Learning Sectional Anatomy
The Easy Way

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Sectional Anatomy Terminology

Nomenclature: Topographic Landmarks

- C7
- T5-10
- L1-3-5
- 1st rib
- 1-2" below xiphoid
- Symphysis pubis
- 1-2" below coccyx
- Inferior pub margin
- Ischial tuberosity
- Inguinal ligament
- Pubic crest
- Sternal angle
- Vertebral prominens
- Jugular notch
- Xiphoid process
- Inferior rib margin
- Umbilicus
- ASIS
- Iliac crest
- 1" below coccyx
- Symphysis pubis
- 1-2" below coccyx
Identify the plane:

Section: a slice parallel to a plane

Viewing Anatomy in Various Planes:

Sectional images:
- Viewing coronal images - subject is “sliced” in the imaging sense from the front to the back similar to the anteroposterior (AP) projection in radiography.
- Viewing sagittal views is related to the lateral projection in radiography and slices are viewed from right to left or vice versa.
- In Axial plane images the subject is “sliced” from superior to inferior or vice versa.
Dorsal & Ventral Cavities:

**Ventral:**
- Thoracic Cavity
- Abdominopelvic Cavity

**Dorsal:**
- Cranial Cavity
- Spinal Cavity

**Ventral Cavities:**

The thoracic cavity is divided by membranes to form separate pleural cavities and the pericardial cavity, which contains the heart.

The abdominopelvic cavity can be further split into the upper abdominal and lower pelvic cavities.

**Regions & Quadrants of Abdomen**

- 9 Regions
4 Abdominal Quadrants: RUQ, LUQ, RLQ, LLQ

Anatomic Position
- Body erect
- Arms to side
- Palms forward
- Head & neck forward

Terms of Position/Direction, Planes, Cavities, quadrants & Regions
- **VISCERAL** - internal organs or coverings of organs; e.g. visceral pleura
- **PARietal** - wall of a body or cavity; e.g. parietal pleura
- **CEPHALIC** - toward the head
- **CAUDAL** - toward the feet
- **MEDIAL** - toward the midline
- **LATERAL** - away from the midline
- **SUPERFICIAL** - near the surface
- **DEEP** - away from the surface
- **PROXIMAL** - toward the point of origin
- **DISTAL** - away from point of origin

Identify Proximal vs. Distal
Terms of Position/Direction

- INFERIOR - below
- SUPERIOR - above
- INTERIOR - inside
- EXTERIOR - outside
- ANTERIOR - (ventral) toward the front
- POSTERIOR - (dorsal) toward back
- IPSILATERAL - same side
- CONTRALATERAL - opposite side

Anterior verses Posterior

Learning Sectional Anatomy The Easy Way

An easy five step process designed to provide a self paced process for learning sectional anatomy with computed tomography or MRI images.
How to Use it to Your Benefit:

- Once you master the steps for one anatomical area, you simply repeat the steps for the next anatomical area.

- It is a method that was designed originally and has proven very successful for CT and MRI technologists working in the clinical setting who wish to improve their anatomy identification skills.

Five Easy Steps for Learning Sectional Anatomy

1. Choose an area to learn about.  
   e.g. abdomen and pelvis

2. List the major organs and structures in the area and briefly describe the location of each. 
   e.g. Liver, spleen, stomach, gallbladder etc.

3. Find and view the organs or structures on diagrams in the anteroposterior (coronal) and/or lateral (sagittal) directions.
Five Easy Steps for Learning Sectional Anatomy

4. While viewing the area (organs) from the anterior direction:
   - Draw an imaginary line across the area you are studying at different levels.
   - The lines represent the locations of slices acquired in the axial plane.
   - Proceed to list the organs or structures you see in order from the right to left side of the body as you view the diagram.

Five Easy Steps for Learning Sectional Anatomy

5. The last step involves making the transition from the anteroposterior (coronal) or lateral (sagittal) view to viewing the organs and structures on your list in the axial plane using CT or MRI images.
   - Beginning again from the right to left side of the body, try to locate the organs or structures you listed using a CT/MR image at the same or similar location.

1. Choose an area, for example abdomen and pelvis
2. List the major organs and structures in the area and briefly describe the location of each

   **Stomach:**
   - Mostly located in left upper quadrant (LUQ), partly in right upper quadrant (RUQ)
   - Between T10 and L2
   - Anteriorly located in abdominal cavity
   - Anterior to spleen
   - Helpful hint: Readily visualized on CT images after oral contrast has been administered

   **Liver:**
   - Four Lobes - left, right, caudate, quadrate
   - Largest solid organ in body
   - Mostly located in RUQ, partly in LUQ
   - Between T10 and L3
   - Falciform Ligament - between right and left lobes
   - Porta Hepatis - opening or fissure for the passage of portal vein, hepatic artery, and hepatic ducts
Organ and Structure Descriptions:

**Spleen:**
- Located in LUQ
- Between T12 and L3
- Posterior to the stomach in posterior aspect of abdomen

**Gallbladder:**
- Located in RUQ
- Located in anterior aspect of abdomen under the inferior surface of the liver
- Between T12 and L3
- Medial to stomach

