

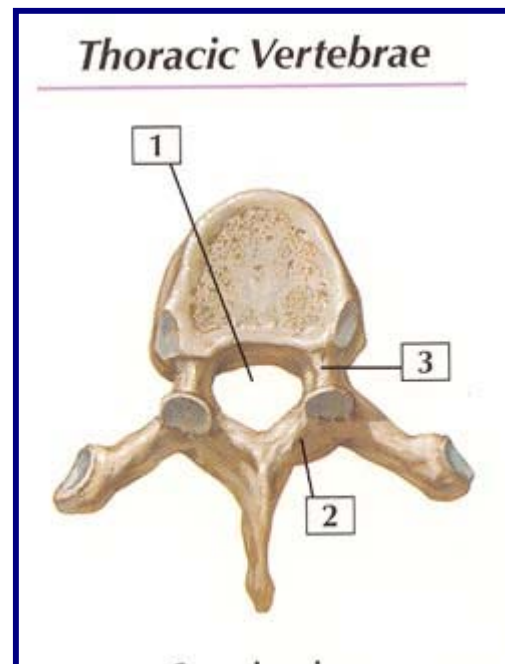
## Dissection 1: The Back and Spinal Cord

### Objective 1)

Identify the components of a typical vertebra and specific differences in the cervical, thoracic and lumbar regions.

#### *Components of the vertebrae*

- a) **vertebral body:** large circular structure that supports weight. From T4 & inferior, the bodies are progressively larger to bear weight.
- b) **vertebral arch:** located posterior to vertebral body & formed by laminae and right and left pedicles.
- c) **lamina(e):** 2 broad- flat plates of bone posterior to the pedicle. Serves to protect the spinal cord. The laminae join the spinous processes and the pedicles.
- d) **pedicle:** short, stout processes that join vertebral arch to vertebral body & project posteriorly to meet laminae.
- e) **vertebral foramen:** aperture in each vertebra whose walls are formed by the vertebral arch & posterior surface of vertebral body . Succession of the foramina forms the vertebral **canal**.
- f) **vertebral canal:** articulated column of vertebral foramina which contain spinal cord, meninges, fat, spinal nerve roots, and vessels.
- g) **vertebral notches (superior and inferior):** indentations formed by the projections of body and articular processes above and below the pedicles. Contains synovial joint.
- h) **spinous process:** projects posteriorly from the medial vertebral arch at the junction of the laminae and overlaps vertebra below.
- i) **transverse process (2):** project posterolaterally from junctions of the pedicles and laminae.
- j) **articular processes (4):** 2 superior, 2 inferior; also arise from the junctions of the pedicles & laminae-each process has articular facet
- k) **articular facet:** region of articular process covered with articular cartilage.
- l) **costal facet:** specific to thoracic vertebrae upon which the ribs articulate.
- m) **intervertebral foramen:** formed from the inferior vertebral notch of one vertebra and the superior vertebral notch of the inferior vertebra.
- n) **IV discs:** cartilage located between vertebra that consist of 2 parts: annulus fibrosus (outer fibrous part) and nucleus pulposus (gelatinous central mass). Hyaline cartilage is located between the disc and the vertebra



### *The different vertebrae*

**Cervical:** 7 vertebrae; most distinct—foramen transversaria (holes in the transverse processes) help protect R

& L vertebral arteries as they travel to the brain. All cervical vertebrae have foramen transversaria, but arteries only pass in them from C6 up. Bifid spinous processes, articular processes face superior-dorsal and inferior-ventral. C1 is called the atlas, and does not have a body nor a spinous process. C2 is called the axis, and is distinguished by the dens. C7 is marked by the most prominent spinous process (feel it on your back).

**Thoracic:** 12 vertebrae; facets on transverse processes for articulation with ribs (costal facets). Spinous processes extend posteromedially below next vertebra. The thoracic vertebra allow for flexion, rotation, and extension.

**Lumbar:** 5 vertebrae; thick spinous processes, body is kidney-shaped; The lumbar vertebrae allow for flexion, extension, and lateral bending. They are characterized by thick IV discs, and have mamillary & accessory processes.

