

# **TRICKY CONCEPTS**

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**MICRO / ANAT**

# **MICROBIOLOGY**

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A 7-year-old boy is brought to the pediatric clinic by his mother because of multiple skin lesions on his arms and trunk for the past 6 weeks. The lesions are not painful but the child sometimes scratches them due to mild itching. He has no fever, weight loss, or systemic symptoms. His vaccinations are up to date, and he has no significant medical history. He lives with his parents and attends elementary school. On examination, the child is well-appearing. Multiple small, firm, dome-shaped, flesh-colored papules with a central dimple are present on his trunk and flexor surfaces of the arms. No mucosal involvement is noted. Which of the following viruses is the most likely cause of this child's condition?



MCV

Pox

dsDNA



4.

A

- A) dsDNA unenveloped <sup>A P</sup>
- B) ~~ssDNA~~ unenveloped → *PanV*
- C) ~~dsRNA~~ unenveloped
- D) dsDNA enveloped

A 10-month-old boy is brought to the emergency department because of a seizure that lasted 3 minutes. His mother reports that he has had fever up to 39.5°C (103.1°F) for the past 3 days and mild irritability, but no cough, rhinorrhea, or vomiting. On arrival, the child is alert but fussy. His temperature is 38.7°C (101.7°F), pulse is 160/min, and respirations are 30/min. Physical examination reveals no meningismus.

Laboratory studies, including cerebrospinal fluid analysis, are unremarkable. The next day, his fever subsides abruptly, and a blanching, erythematous, maculopapular rash appears on his trunk and spreads to the extremities.

Which of the following pathogens is the most likely cause of this child's illness?

A. Parvovirus B19

B. Human herpesvirus 6

C. Epstein-Barr virus

D. Coxsackievirus A16

*HSM + fever + LN*

*CARS*

*HFMD*



*ES/RI*  
*SIXTH*

A 2-year-old girl is brought to the emergency department with fever, poor appetite, and irritability. Her parents report that she has been drooling and refusing food for the past day. On examination, her temperature is 38.5°C (101.3°F). The child has painful vesicular lesions on the tongue and oral mucosa. Similar vesicular eruptions are noted on the palms and soles. No skin lesions are seen on the trunk.

Which of the following best describes the causative organism of this illness?

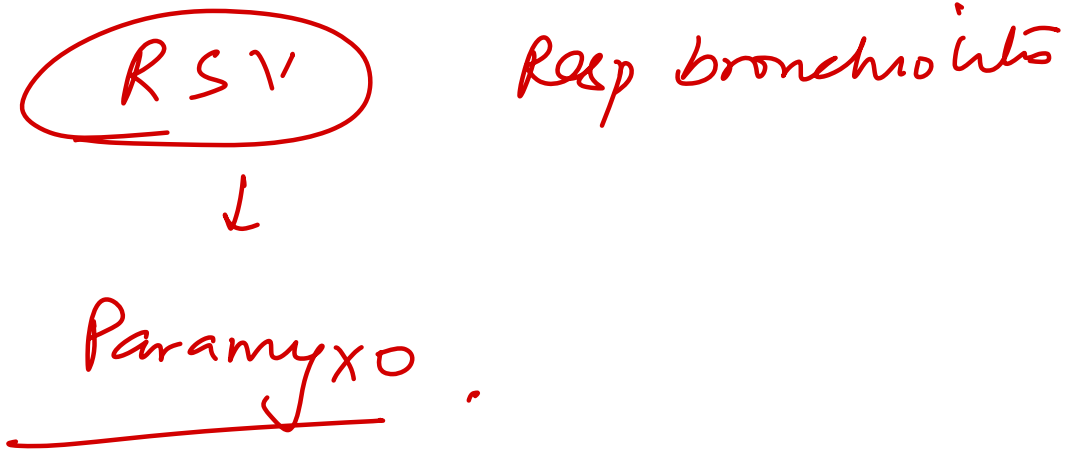
- A) Nonenveloped, single-stranded RNA virus of the Picornaviridae family
- B) Enveloped, double-stranded DNA virus of the Herpesviridae family
- C) Enveloped, single-stranded RNA virus of the Paramyxoviridae family
- D) Nonenveloped, double-stranded DNA virus of the Adenoviridae family
- E) Enveloped, single-stranded RNA virus of the Orthomyxoviridae family

Coxsackie A16

A 6-month-old boy is brought to the emergency department in January with 2 days of cough, rhinorrhea, and fever. Today, his mother noticed rapid breathing and wheezing. The child was born at term, is up-to-date on vaccinations, and has no past medical history.

On exam, temperature is 38.2°C (100.8°F), pulse 162/min, respiratory rate 56/min, and oxygen saturation 90% on room air. He appears irritable and is using accessory muscles for breathing. Auscultation reveals diffuse wheezes and crackles. Chest x-ray shows hyperinflation and peribronchial thickening. Which of the following is the most likely cause of this patient's condition?

- ~~a. ssRNA negative sense~~
- ~~b. dsRNA negative sense~~
- c. ssRNA positive sense
- ~~d. dsDNA enveloped~~



# VIROLOGY- DNA VIRUSES

icosahedral

dsDNA

ssDNA

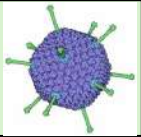
Nonenveloped

Enveloped



HP

Parvovirus B19  
Nonenveloped  
Smallest

Adenovirus



**HSV**

- 1- *H. labialis / oncopathicus* → 
- 2- STDs (2-SD)
- 3- VZV → pleomorphic (centripetal) → fetal chickenpox / shingles
- 4- EBV → MONONUCLEOSIS
- 5- CMV (MCMV)
- 6- HHV 6 → 
- 7- HHV 7 → P. ROSEA
- 8- HHV 8 → Kaposi's sarcoma (Ks), i' eff usin L (cutaneous S -)

Hep B


- Replicates through RNA intermediate
- Circular

**PAPOVA**  
Circular

- Polyoma
  - JC - PML - HIV
  - BK - Dereg cell
  - SV 40
  - Merkel cell virus
- Papilloma  
HPV

POX

Largest  
Cytoplasm  
Complex



BRICK

**Nucleic acid replication**

**DNA** → (N) except  
POX

**RNA** → cytoplasm etc  
R I M  
Relio hyt menter

# VIROLOGY- RNA VIRUSES

ssRNA

Positive sense

infections

Negative sense  
Enveloped

need RNA pol

dsRNA

ROTA / Aeo  
Nonenveloped  
Villous atrophy  
NSP4 toxin  
TOC: stool - Ag.  
*mcc of D in infants*



Unenveloped

Enveloped

"MR-FAB Delta"  
 • Myxo - ortho - Influenza  
     - paramyxo  
     ↳ Measles Mumps  
     ↳ Rabies RSV Paramyxo  
 • Rhabdo  
     ↳ Ebola Marburg  
     ↳ Lassa LCMV  
 • Arena  
     ↳ Hanta CCHF  
 • Buny  
     ↳ Hanta CCHF  
 • Delta = Hep D

PEC - PICORNA  
 ↳ Hep E  
 ↳ Calici  
 Norwalk virus: *mcc diarrhea adult 2*  
PERCH  
 ↳ Polio ECHO Rhuio Coxsackie Hep A

• Flavi  
 HCV, YF, Dengue, Zika, WN, JE, KFD  
*Aedes*  
 • Toga "CREW"  
 Chikungunya Rubella (Matona)  
*equine*  
 • Retro (2 copies)  
 • Corona

**UNSEGMENTED** except

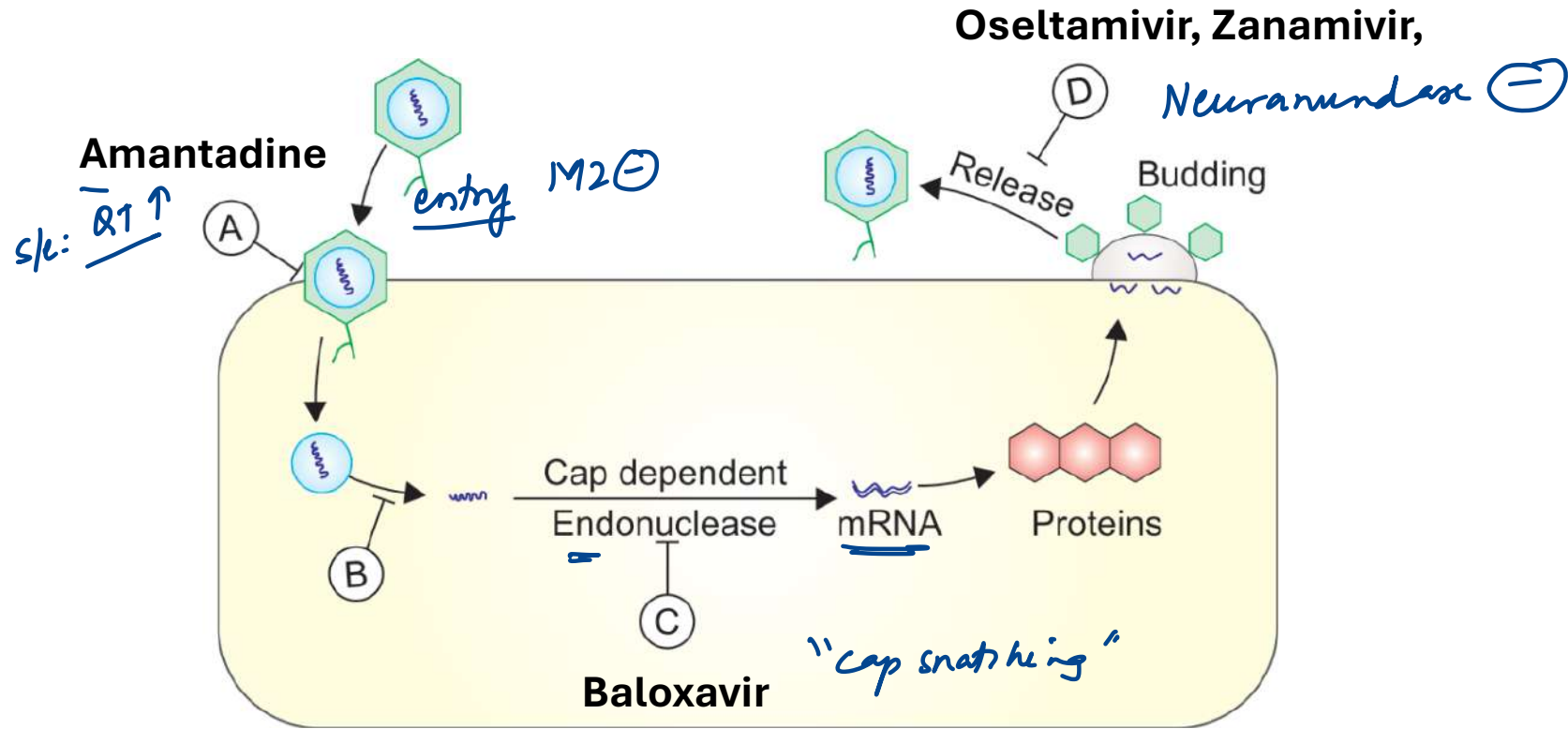
$\frac{B}{3}$	$\frac{1}{8}$	$\frac{R}{11}$	$\frac{A}{2}$
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Hep A, E: feco-oral

A 42-year-old man comes to the clinic in January with fever, chills, sore throat, myalgias, and dry cough that began yesterday morning. He has no chronic medical conditions. He works in an office where several coworkers were recently ill with similar symptoms. He has not received the influenza vaccine this season. Temperature is 38.9 °C (102 °F), pulse 110/min, respirations 20/min. Physical exam shows an ill-appearing man with mild pharyngeal erythema and diffuse muscle tenderness. A rapid influenza antigen test is positive for influenza A virus. He is prescribed oseltamivir. Which of the following best explains the mechanism of action of this medication?

- A. Blocks the M2 ion channel, preventing viral uncoating //
- B. Inhibits neuraminidase, decreasing release of progeny virions from infected host cells
- C. Inhibits viral RNA-dependent RNA polymerase, blocking genome replication
- D. Prevents viral attachment to host cell sialic acid receptors

# ANTIVIRALS



High risk  
severe  
influenza

Inhibits viral RNA-dependent RNA polymerase in **COVID-19**: Remdesivir  
 Inhibit viral DNA polymerase in **VZV/HSV** (Viral thymidine kinase): Acyclovir / Fam / Vala  
 Inhibit viral DNA polymerase in **CMV** (Viral **UL97** kinase): Ganciclovir → Foscarnet  
 Cidofovir

A 9-year-old boy is brought to the clinic by his parents due to perianal itching that is most intense at night. His teacher also reports that several children in his class have similar symptoms. Physical examination is unremarkable. A piece of clear adhesive tape applied to the perianal region reveals elongated, oval eggs under the microscope.

Which of the following is the most appropriate pharmacologic treatment for this patient?

A. Ivermectin

B. Albendazole

C. Praziquantel

D. Metronidazole

D

A 34-year-old man from rural Mexico presents to the emergency department after a new-onset generalized tonic-clonic seizure. He recently immigrated to the United States. He has no past medical history and takes no medications. On exam, the patient is postictal but hemodynamically stable. CT scan of the brain shows multiple calcified cystic lesions with surrounding edema. Stool studies are negative for ova and parasites.