**Pancreas:**
- Located in LUQ and RUQ
- Composed of a head, body, and tail
- Between L2 and L3
- Posterior to the stomach
- Medial to the spleen
- Location of blood vessels in relationship to pancreas
  - Posterior to head: IVC, Portal Vein, Aorta, Right renal artery and vein
  - Posterior to body: SMA, IMV

**Duodenum:**
- Located in LUQ and RUQ
- Posterior to the pylorus of stomach and transverse colon
- Encircles the head of pancreas
  
  **Helpful hint:** Should appear white on CT images when filled with oral contrast media

**Jejunum:**
- Centrally located occupying all four quadrants

**Ileum:**
- Centrally located except terminal ileum (RLQ)

**Large Intestines:**
- Cecum - RUQ
- Ascending Colon - RUQ and RLQ
- Transverse Colon - RUQ (hepatic flexure or bend near liver) and LUQ (splenic flexure or bend near spleen)
- Descending Colon - LUQ and LLQ
- Sigmoid Colon - travels posteriorly and inferiorly in midline and LLQ, posterior and inferior to small intestines
- Rectum - located in midline of posterior abdomen, posterior to bladder

**Organ and Structure Descriptions:**

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- Located in LUQ and RUQ
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Organ and Structure Descriptions:

Adrenal Glands:
- Located on superior pole of each kidney
- Seen at the level of T11-12

*Helpful hint:* Adrenal glands appear as tent-like structures, gray in color on an axial CT image just above the kidneys.

Organ and Structure Descriptions

Urinary Structures

Kidneys:
- Located in RUQ and LUQ between the levels of T12 and L4

*Helpful hint:* Appear as white/gray circular structures on axial CT image after intravenous contrast administration

Ureters:
- Located medial to kidneys and lateral to IVC and aorta
- Descend into pelvis and empty into bladder

*Helpful hint:* Appear as small white circular structures on axial CT image after contrast administration

Organ and Structure Descriptions

Urinary Bladder:
- Located in pelvic area posterior to the upper aspect of symphysis pubis
- Anterior and inferior to uterus in female
- Superior to the prostate gland and anterior and superior to rectum in the male

*Helpful hint:* Appears as a white secular structure on an axial CT image after intravenous contrast administration
### Organ and Structure Descriptions

#### Female Reproductive Structures:
- **Uterus** - Centrally located in the pelvis, superior and posterior to bladder and anterior to rectum
- **Fallopian Tubes** - Lateral to the uterus and superior to the ovaries
- **Ovaries** - Lateral to the uterus below the fallopian tubes
- **Vagina** - Posterior to the urethra and urinary bladder and directly anterior to rectum and anal canal

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#### Male Reproductive Structures:
- **Prostate Gland** - directly inferior to bladder and anterior to rectum and surrounding the urethra
- **Testes** - posterior to urethra and inferior to the bladder
- **Penis and Urethra** - inferior to bladder and anterior to testes
- **Seminal Vesicles** - paired glandular pouches superior to prostate and posterior to bladder

*Helpful hint:* Appear as a bowtie formation on an axial CT image

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#### Pertinent Bony Anatomy:
- **Ilium** - Located anteriorly, posteriorly, and laterally
- **Ischium** - Located laterally
- **Pubis** - Located anteriorly in midline
- **Head, Neck and Trochanter of Femur** - Laterally located
- **Sacrum & Coccyx** - Posteriorly located

*Helpful hint:* Appear white on a CT image
Organ and Structure Descriptions:

**Aorta:** - Main systemic artery of abdomen
  - Continuation of descending thoracic aorta that descends through abdomen to the left of the inferior vena cava (IVC)

Organ and Structure Descriptions

**Aorta:** Three anteriorly originating unpaired branches including:
  - **Celiac Arterial Trunk** (arises anteriorly at the L1 level) - further divides into gastric, splenic, and common hepatic arteries
  - **Superior Mesenteric Artery** (SMA - branching anteriorly at the L2 level) - supplies small intestine and proximal half of large intestine
  - **Inferior Mesenteric Artery** (IMA - branching anteriorly at the level of L3-L4) - supplies distal half of large intestine
  - **Middle Sacral Artery** - unpaired inferior branch

Organ and Structure Descriptions

**Aorta:** Has laterally originating paired branches including:
  - ** Inferior Phrenic Artery** - supplies diaphragm
  - **Four pairs of lumbar arteries**
  - **Middle Suprarenal Arteries** - supply adrenal glands (arise at the L2 level)
  - ** Renal Arteries** - supply kidneys
  - **Ovarian or Testicular Arteries**

**Aorta:** Has paired terminal branches:
  - **Right and Left Common Iliac Arteries** - further divides into
  - **Internal and external Iliac arteries**
Organ and Structure Descriptions