### **Objective 2**

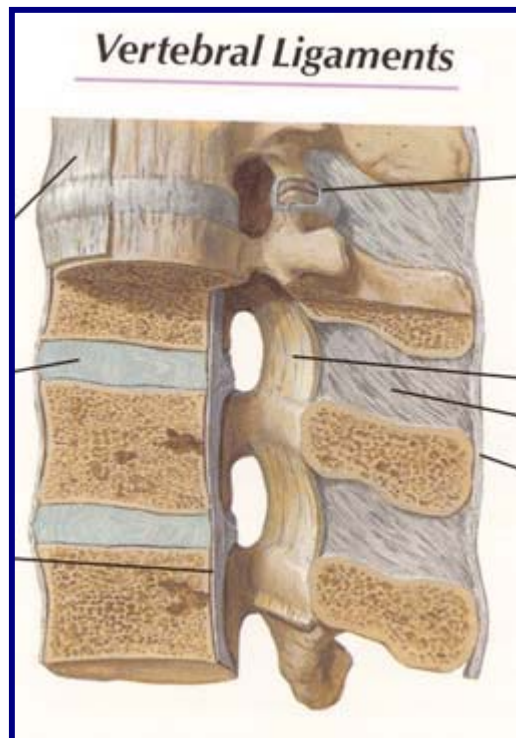
**Identify typical intervertebral articulations, and identify the course and location of the major ligaments connecting the vertebrae.**

#### *Intervertebral*

- a) **synovial joints** (2) → of adjacent vertebrae; facets region → zygapophysial
- b) **IV discs** → hyaline vertebrae

#### *Major Ligaments*

- 1) **Anterior longitudinal** strong fibrous band that and vertebral bodies; runs sacrum, widens as it
- 2) **Posterior longitudinal** flimsy band which passes spanning the posterior vertebral bodies. Narrows as
- 3) **Interspinous ligament:** spinous processes
- 4) **Supraspinous ligament:** spinous processes
- 5) **Nuchal ligament:** external occipital whereupon it becomes the supraspinous ligament.
- 6) **Intertransverse ligament:** connects adjacent transverse processes
- 7) **Ligamentum flavum;** almost vertical ligament connecting laminae of adjacent vertebrae



#### *Articulations:*

articular processes for ribs in thoracic joints  
cartilage b/ disc and

**ligament:** broad, attaches to discs from skull to descends

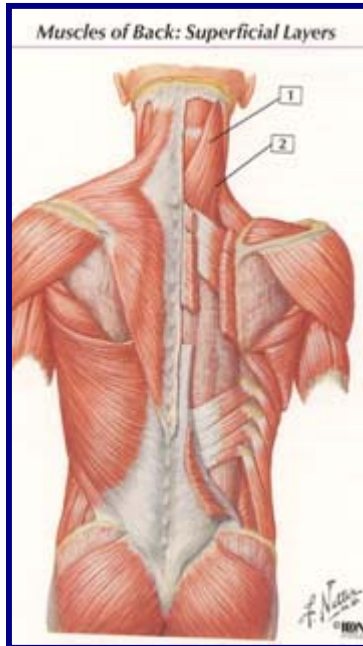
**ligament:** taut, form disc to disc surface of the it descends. connects adjacent

connects tips of the

extends from the protuberance to C7,

### **Objective 3**

**Identify the anatomical components of superficial, and intermediate layers of musculature of the back. Indicate their innervation and the mechanical effect of each.**



### 1) Superficial Extrinsic

- a) **Trapezius:** innervated by accessory nerve (CN XI) & cervical nerves 3 & 4. elevates & retracts scapula, depress scapula and shoulder
- b) **Latissimus dorsi:** innervated by thoracodorsal nerve. Extends, adducts, and medially rotates humerus
- c) **Rhomboids:** major and minor innervated by dorsal scapular nerve. Retract scapula, fix scapula to thoracic wall/stabilize shoulder
- d) **Levator scapulae:** innervated by dorsal scapular nerve. Elevates scapula, rotates scapula in opposite direction of trapezius

### 2) Intermediate Extrinsic

- a) **Serratus posterior superior:** innervated by the 2<sup>nd</sup>-5<sup>th</sup> intercostal nerves. Attaches C7-T3. Elevates ribs.
- b) **Serratus posterior inferior:** innervated by the 9<sup>th</sup>-12<sup>th</sup> intercostal nerves. Attaches T1-L2. Depress ribs.

### Objective 4

Identify the anatomical components of the deep back muscles and indicate their segmental extent, the innervation and the mechanical effect of each.

#### Intrinsic superficial:

##### 1) Splenius capitis

- a) innervated by posterior rami of spinal nerves
- b) extends the head bilaterally, laterally bend and rotate face to the same side
- c) originates b/t C7 and T4
- d) inserts to mastoid process, temporal bone, and lateral third of superior nuchal line of occipital bone.