Which of the following is the most likely mechanism by which this patient acquired his current condition?

A. Ingestion of undercooked pork containing larval cysts that mature into adult tapeworms in the intestine

B. Ingestion of water or food contaminated with eggs excreted in human feces


C. Direct invasion of the intestinal mucosa by adult tapeworms

D. Penetration of intact skin by larval forms in contaminated soil

↪

NCC

A 25-year-old man presents with 1 week of fever, myalgias, and swelling around the eyes. Two weeks ago, he attended a wilderness retreat in Alaska, where he ate undercooked bear meat. Since then, he has developed abdominal cramping, diarrhea, and progressive muscle pain. On exam, he is febrile and appears ill. Periorbital edema is noted. Laboratory studies show:

- WBC: 14,000/ $\mu$ L (40% eosinophils)
- Creatine kinase: elevated 
- AST/ALT: mildly elevated

Muscle biopsy demonstrates encysted larvae.

Which of the following organisms is the most likely cause of this patient's condition?

- A. *Enterobius vermicularis*
- B. *Trichinella spiralis*
- C. *Ancylostoma duodenale*
- D. *Toxocara canis*



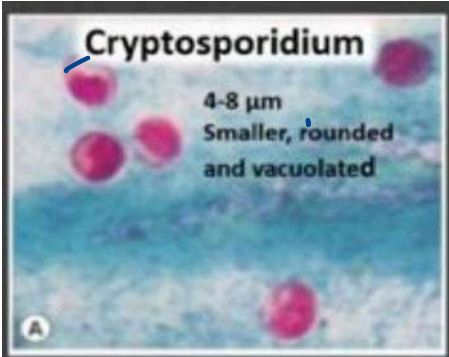
A 17-year-old boy is brought to the emergency department with severe headache, fever, nausea, and confusion that began 2 days ago. His parents report that he returned from a summer camp 5 days ago, where he frequently swam and dove in a freshwater lake. On arrival, temperature is  $39.5^{\circ}\text{C}$  ( $103.1^{\circ}\text{F}$ ), blood pressure 110/70 mm Hg, pulse 110/min. Neurologic exam shows nuchal rigidity and positive Kernig and Brudzinski signs. CT scan of the brain is unremarkable. Lumbar puncture shows: Opening pressure: 280 mm H<sub>2</sub>O; WBC count: 800/ $\mu\text{L}$  (90% neutrophils); Protein: 160 mg/dL; Glucose: 20 mg/dL. Gram stain and routine bacterial cultures are negative. Despite empiric broad-spectrum antibiotics, the patient deteriorates rapidly and dies within a week. Which of the following is the most likely cause of this patient's condition?

- A. Free-living amoeba entering through the nasal mucosa and cribriform plate
- B. Encapsulated yeast acquired from pigeon droppings inhalation
- C. Vector-borne protozoan infecting cerebral vasculature
- D. Reactivation of latent herpesvirus in trigeminal ganglia

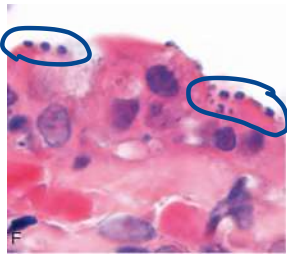
# Parasitology- Protozoa

*h/o HIV/AIDS + diarrhea*

## Sporozoa



DOC-Nitazoxanide



DOC-TMP-SMX

Raspberry Auto-fluorescence<sup>R</sup>

DOC-TMP-SMX



Auto-fluorescence<sup>R</sup>



## TOXOPLASMA

Ingestion-

Cat feces: *oocyst*

Meat: *bradyzoite*

Vertical: *tachyzoite*

Frenkel test

Sabin Feldman test

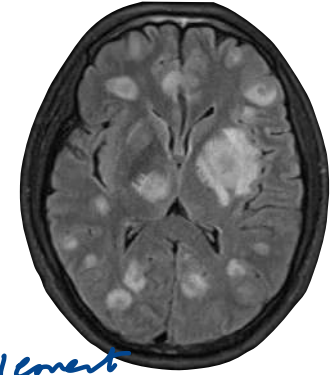
IgG avidity test:

High- *chr - reaction*

Low- *1° infn*

DOC: S+P

DOC in Pregnancy: *Spiramycin -*



HIV+

Plasmodium

Babesiosis

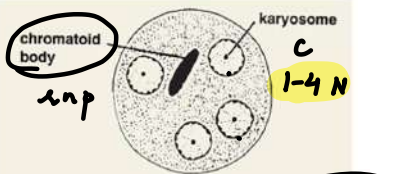
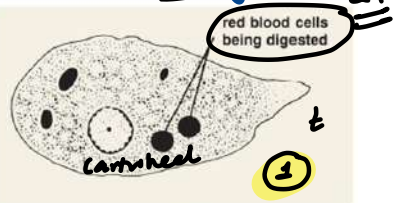
# Parasitology- Protozoa

## Amoeba

## Ciliated

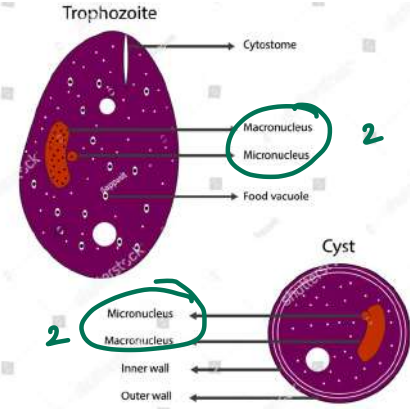
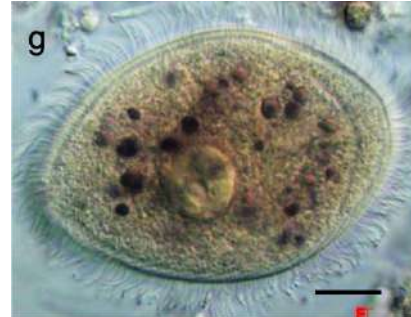
## Flagellated

*E. histolytica*  
 vs *E. coli*  
 x RBC  
 c: 1-8 nuclei



DOC: Amp B

*B. cilia* - rotatory mit



DOC: Doxycycline

*T. cruzi*/American trypanosomiasis  
 Romana - Chagas D Redwid  
 DOC-Benznidazole

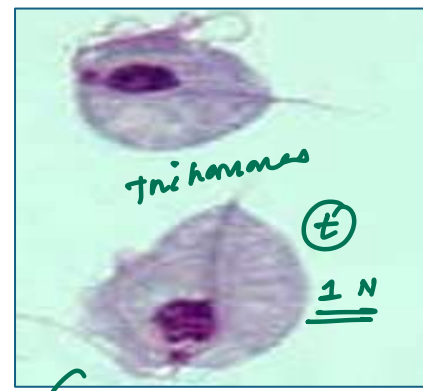


*T. brucei*/African trypanosomiasis  
 sleeping = Tsetse fly

DOC-Suramin  
 NNN medium



DOC: Metrogl



DOC: Metrogl

Strawberry Culture: Diamond M

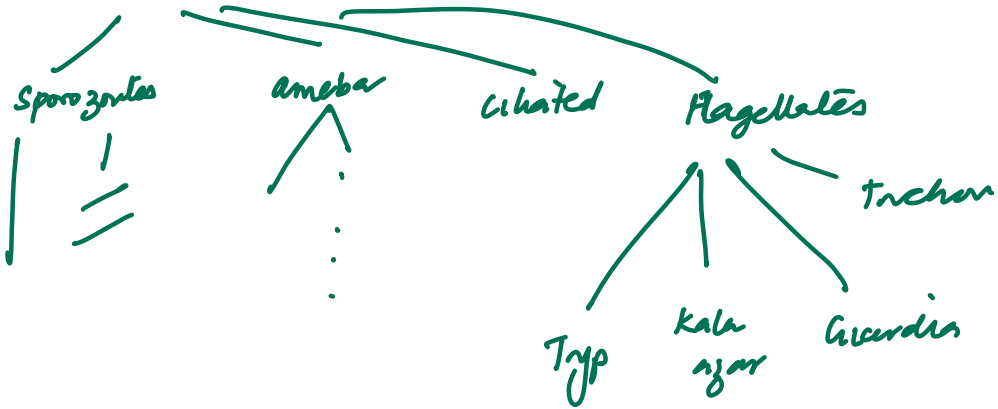


DOC: Metrogl + Paromomycin

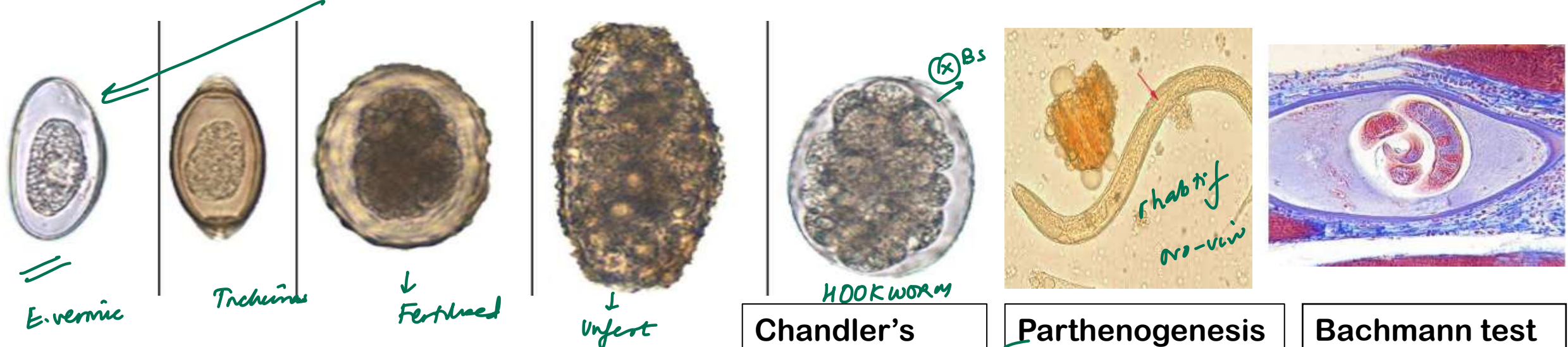


DOC: Pentamidine

Non-nutrient agar  
 Balmuthia Sappnia  
 Chronic Meningo-E



# Parasitology- Nematodes



E. vermic

Trichuris

↓ Fertilized

↓ Unfert

HOOKWORM

rhabdites  
no-vivi

Chandler's index

Parthenogenesis  
Fullborne test  
Smallest

Bachmann test

• TRICHINELLA  
Vivi

IDA

Strongyloides.

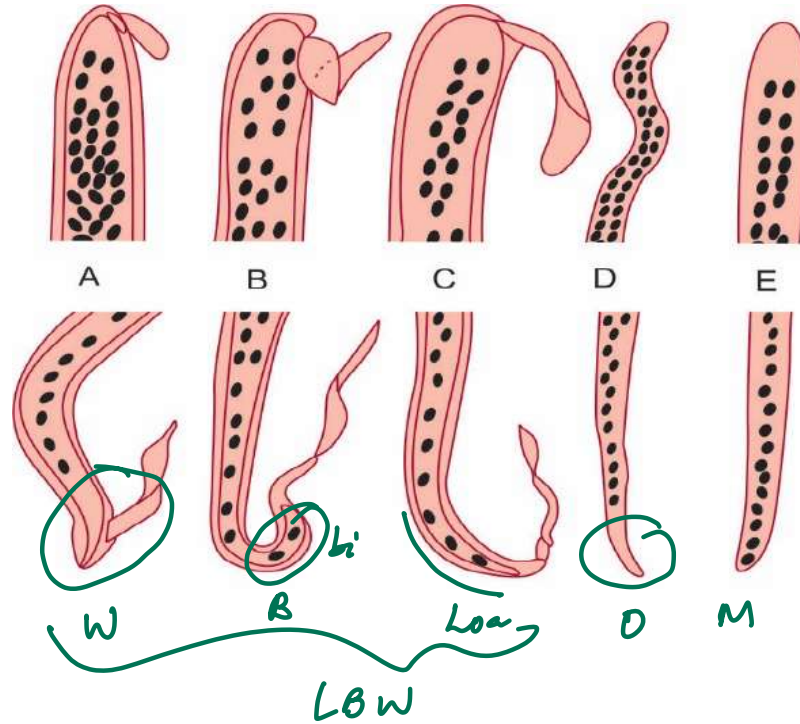


VLM

Ingested—Enterobius, Ascaris, Trichuris, Trichinella, Toxocara  
Cutaneous—Strongyloides, Hookworm — CLM  
Bites—Loa loa, Onchocerca volvulus, Wuchereria bancrofti

# Nematodes- Filarial worms

- A. *Wuchereria bancrofti*
- B. *Brugia malayi*
- C. *Loa loa* (calabar swelling-deerfly-  
Chrysops)
- D. *Onchocerca volvulus*  
(river blindness-Blackfly/*Simulium*  
Mazzoti test)
- E. *Mansonella perstans*



*Filaria*

Transmission assessment survey

IOC: *Night time 10pm-2am*

DEC Provocation test

Concentration: Membrane filtration / Knott method (2% formalin)

DOC: *DEC + Albenda / Ivermectin*

*MDA -*

# Parasitology- Cestodes



*E. granulosus*

Casoni test - Type 1

*T. solium*    *T. saginata*    *H. nana*    *H. diminuta*    *D. latum*    *E. granulosus*