**Inferior Vena Cava (IVC)**

- Main systemic vein of abdomen draining the lower half of the body
  - Formed by the union of the
    - Right and Left Common Iliac Veins in the lower abdomen
  - Ascends in posterior abdomen in front of the lumbar vertebrae, along the right side of the aorta, and passes posterior to head of pancreas before entering thorax and emptying into right atrium
  - Has a similar arrangement of branches to aorta except ovarian and testicular vein arrangement
  - **Right ovarian or testicular vein** empties directly into IVC
  - **Left ovarian or testicular vein** empties into the renal vein and renal vein then empties into IVC

Organ and Structure Descriptions

**Hepatic Portal Vein (Portal Vein)**

- Formed by union of superior mesenteric vein and splenic vein
  - Ascends through the upper posterior abdomen behind the pancreatic head and anterior to the IVC
  - Collects blood from the spleen, pancreas, GB, stomach, and intestines and transports it to the liver before it goes to vena cava and back to the heart
  - Carries 80% of blood to liver
  - Passes through porta hepatitis into liver
  - Has these branches: **gastric, pyloric, cystic vein**

Step 3: View the organs and structures on diagrams

**Digestive System**

- Stomach
- Liver
- Spleen
- Gallbladder
- Pancreas
- Duodenum
- Jejunum
- Ileum
- Cecum
- Ascending colon
- Transverse colon
- Descending colon
- Sigmoid colon
- Rectum
Step 3: View the organs and structures on diagrams - Adrenal & Urinary

- Adrenal Glands
- Kidneys
- Ureters
- Urinary Bladder

Step 3: View the organs and structures on diagrams - Reproductive System

- Female Reproductive Structures - Uterus, Fallopian Tubes, Ovaries, Vagina
- Male Reproductive Structures - Prostate Gland, Testes, Penis and Urethra, Seminal Vesicles

Step 3: View the organs and structures on diagrams - Bony Anatomy

- Ilium
- Ischium
- Pubis
- Femoral Head
- Neck
- Trochanter
- Sacrum
- Coccyx
Step 3: View the organs and structures on diagrams - Major Vascular Anatomy

- Abdominal Aorta (AA)
- Inferior Vena Cava (IVC)
- Hepatic Portal Vein (PV)
- Hepatic Arteries
- Superior Mesenteric Artery (SMA) & Vein (SMV)
- Inferior Mesenteric Artery (IMA) & Vein (IMV)
- Splenic Artery (SA) & Vein (SV)
- Renal Arteries & Veins

Step 4. Draw an imaginary line across the area you are studying at different levels as demonstrated. The lines would represent the locations of slices acquired in the axial plane. Proceed to list the organs or structures you see in order from the right to left side of the body as you view the diagram.

- It may be helpful to note what level your list indicates. For example, write down Level 1 List followed by the structures you viewed.
- Level 2 List followed by structures you saw at that level.
Step 4. Draw an imaginary line across the area you are studying at different levels as demonstrated. The lines would represent the locations of slices acquired in the axial plane. Proceed to list the organs or structures you see in order from the right to left side of the body as you view the diagram.

Abdominal Aorta
Hepatic Portal Vein (PV)

Step 5: Beginning again from the right to left side of the body, try to locate the organs or structures on your lists using CT/MR images at the same or similar location. You can find the correct CT level by viewing a CT scout image of an abdomen and pelvis study that indicates the various image levels.
Step 5: Portal Vein - union of superior mesenteric vein and splenic vein
Step 5: Level of Transverse Colon

Step 5: Level of Small Bowel

Step 5: Level of Bifurcation of the Aorta
Step 5:

Female Pelvis

Bladder, Uterus, Rectum

Pubic Symphysis, Bladder, Cervix, Rectum

Step 5:

Male Pelvis

Bladder, Seminal Vesicle, Prostate, Sympysis, Pubis, Rectum, Coccyx
Success! It’s just that easy - Five Easy Steps for Learning Sectional Anatomy

1. Choose an area.
2. List the major organs and structures in the area and briefly describe the location of each.
3. Find and view the organs or structures in the anteroposterior (coronal) and/or lateral (sagittal) directions.
4. While viewing the area from the anterior direction, draw an imaginary line across the area you are studying at different levels as demonstrated. The lines would represent the locations of slices acquired in the axial plane. Proceed to list the organs or structures you see in order from the right to left side of the body as you view the diagram.
5. The last step involves making the transition from the anteroposterior (coronal) or lateral (sagittal) view to viewing the organs and structures on your list in the axial or transverse plane using computed tomography or magnetic resonance images. Beginning again from the right to left side of the body, try to locate the organs or structures you listed using a CT/MR image at the same or similar location.

Tips:
1. Although this method is not difficult to learn, it does require patience, time, and practice.
2. Once you have completed these five steps, repeat the steps if you had difficulty identifying structures on the CT or MR images.
3. If you are confident you have mastered viewing the structures in the axial plane, try using these steps to master viewing images in the coronal and sagittal planes.
   - To master coronal images, draw vertical lines from front to back on lateral diagrams of structures.
   - To master sagittal images, draw vertical lines on anteroposterior diagrams of structures.
Coronal Images - draw vertical lines from front to back on lateral diagrams

Sagittal Images - draw vertical lines AP diagrams

DO YOU FEEL LIKE THIS YET?