2] sternoclavicular joint
- f] ball and socket - one bone has a rounded convex head and the other has a concave socket; it permits movement in any direction; the freest of the synovial joints
  - 1] hip
  - 2] shoulder

C. Structures associated with synovial joints

1. Ligaments - Bands or sheets of fibrous connective tissue connecting two structures, generally bones.

- a] intrinsic - intra-articular
  - 1] anterior cruciate ligament
  - 2] posterior cruciate ligament
  - 3] lateral collateral ligament
  - 4] medial collateral ligament
  - 5] transverse ligament of the knee
  - 6] ligament of the elbow
  - 7] ligament of the hip
  - 8] ligament of the shoulder
- b] extrinsic - extra-articular
  - 1] anterior cruciate ligament
  - 2] posterior cruciate ligament
  - 3] lateral collateral ligament
  - 4] medial collateral ligament
  - 5] transverse ligament of the knee
  - 6] ligament of the elbow
  - 7] ligament of the hip
  - 8] ligament of the shoulder

- a] unipennate - fibers insert at an angle along one side of the tendon
- b] bipennate - fibers insert at angles along two sides of the tendon
- c] multipennate - the tendon has many septa into which fibers insert
- d] circumpennate - the tendon runs through the center of the muscle and receives fibers all around the tendon

B. Muscle names - muscles are named for the following:

- a] shape or geometry
- b] action
- c] attachment(s)
- d] location

C. Muscle movement



1. Characteristics
  - a] regulates all visceral structures
  - b] is automatic - involuntary
  - c] is, by definition, motor, or efferent - even though it is now known that the autonomic nerves carry afferent (sensory) fibers - accounts for visceral pain
  - d] consists of two neurons (is two neurons long)
    - 1] preganglionic - located within the CNS
    - 2] postganglionic - located in autonomic ganglia
  - e] consists of two antagonistic parts which generally innervate the same visceral organs
    - 1] sympathetic
    - 2] parasympathetic
  
2. Sympathetic nervous system - found in all 31 pairs of spinal nerves, but outflow from the CNS is T1-L2
  - a] thoracolumbar - outflow from all 12 pairs of thoracic and lumbar spinal nerves 1 and 2
  - b] preganglionic neurons - cell bodies located in the spinal cord between the dorsal horn and the ventral horn; fibers enter spinal nerves with the ventral roots
  - c] rami communicans - means of sympathetic fibers leaving or re-entering spinal nerves
    - 1] white - conducts preganglionic fibers out of spinal nerves and into the sympathetic chain
    - 2] gray - conducts postganglionic nerve fibers back into spinal nerves
  - d] ganglia - contain cell bodies of postganglionic neurons (2nd neuron)
    - 1] sympathetic chain (paravertebral) - run on either side of the vertebral column
    - 2] collateral (prevertebral) - some distance from the origins of their preganglionic fibers; generally around blood vessels; they receive splanchnic nerves
  - e] splanchnic nerves - preganglionic nerve fibers which leave the sympathetic chain without synapsing; they synapse in collateral ganglia
  - f] postganglionic nerve fibers - from autonomic ganglia, after synapse; travel to the effector organ
  - g] preganglionic fibers are relatively short - postganglionic fibers are relatively long
  - h] functions - generally prepares body for "fight or flight"
    - 1] increases: heart rate, blood pressure, blood flow to somatic muscles, respiration
    - 2] decreases: peristalsis, blood supply to the viscera
    - 3] dilates pupils
    - 4] stimulates sweat glands
    - 5] stimulus is generalized and long-lasting - one preganglionic neuron activates up to 20 postganglionic neurons
  
3. Parasympathetic nervous system
  - a] craniosacral - outflow is via cranial nerves and sacral spinal cord
    - 1] cranial nerves numbered 3, 7, 9 and 10
    - 2] sacral spinal nerves S2-S4

- b] preganglionic neurons - cell bodies are located in special ganglia in the brain stem and in the sacral spinal cord
- c] ganglia - contain the cell bodies of postganglionic neurons
  - 1] special - four in number, synapsing with preganglionic fibers from cranial nerves 3, 7 and 9, but all hang off of CN #5
  - 2] intrinsic - in the walls of the organs innervated, associated with cranial nerve 10 and S2-S4
- d] postganglionic nerve fibers - from the 2nd neuron cell bodies after synapse, they innervate effector organs
- e] preganglionic fibers are long and postganglionic fibers are very short
- f] functions - to preserve the body as a vegetative organ
  - 1] decreases heart rate
  - 2] increases peristalsis
  - 3] constricts pupil and accommodates the eye
  - 4] empties the bladder and rectum
  - 5] stimulates salivary and lacrimal glands
  - 6] stimulus is discrete, localized and short-lived; one preganglionic neuron will effect as few as two postganglionic neurons

## VII. Blood Vessels