4 suckers 2 rows of hooks	4 suckers No hooks	4 suckers single row of 20-30 hooks	4 suckers No hooks	2 Suctorial grooves or bothria, no suckers, No hooks	4 suckers 2 rows of hooks

# Parasitology- Trematodes

Infective form: *metacercaria*

Transmission: *feco oral*

Sexes- *Herms*

Eggs- 

Definitive host- *Man*

Primary Intermediate- *SNAIL*

Second Intermediate-

Paragonimus - *Crustaceans / crabs*

Opisthorchis/ Clonorchis- *Fish*

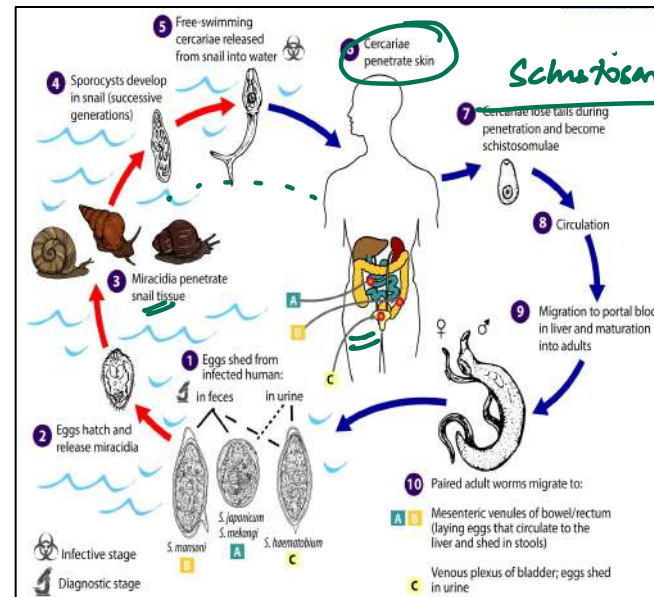
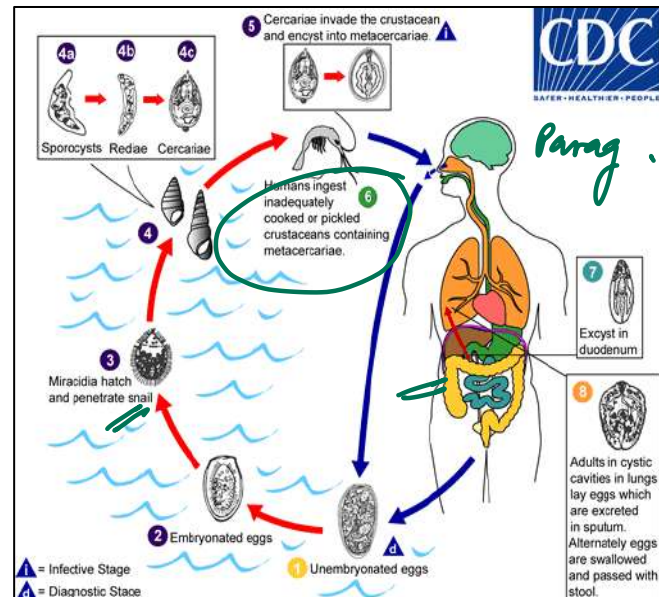
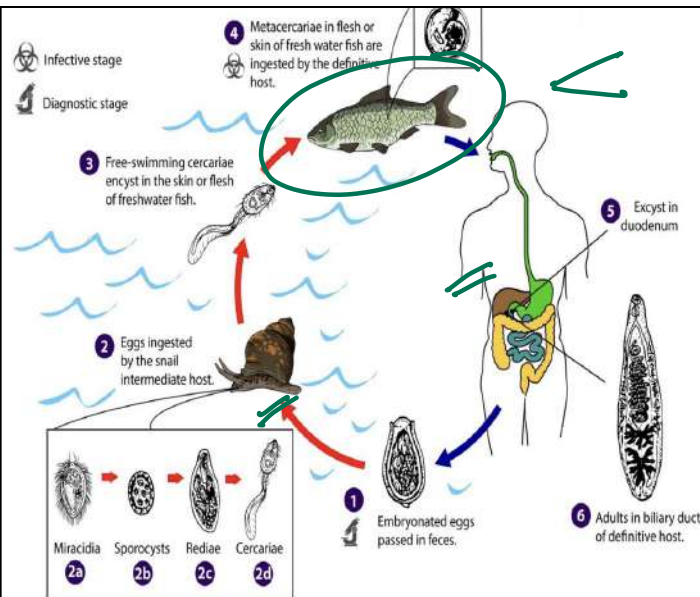
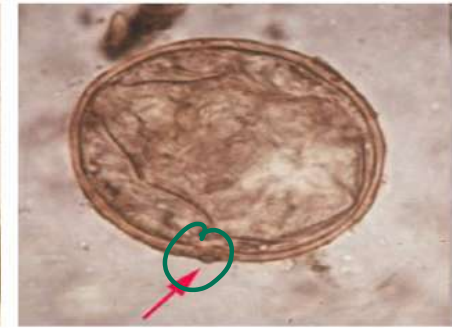
Fasciola- *fresh aquatic veg*

S- *Cercariae*

S- *skin*

S- *sep exco.*

S- *spine*



QQ

DOC: Cestodes, Trematodes- *praziquantel*

Liver Fluke- *Triclabendazole*

Hydatid, NCC, Nematodes- *Albendazole*.

Filaria, Loa, Loa- *DEC*

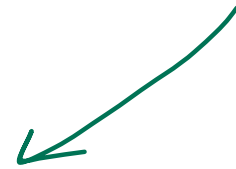
Onchocerca, Strongyloides- *Ivermectin*

A 19-year-old college student presents with 1 week of fever, malaise, abdominal pain, and constipation. He recently returned from visiting relatives in India. His temperature is 39.2°C (102.6°F). Physical examination reveals a faint, salmon-colored maculopapular rash on his abdomen. Abdominal palpation shows splenomegaly and right lower quadrant tenderness.

Stool culture grows a motile, gram-negative bacillus that does not ferment lactose but produces hydrogen sulfide on triple sugar iron agar. The organism is able to survive and replicate within macrophages after being phagocytosed.

Which of the following best describes the pathogenesis of this patient's condition?

- A. Preformed exotoxin-mediated enterocyte destruction
- B. Enterotoxin-mediated increase in chloride secretion
- C. Direct invasion of enterocytes without dissemination
- D. Facultative intracellular survival within mononuclear phagocytes



Salmorella

# Facts!

*obligate anaerobes*

Actinomyces  
Bacteroides  
Clostridium

*facultative anaerobes*

Staphylococcus  
Streptococcus  
Enterobacteraceae  
Hemophilus  
Vibrio

*Microaerophilic <10%*

Helicobacter  
Campylobacter  
M.bovis

o.o.o.o ↓ metal demand

Biofilm:  
• S.epidermidis *- prosthetic*  
• Pseudomonas aeruginosa *- bronchect CP*  
• Nontypeable H. influenzae *- DM*  
• Viridans streptococci *- dental care*

*obligate intracellular*

Chlamydia  
Rickettsia / Coxiella

*Facultative ic*

Salmonella, Neisseria, Brucella, Mycobacterium, Listeria, Francisella,  
Legionella, Yersinia pestis, Bartonella  
"Some Nasty Bugs May Live FacultativeLY"

*Urease (+)*

Proteus, Cryptococcus, H pylori, Ureaplasma, Nocardia, Klebsiella, S epidermidis, S saprophyticus

*CONS*

*AF + Aerobic + urease +*

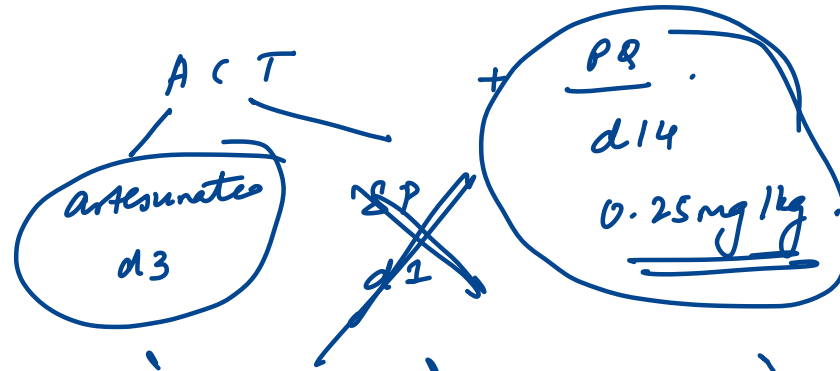
Polysaccharide: SHiN, Pseudomonas,  
E.coli, Salmonella, Klebsiella, Grp B Strep  
Hyaluronic acid: S. pyogenes  
Polypeptide: B. anthrax

Bipolar staining: *H. ducreyi* / *K. granulomatis* / *Y. pestis* /

*V. parahaemolyticus*  
B. pseudomallei - vietnam  
↳ Ashdarm

An 18-year-old boy from Rajasthan weighing 50 kg is diagnosed with mixed *P. vivax* and *P. falciparum* malaria. What is the appropriate treatment regimen on day 2? (NEET PG 2024)

- A. Artesunate 50 mg (4 tablets) + Primaquine 2.5 mg (6 tablets)
- B. Artesunate 50 mg (4 tablets) + Primaquine 7.5 mg (6 tablets)
- C. Artesunate 50 mg (4 tablets) + Sulfadoxine/pyrimethamine (750/37.5 mg) (2 tablets) + Primaquine 2.5 mg (6 tablets)
- D. Artesunate 50 mg (4 tablets) + Sulfadoxine/pyrimethamine (750/37.5 mg) (2 tablets) + Primaquine 7.5 mg (6 tablets)



# Malaria Rx

<p>P. vivax/ovale <i>-relapse</i></p>	<p>• Chloroquine (CQ) 25 mg/kg: DAY 1-3 + Primaquine (PQ) 0.25 mg/kg: DAY 1-14</p>
<p>P. falciparum/ malariae <i>-recrudescence</i></p>	<p>All Indian States (except northeastern): ACT-SP</p> <ul style="list-style-type: none"> <li>• Artesunate 4 mg/kg: DAY 1-3</li> <li>• Sulfadoxine + Pyrimethamine, 25 mg/kg + 1.25 mg/kg : ONLY DAY 1</li> <li>• Primaquine 0.75 mg/kg: ONLY DAY 2</li> </ul> <p>Northeastern States: ACT-AL</p> <ul style="list-style-type: none"> <li>• Artemether + Lumefantrine: DAY 1-3</li> <li>• Primaquine 0.75 mg/kg: ONLY DAY 2</li> </ul>
<p>Mixed infections: Vivax + Falciparum</p>	<ul style="list-style-type: none"> <li>• Artesunate 4 mg/kg: DAY 1-3</li> <li>• Sulfadoxine + Pyrimethamine, 25 mg/kg + 1.25 mg/kg : ONLY DAY 1</li> <li>• Primaquine 0.25 mg/kg: DAY 1-14</li> </ul>
<p><b>COMPLICATED MALARIA (Seizures, hypoglycemia, pulmonary edema and neurological deficits)</b></p>	
<p>P. falciparum (predominantly)</p>	<p>Initial Treatment: <b>IV/ IM Artesunate</b> at 2.4 mg/kg for 3 days or <b>IV/ IM Quinine</b>          After stabilisation: State based Oral Artemisinin-based Combination Therapy (ACT) for 3 days.</p>
<p>Pregnancy</p>	<p><i>CI → PQ / Doxycycline 1st T - xx ACT</i></p> <p><i>P.v/o → CQ x 3d</i></p> <p><i>P.f/mv → 1st T: Quinine 2/3rd T: ACT</i></p>
<p>Prophylaxis</p>	<ul style="list-style-type: none"> <li>• Chloroquine wkly 1 week prior-4 weeks after</li> <li>• Mefloquine wkly 2 weeks prior-4 weeks after</li> <li>• Doxycycline OD 2 d prior-4 weeks after</li> </ul>

A microbiologist is mapping the bacterial chromosome using horizontal gene transfer experiments. An *Escherichia coli* donor strain carrying an F factor integrated into its chromosome is mated with an F<sup>-</sup> recipient strain. Conjugation is interrupted after 10 minutes. Analysis shows transfer of genes encoding lactose metabolism but not genes encoding histidine biosynthesis. Despite receiving new chromosomal genes, the recipient strain remains F<sup>-</sup>.

Which of the following best describes this process?