##### 2) Splenius cervicis

- a) innervated by posterior rami of spinal nerves
- b) bilaterally extends neck and laterally bends and rotates neck towards the same side
- c) originates in spinous processes of T3/T6
- d) inserts into transverse process of C1-C4

#### Intrinsic Intermediate (Erector Spinae):

##### 1) Iliocostalis

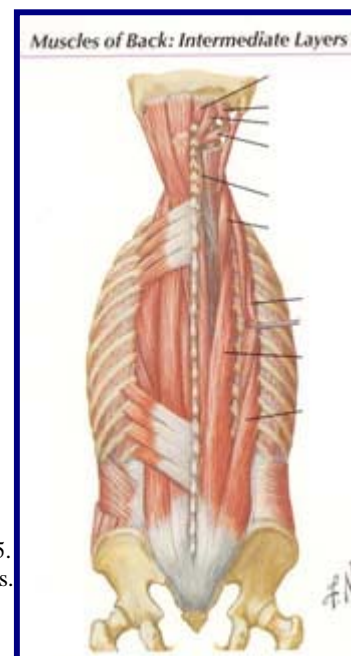
###### a) Lumborum-

- i) innervated by posterior rami of spinal nerves
- ii) extend and laterally bend vertebral column
- iii) common origin of erector spinae (iliac crest, spines of lower 3 vertebrae regions, ie. Lumbar, sacral, coccyx.)
- iv) inserts at angle of lower 6-12 ribs

###### b) Thoracis

- i) innervated by posterior rami of spinal nerves
- ii) extends and laterally bends vertebral column
- iii) originates angle of ribs 6-12
- iv) inserts at angles of ribs 1-6 and TVP of C7

###### c) Cervicis



- i) innervated by posterior rami of spinal nerves
- ii) extends and laterally bends vertebral column
- iii) originates angle of ribs 3-6
- iv) inserts TVP of C4-C6

## 2) Longissimus

### a) Thoracis

- i) innervated by posterior rami of spinal nerves
- ii) extends and laterally bends vertebral column and extends head
- iii) common origin of erector spinae, also TVPs and AccP of L1-L5, and middle layer of thoracolumbar fascia
- iv) inserts TVP T1-T12 and angles of ribs 9 and 10

### b) Cervicis

- i) innervated by posterior rami of spinal nerves
- ii) extends and laterally bends vertebral column and extends head
- iii) originates TVPs of T1-T5
- iv) inserts TVP and APs C2-C6

### c) Capitis

- i) innervated by posterior rami of spinal nerves
- ii) extends and laterally bends vertebral column and extends head
- iii) originates TVPs of T1-T5 and AP of C4-C7
- iv) inserts mastoid process of temporal bone

## 3) Spinalis

### a) Thoracis

- i) innervated by posterior rami of spinal nerves
- ii) extends vertebral column and extends head
- iii) originates from SP of T11-L2
- iv) inserts SP of T1-T4

### b) Cervicis

- i) innervated by posterior rami of spinal nerves
- ii) extends vertebral column
- iii) originates inferior part of nuchal ligament and spinous processes of C7-T2
- iv) inserts spinous processes of C2 and occasionally C3 and C4

### c) Capitis

- i) innervated by posterior rami of spinal nerves
- ii) extends vertebral column, extends head
- iii) originates from articular processes of C4-C6, also C7-T6 (blends in w/ semispinalis capitis)
- iv) insertion into occipital protuberance

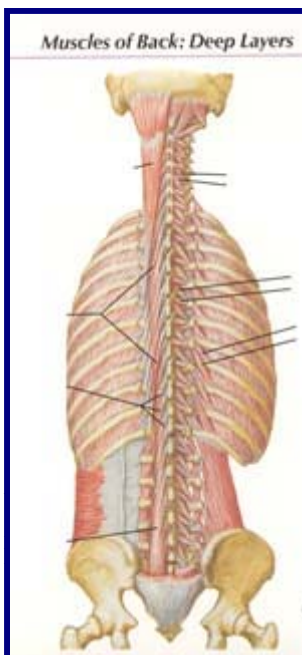
### Intrinsic Deep (Transversospinal):

#### 1) Semispinalis

- a) innervated by posterior rami of spinal nerves
- b) extends head, thoracic, and cervical regions of vertebral column, and rotates
- c) originates from transverse processes of C4-T12
- d) insertion- span 6 segments from their origin