- A. Transformation
- B. Specialized transduction
- C. Hfr conjugation
- D. Standard F plasmid conjugation

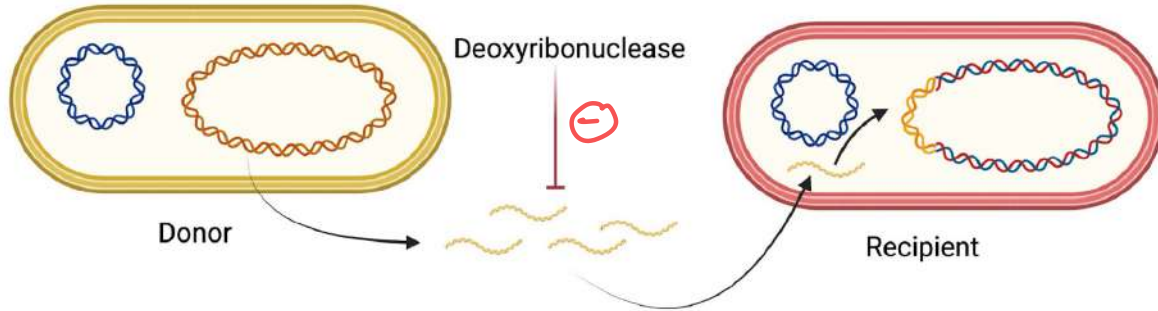
A researcher is studying the virulence of *Streptococcus pneumoniae*. In an experiment, mice are injected with a heat-killed encapsulated strain of *S. pneumoniae* alone and survive. When injected with a live nonencapsulated strain alone, they also survive. However, when injected with a mixture of the heat-killed encapsulated strain and the live nonencapsulated strain, the mice die. On culture, the bacteria isolated from the dead mice are encapsulated and virulent.

Which of the following processes best explains this finding?

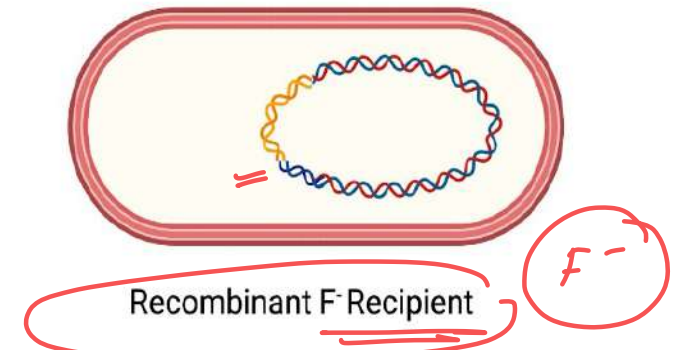
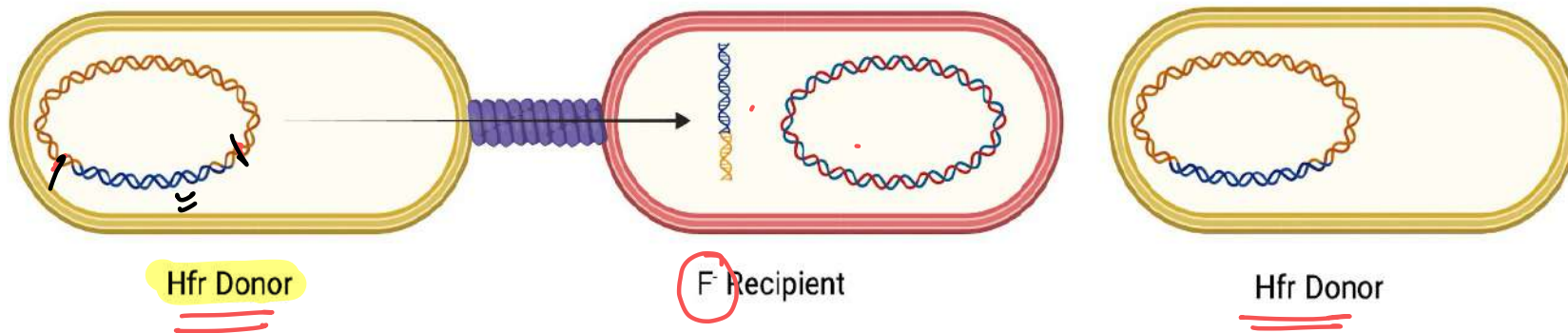
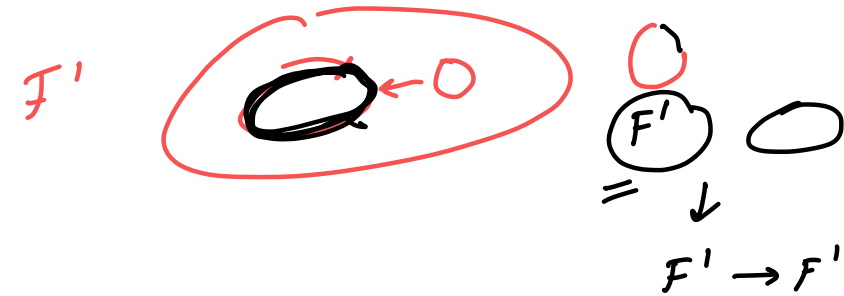
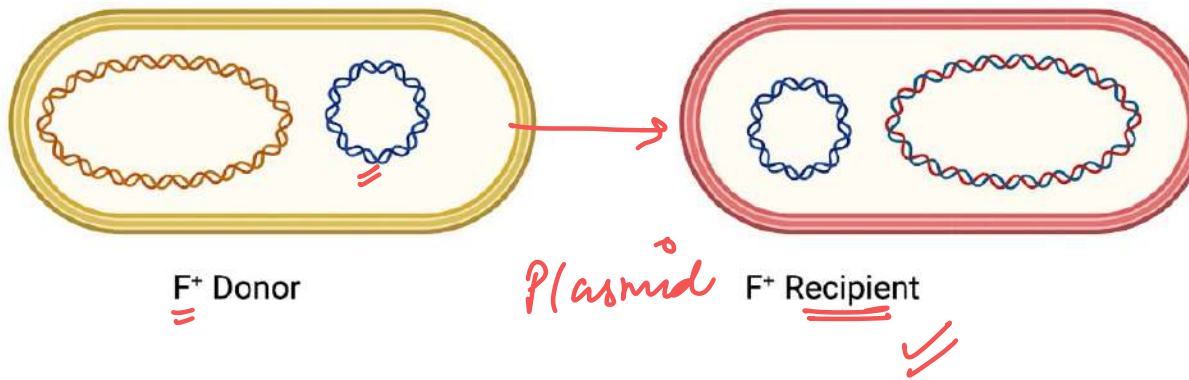
- A. Conjugation via sex pilus
- B. Transduction by bacteriophages
- C. Transformation with uptake of genetic material from the environment
- D. Transposition of insertion sequences within the bacterial chromosome
- E. Lysogenic conversion with prophage integration

# HORIZONTAL TRANSFER OF GENES

*SHIN* TRANSFORMATION

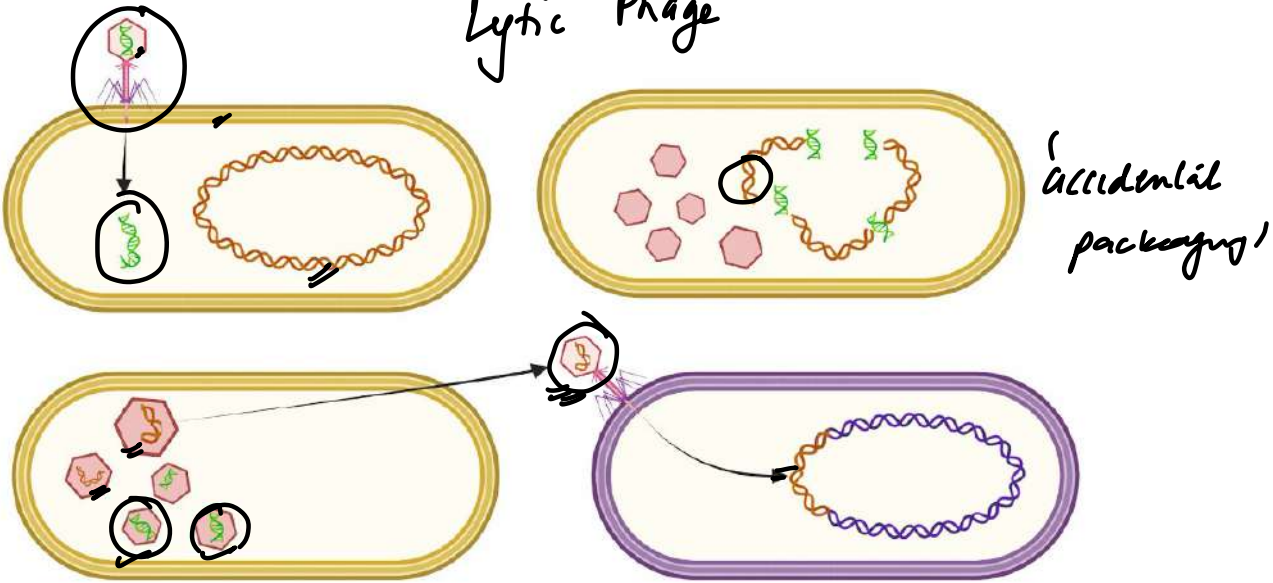


*CONJUGATION*

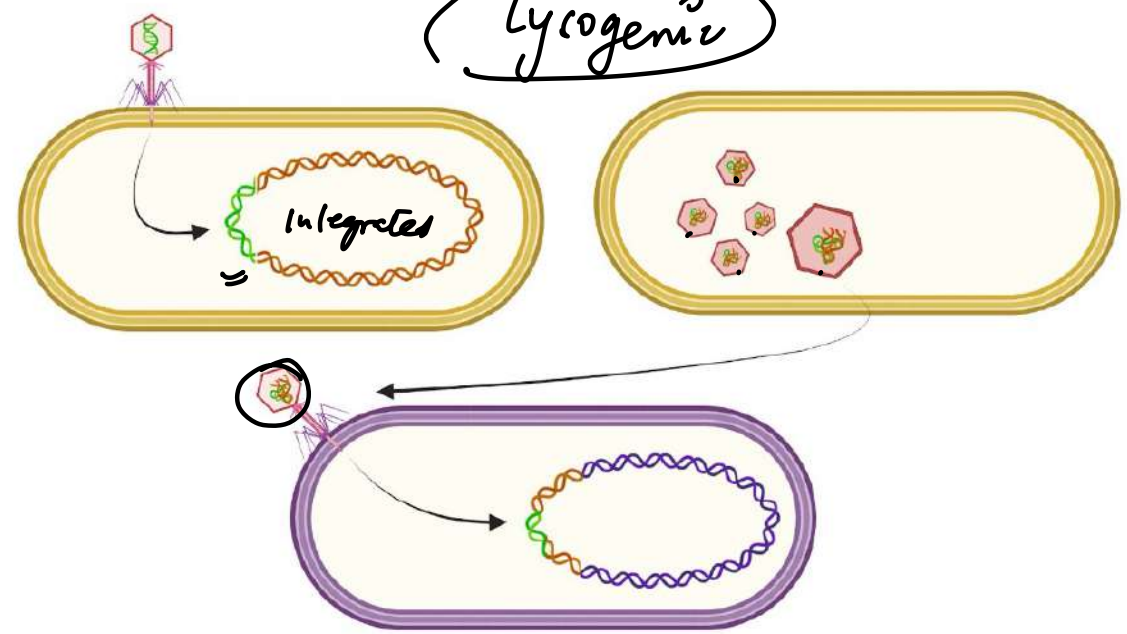


# HORIZONTAL TRANSFER OF GENES

Lytic Phage

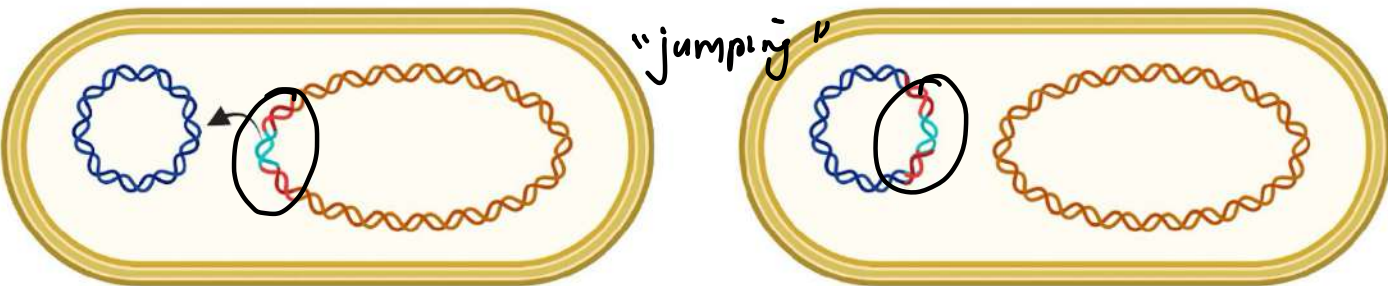


Lysogenic



TRANSPOSONES

"jumping"