#### 2) Multifidus

- a) innervated by posterior rami of spinal nerves



- b) stabilizes vertebrae during local movements of vertebral column
- c) originates sacrum, ilium, and transverse processes of T1-T3, and articular processes of C4-C7

d) inserts 4 segments superomedially from origin

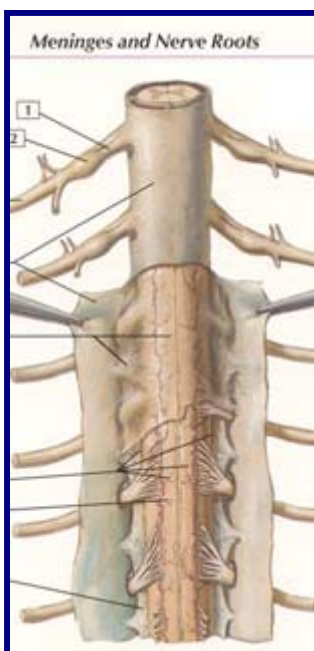
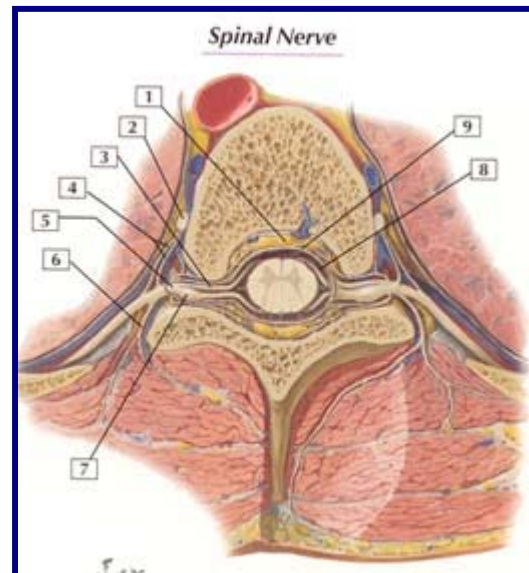
### 3) Rotatores

- a) innervated by posterior rami of spinal nerves
- b) stabilize vertebrae, assist with extension and rotation of vertebral column
- c) originates from transverse processes, mainly in thoracic region
- d) inserts:
  - i) **brevis**- inserts SP of adjacent superior vertebrae – 1 segment
  - ii) **longus**- inserts SP of 2 vertebrae superior

### Objective 5)

#### Identify the components of a typical spinal nerve

- 1) **Roots**- formed by converging rootlets; posterior/dorsal roots are sensory/afferent; anterior/ventral are efferent/motor
- 2) **Mixed Spinal Nerve**- convergence of anterior and posterior roots that immediately divides into 2 rami.
- 3) **Rootlets**- Subsets of roots that arise from the spinal cord, specifically the white matter.
- 4) **Posterior Primary Rami**- supplies nerve fibers to synovial joints of the vertebral column, deep muscle of the back, and the overlying skin.
- 5) **Anterior Primary Rami**- supplies nerve fibers to trunk and upper/lower limbs.
- 6) **Dorsal Root Ganglion**- swelling of cell bodies in the dorsal root. Just lateral to the spinal cord.
- 7) **Axon**- process of neuron transmitting signal away from cell body
- 8) **Dendrite**- branch-like structure that receives impulses and transmits them to the cell body.



### Objective 6

**Identify the spinal cord, the conus medullaris, and the cauda equina. Identify the major coverings (meninges) of the spinal cord. Indicate the relationship of each to the vertebral canal, nerve roots and spinal cord.**

- 1) **Spinal cord**- segment of the CNS that extends from the base of the brain to L2. Major reflex center and conduction pathway b/t body and brain.
- 2) **Conus medullaris**- termination of the SC around L2. Inferior end of SC that tapers off to become a con

shape.

3) **Cauda equina**- bundle of spinal nerve roots in the sub-arachnoid space, inferior to the conus medullaris. Resembles a horse's tail; extension of spinal cord.

4) **Filum terminale** - serves as an anchor for the end of the dural sac; comes from tip of medullary cone; attaches to the coccyx; continuation of the pia mater. (Pia mater to S2 and dura mater to coccyx)

5) **Dura mater**- outer covering of the SC; tough fibrous covering. In b/t dura mater and vertebrae is the epidural space.

6) **Arachnoid mater**- avascular membrane. Not attached to the dura, but CSF pushes it against the dura

7) **Sub-arachnoid space**- covered by arachnoid mater; contains CSF,

8) **Pia mater**- inner most covering of the SC; covers the vasculature