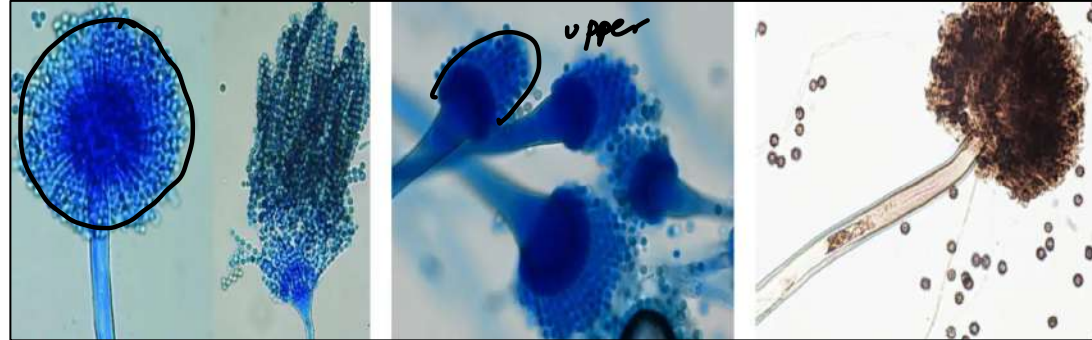
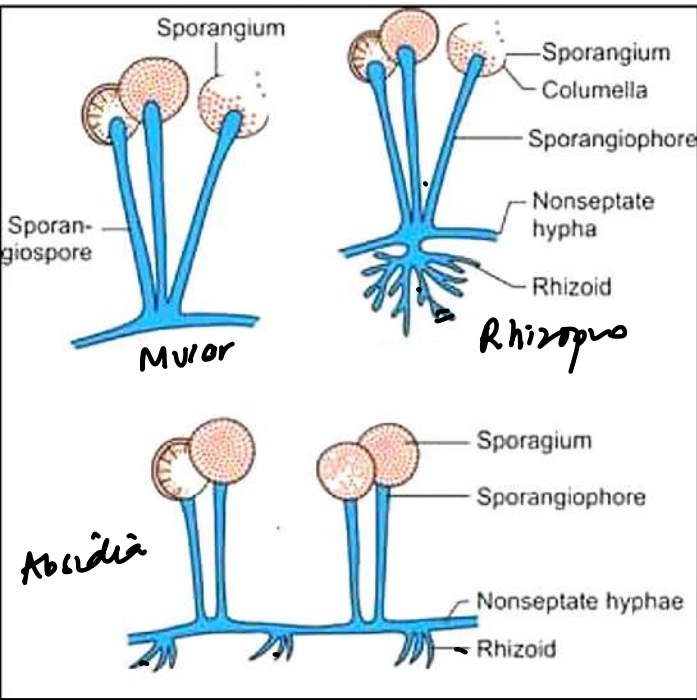


Toxins encoded in a lysogenic phage:

A	B	C	D	S
Grp A	BT	CoT	DT	Shiga

enterobact

MUCOR

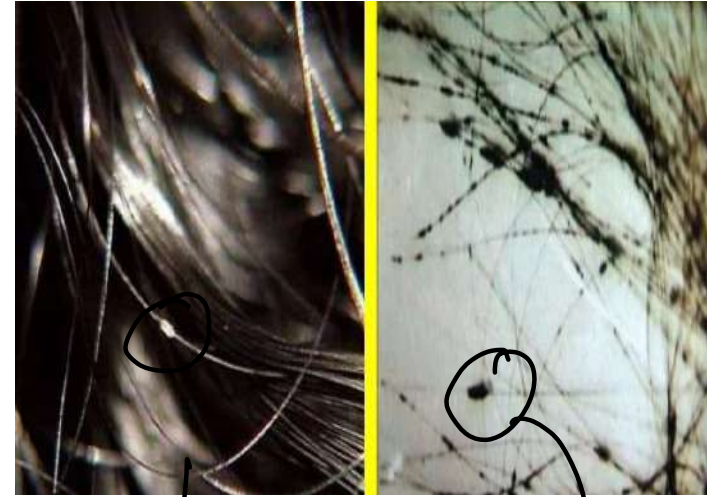


A. flavus  
↓  
yellow green

A. fumigatus  
↓  
Smoky green

A. niger  
↓  
black

Aflatoxins - HCC  
L p53 (-)



PIEDRA

WHITE  
Trichosporon  
bigelli

BLACK  
P. Hortae

## Precipitation/ Flocculation

→ Soluble Ag  
↳ IgG

- Ring test: Ascoli *Arterax*    Lancefield *-Carb*  
*& hemolytic*
- Slide: VDRL
- Tube: Kahn } *Syphilis*
- Immunodiffusion/ Gel: Elek test → *DT*
- Rocket electrophoresis

## Agglutination

→ Insoluble Ag  
↳ IgM

- Slide: Blood grouping, Rose-Bengal *→ Brucella*
- Tube: Widal    Weil Felix    Paul-Bunnell    CAT    SAT    MAT  
*Proteus*    *Rickettsia*    *EBV*    *Mycop*    *IgM*    *Leptospira*  
*EBV*
- Coombs test
- Indirect/Passive agglutination:
- Latex-ASO, CRP, RF, HCG
- Heme-Rose Waaler test

## Complement fixation

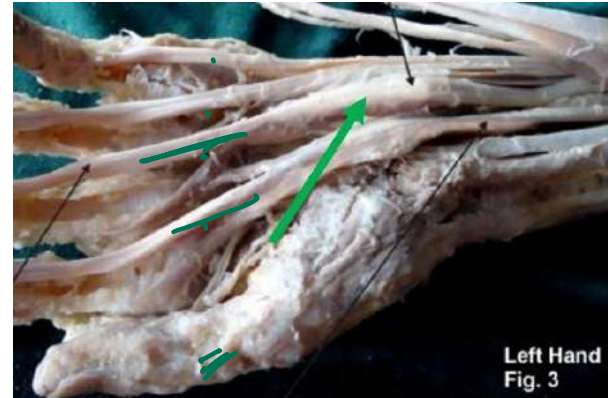
Wassermann, TPI =

Sabin Feldman =

# ANATOMY

---

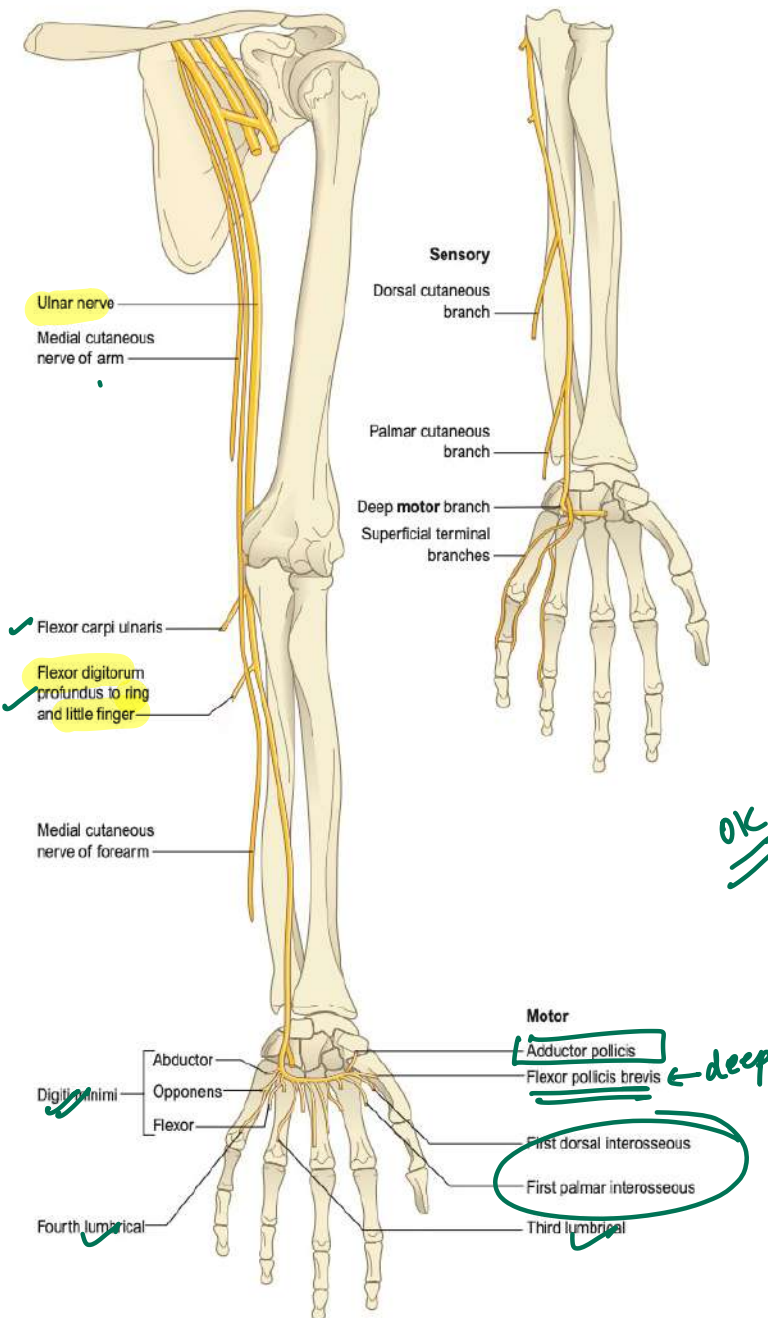
What is the nerve supply of the structure marked by Green arrow in the image below?



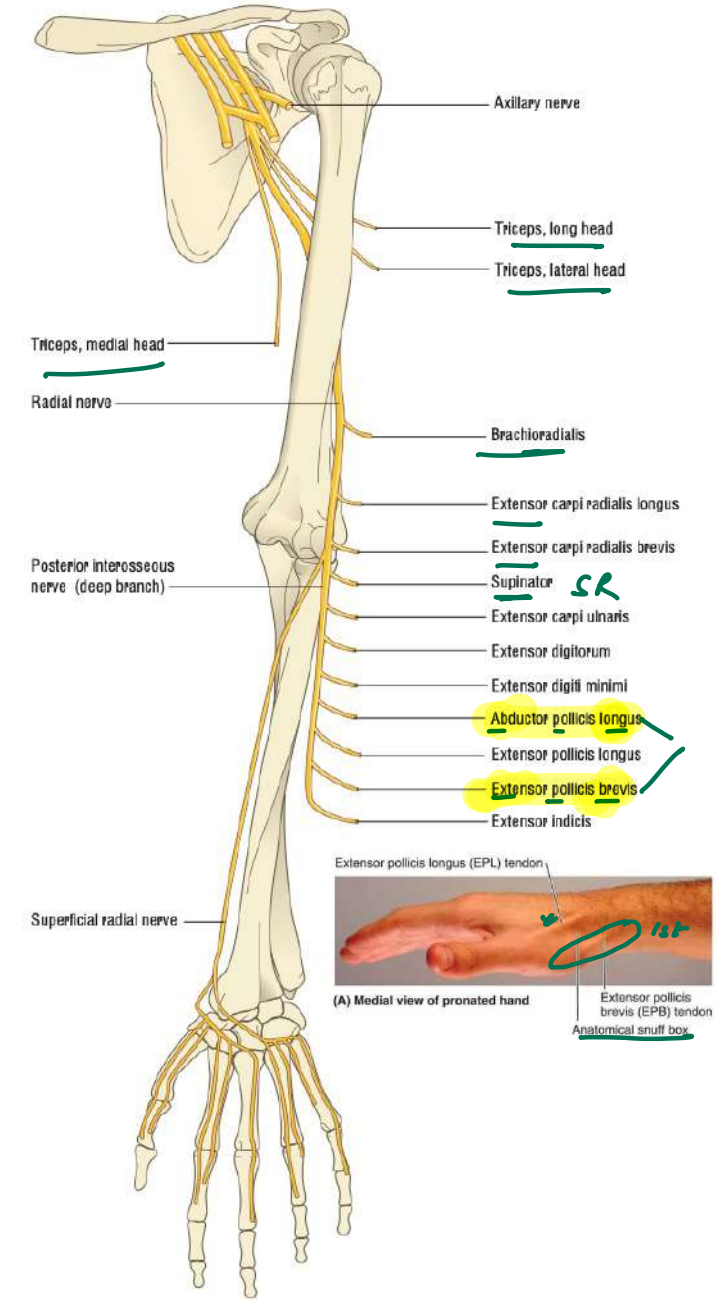
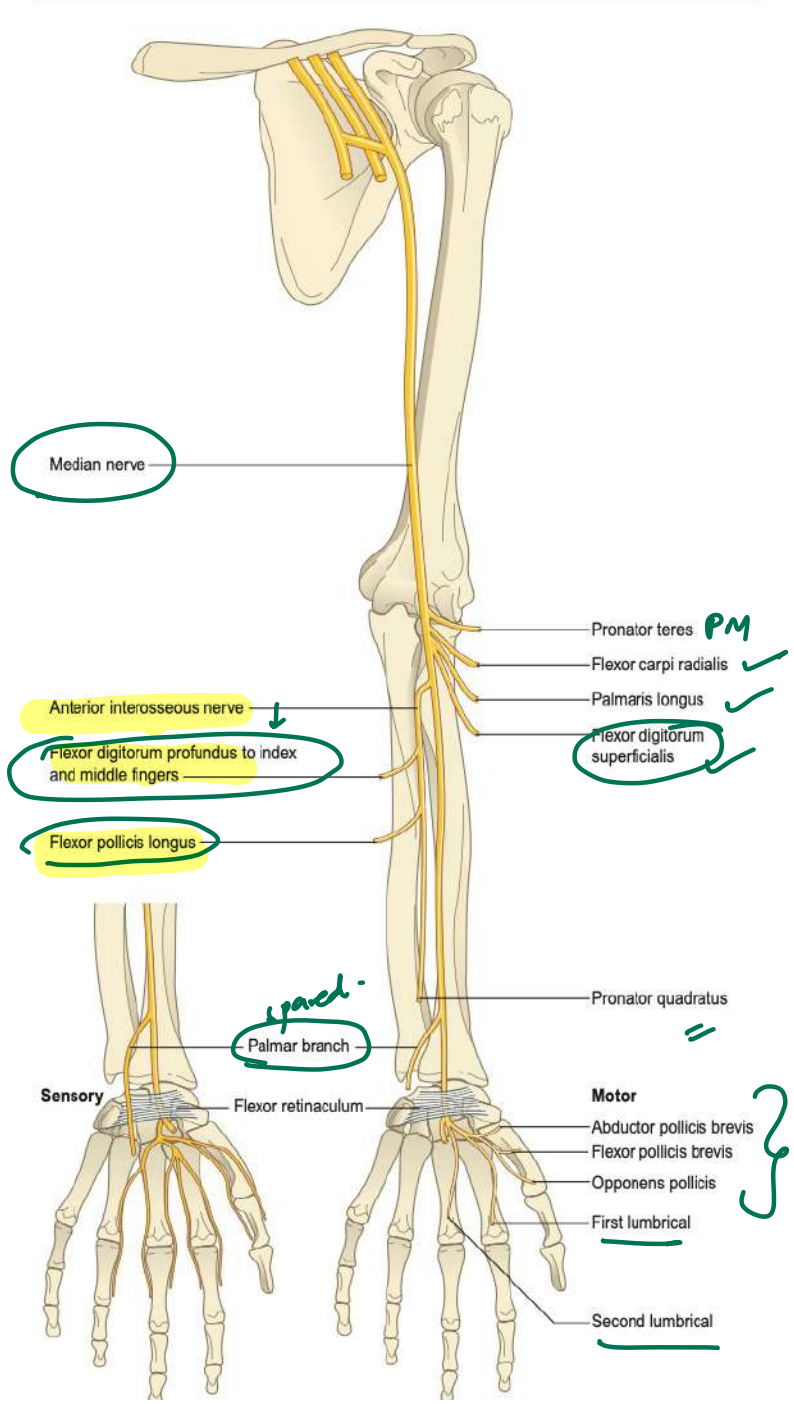
- A. Posterior interosseus nerve
- B. Median nerve
- C. Anterior interosseus nerve
- D. Ulnar nerve

A 45-year-old patient presented with difficulty in foot eversion and sensory loss on the lateral leg & dorsum of foot. Which nerve lesion will lead to the following condition: (Anatomy)

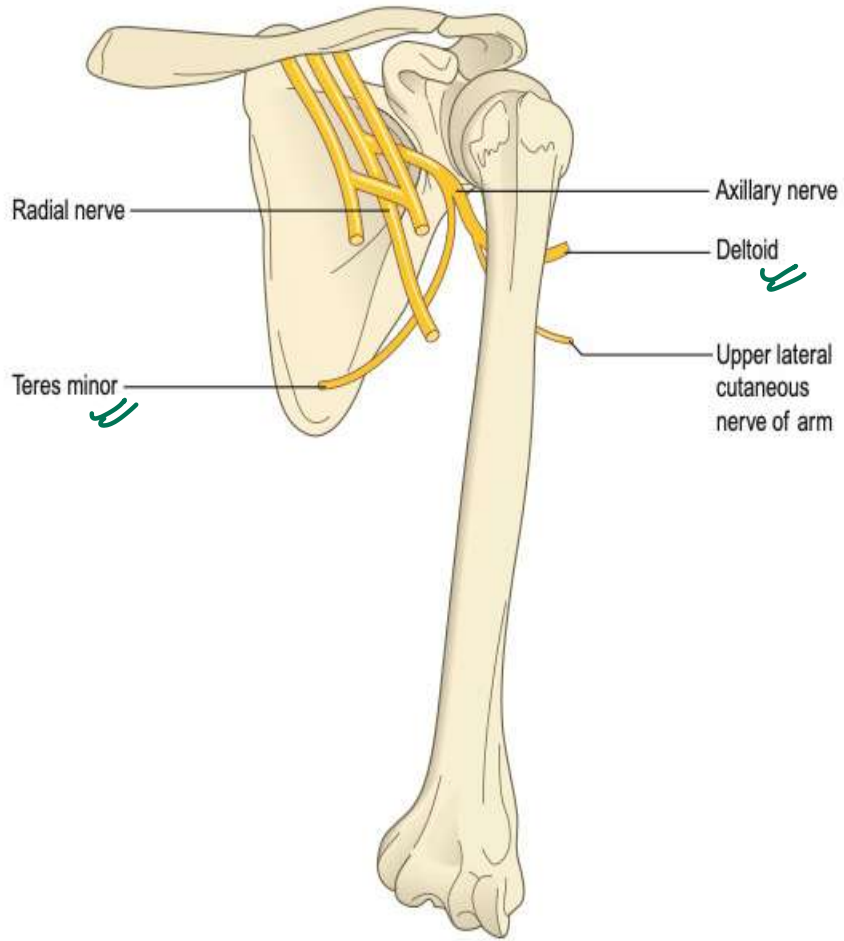
- A. Deep peroneal nerve
- B. Sural nerve
- C. Superficial peroneal nerve
- D. Saphenous nerve



**Fig. 46.12** Motor and sensory branches of the ulnar nerve and the medial cutaneous nerves of the arm and the forearm. Flexor pollicis brevis may be supplied by both median and ulnar nerves. (With permission from

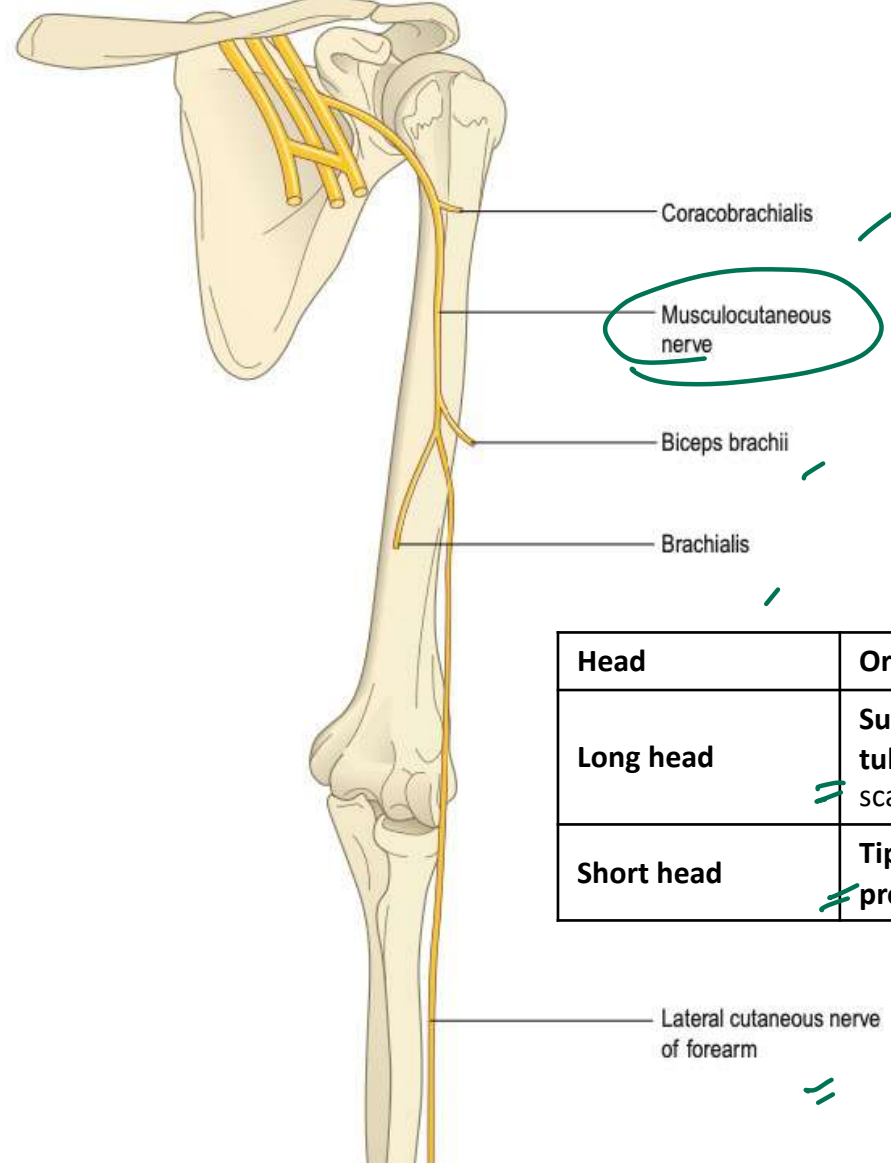


**Fig. 46.9** Motor and sensory branches of the radial nerve. Variation exists in the cutaneous innervation of the dorsal aspects of the digits. Here, the radial nerve is shown to supply all five digits; the skin of the dorsum of the ring and little fingers is frequently innervated by the dorsal branch of the ulnar nerve. (With permission from O'Brien M, Aids to the Examination



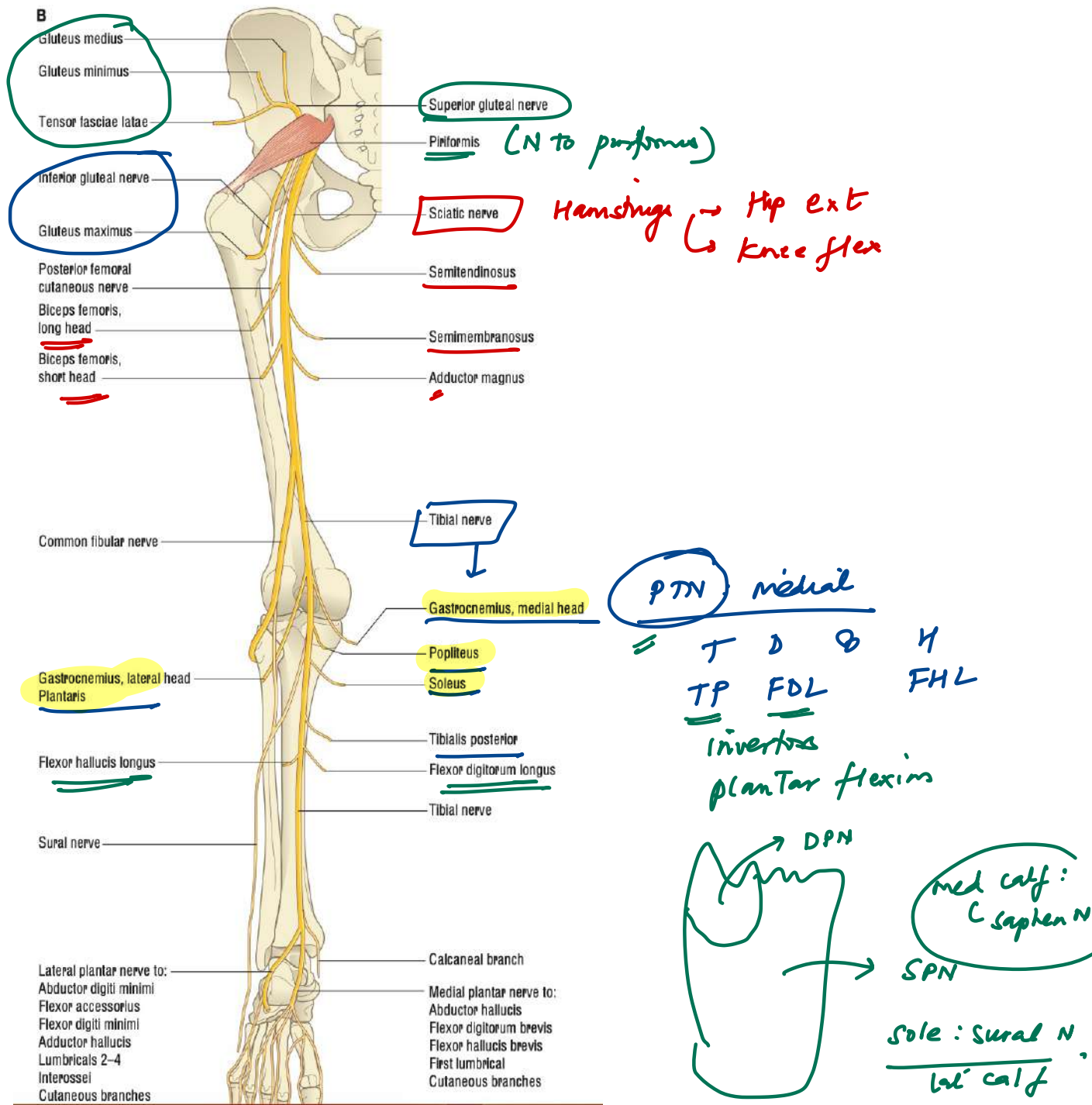
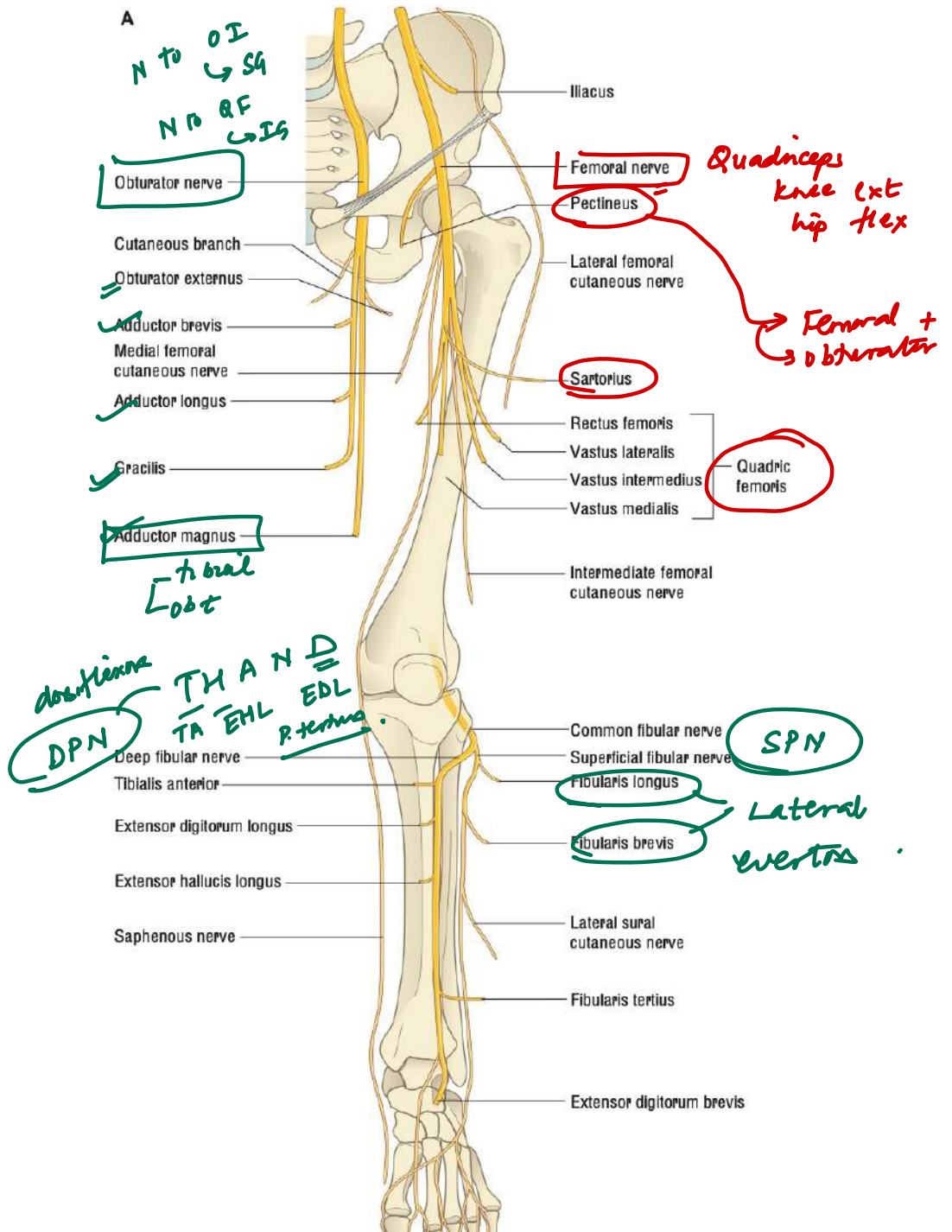
### TRICEPS

Head	Origin	Insertion
Long head	Infraglenoid tubercle of scapula	Olecranon process of ulna
Lateral head	Posterior humerus (above radial groove)	Olecranon process of ulna
Medial head	Posterior humerus (below radial groove)	Olecranon process of ulna



### BICEPS

Head	Origin	Insertion
Long head	Supraglenoid tubercle of scapula	Radial tuberosity
Short head	Tip of coracoid process of scapula	Radial tuberosity



Which of the following areas is not a part of anterior neck?

- A) Subclavian triangle
- B) Submental triangle
- C) Digastric triangle
- D) Carotid triangle

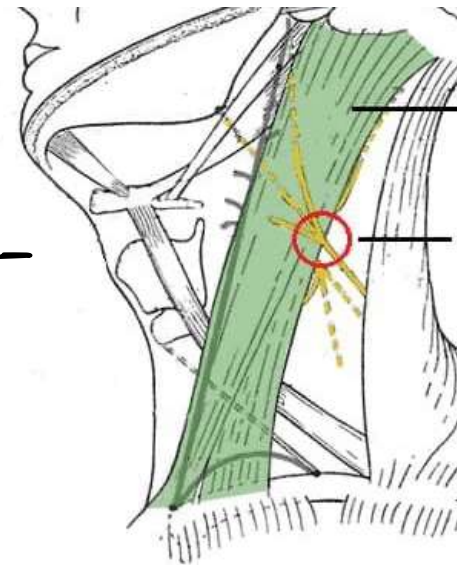
The deep cervical fascia's pretracheal layer encloses everything except:

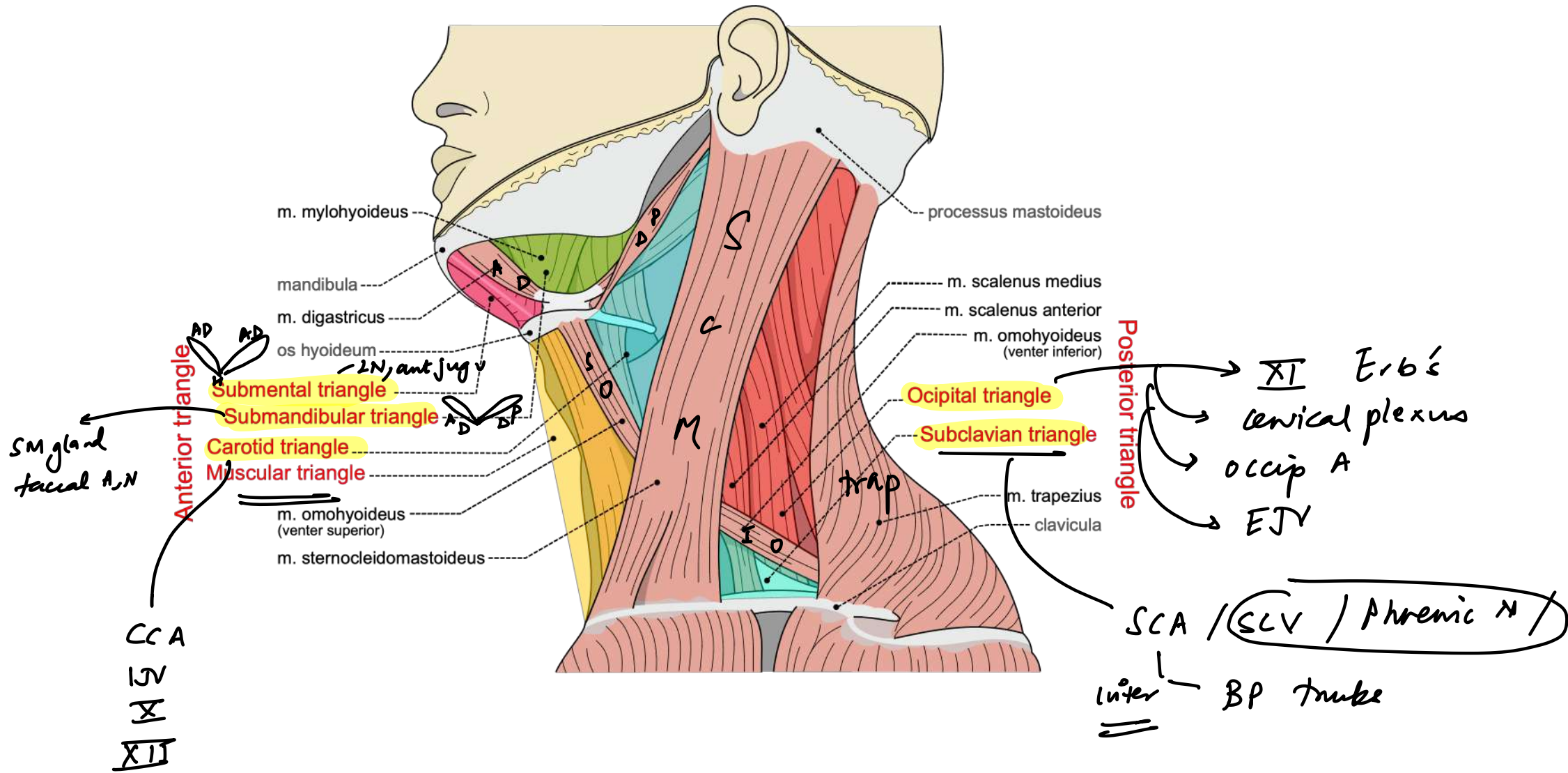
- A. Sternocleidomastoid
- B. Esophagus ✓
- C. Trachea ✓
- D. Thyroid gland ✓

All of the following are true about the marked point except:

- a) Lies in front of the transverse process of the sixth cervical vertebra =
- ~~b) Blocking this point leads to weakness of sternocleidomastoid~~
- c) Landmark in the neck where the spinal accessory nerve emerges into the posterior triangle
- d) Formed by the C5 and C6 nerve roots, and the cutaneous branches of the cervical plexus

ERB'S POINT





# ANATOMY OF HEAD AND NECK IMAGING

Superficial Fascia



*Platysma*

Deep Fascia

Superficial/Investing



- Strap muscles
- SCM
- trapz
- **masseter**
- **parotid**

Middle/Visceral <sup>= pretracheal</sup>



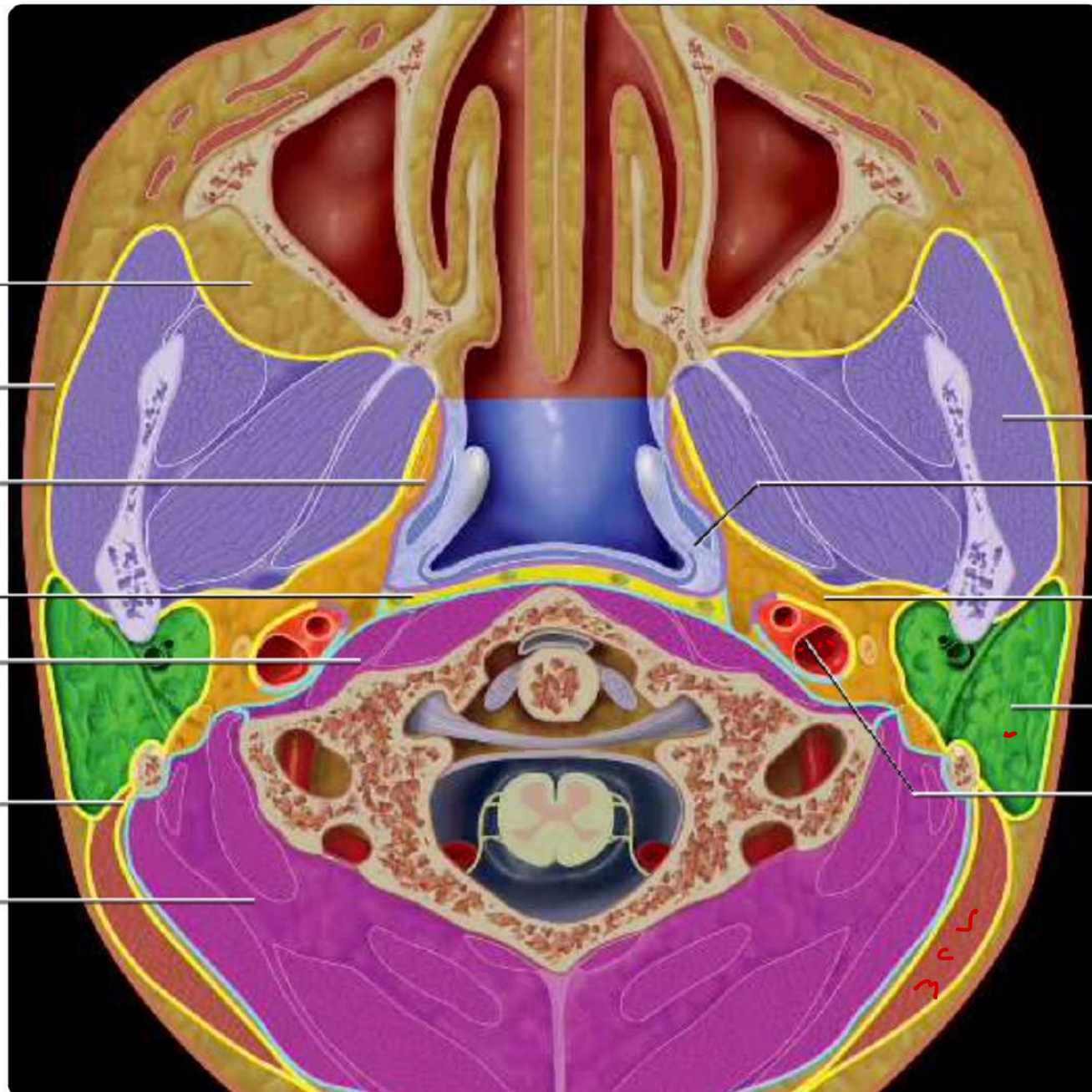
*mucosal /  
viscera  
|  
pharynx*

Deep/Prevertebral



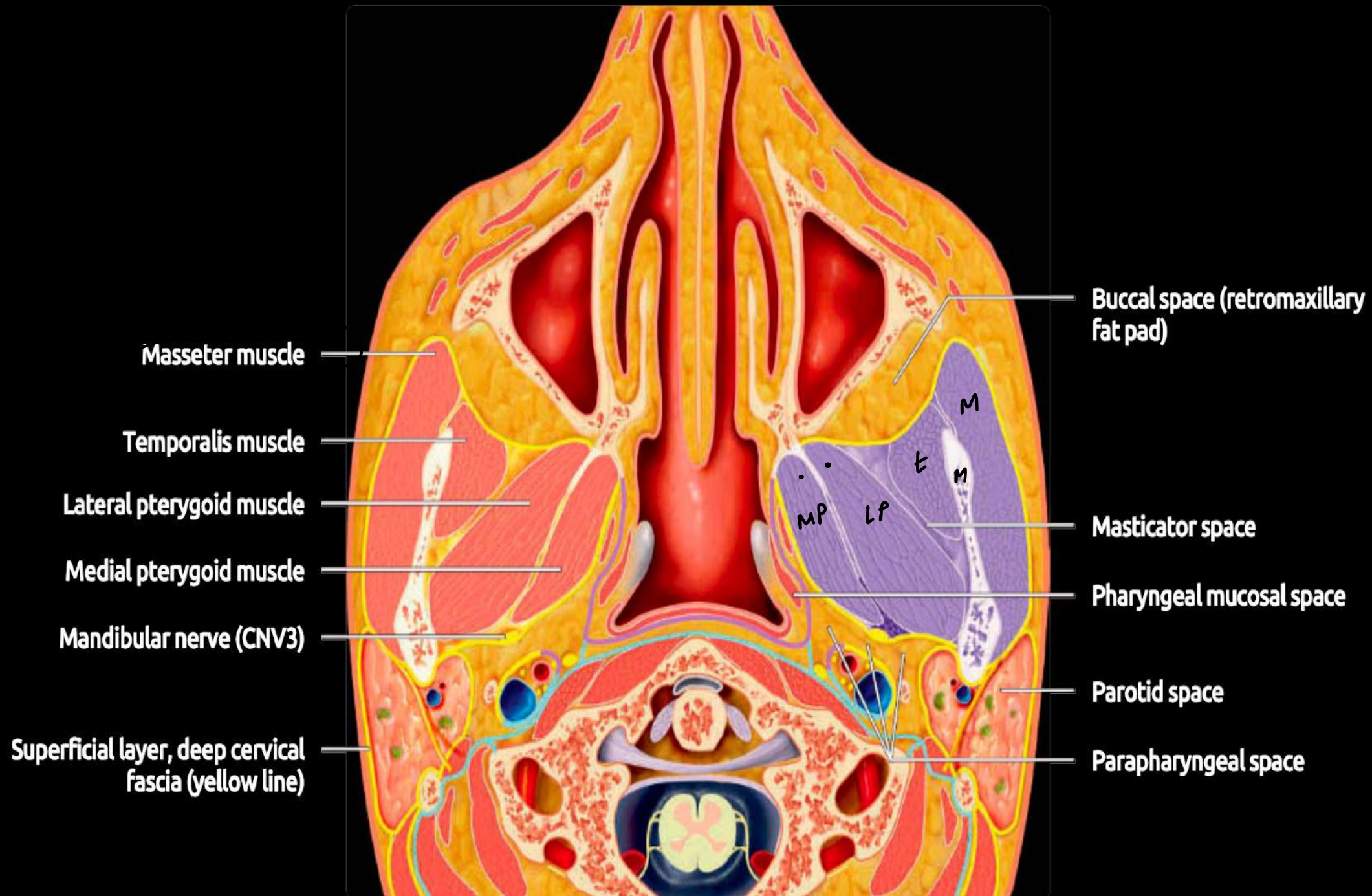
*Cervical*

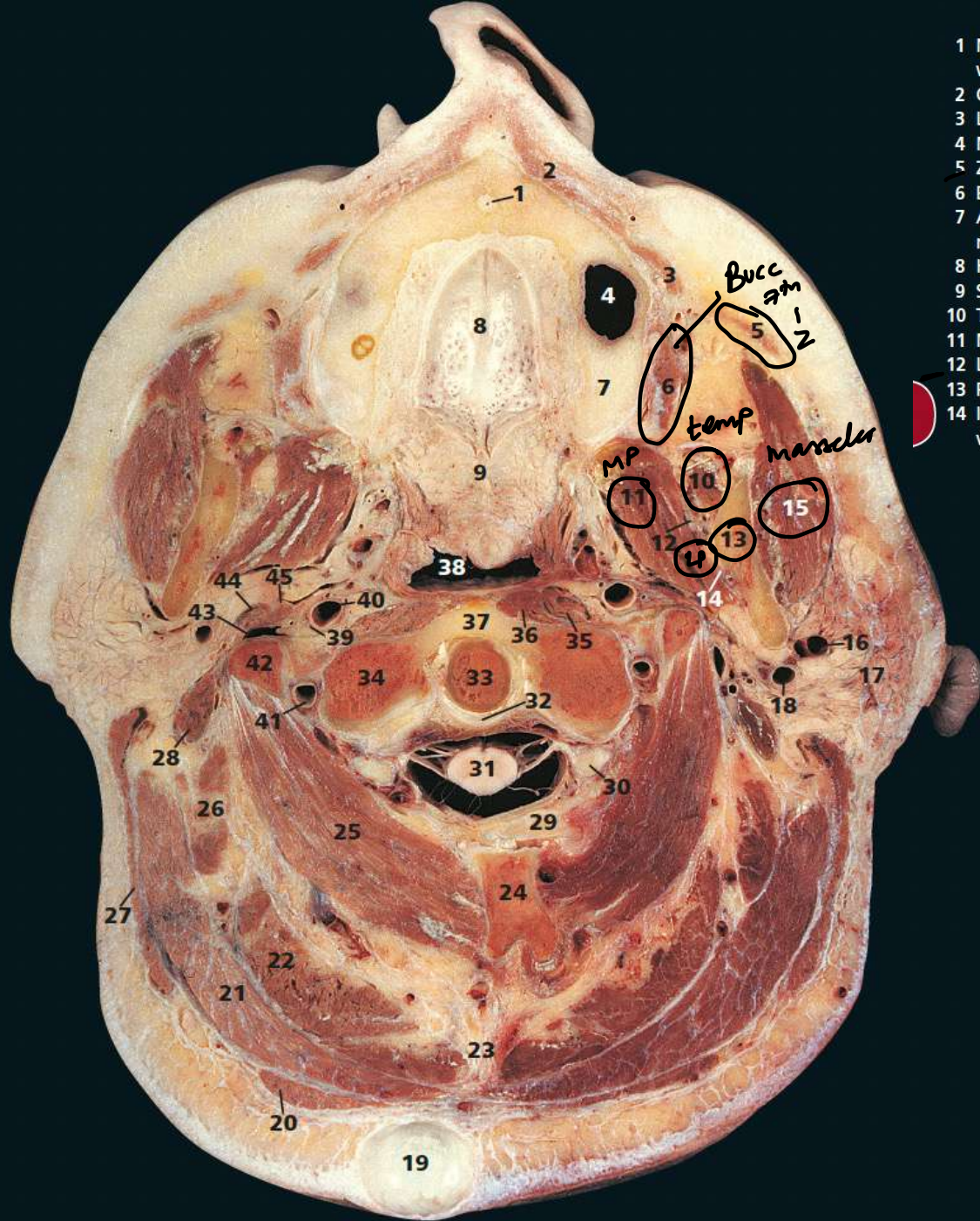
Buccal space, retromaxillary  
fat pad  
 Superficial layer, deep cervical  
fascia  
 Middle layer, deep cervical  
fascia  
 Retropharyngeal space  
 Perivertebral space,  
prevertebral component  
 Deep layer, deep cervical  
fascia  
 Perivertebral space, paraspinous  
component



Masticator space  
 Pharyngeal mucosal  
space/surface  
 Parapharyngeal space  
 Parotid space  
 Carotid space

11/11/11





- |   |                              |  |  |
|---|------------------------------|--|--|
| 1 Nasopalatine nerve (V <sup>tr</sup> ) within incisive canal | 15 Masseter                  | 29 Posterior arch of atlas (first cervical vertebra)           | 37 Anterior arch of atlas (first cervical vertebra)                              |
| 2 Orbicularis oris  | 16 Retromandibular vein      | 30 Dorsal root ganglion of second cervical nerve               | 38 Nasopharynx   |
| 3 Levator angulis oris  | 17 Parotid gland             | 31 Spinal cord within dural sheath                             | 39 Vagus nerve (X) and hypoglossal nerve (XII)                                   |
| 4 Maxillary antrum  | 18 External carotid artery   | 32 Transverse ligament of atlas                                | 40 Internal carotid artery   |
| 5 Zygomaticus major   | 19 Dermoid cyst of scalp     | 33 Dens of axis (odontoid process of second cervical vertebra) | 41 Vertebral artery  |
| 6 Buccinator  | 20 Trapezius                 | 34 Lateral mass of atlas (first cervical vertebra)             | 42 Transverse process of atlas (first cervical vertebra)                         |
| 7 Alveolar process of maxilla                                 | 21 Splenius capitis          | 35 Longus capitis  | 43 Internal jugular vein   |
| 8 Hard palate   | 22 Semispinalis capitis      | 28 Posterior belly of digastric                                | 44 Styloid process, with origins of styloglossus and glossopharyngeal nerve (IX) |
| 9 Soft palate   | 23 Ligamentum nuchae         | 36 Longus colli  | 45 Stylopharyngeus   |
| 10 Temporalis   | 24 Spine of axis             |  |  |
| 11 Medial pterygoid   | 25 Obliquus capitis inferior |  |  |
| 12 Lingual nerve (V <sup>tr</sup> )                           | 26 Longissimus capitis       |  |  |
| 13 Ramus of mandible  | 27 Sternocleidomastoid       |  |  |
| 14 Inferior alveolar artery vein and nerve                    |                              |  |  |

Which of the following is a Y-shaped ligament that connects the calcaneum to the cuboid and navicular bone?

A) Lisfranc

*T-MT*

B) Spring

~~C) Chopart~~

*inter-tarsal*

D) Deltoid

Which of the following muscles are supplied by the lateral plantar nerve?

1. Abductor hallucis

2. Flexor digitorum accessorius

3. Flexor hallucis brevis

4. First lumbrical

5. First interossei

~~A. 2 and 5~~

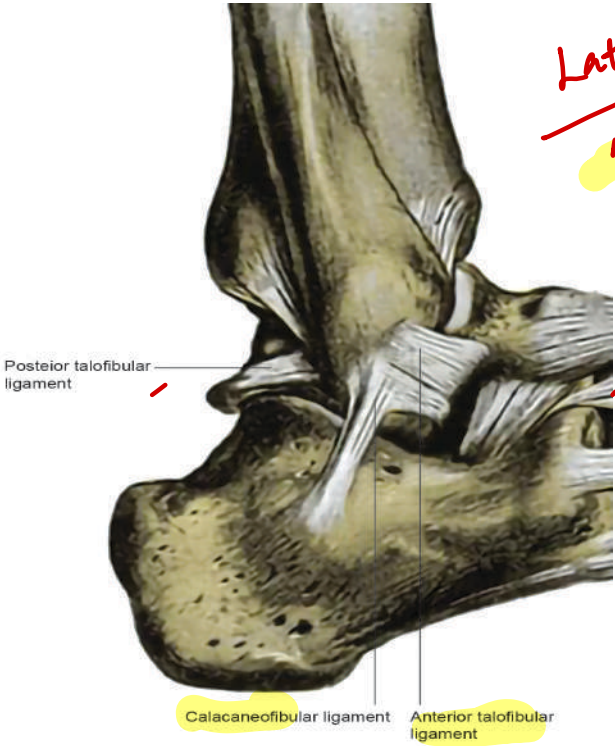
~~B. 3 and 4~~

~~C. 1 and 3~~

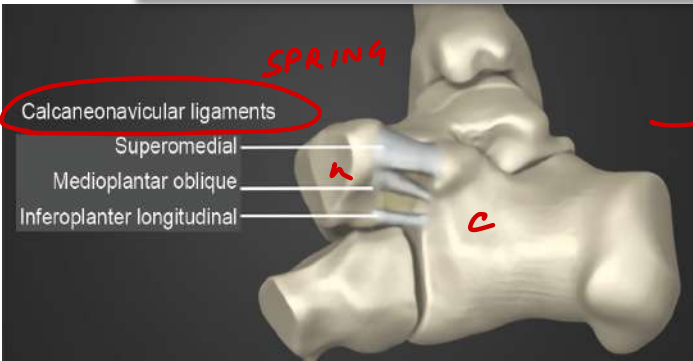
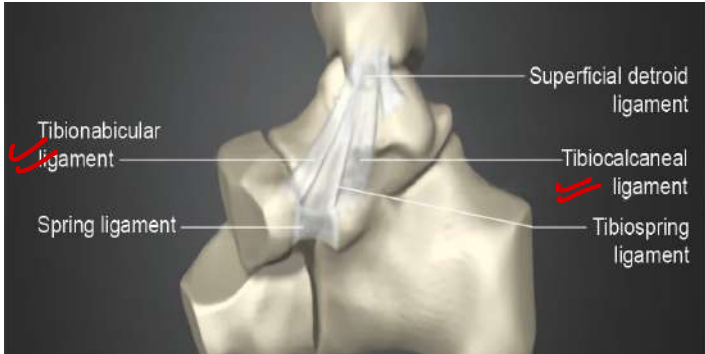
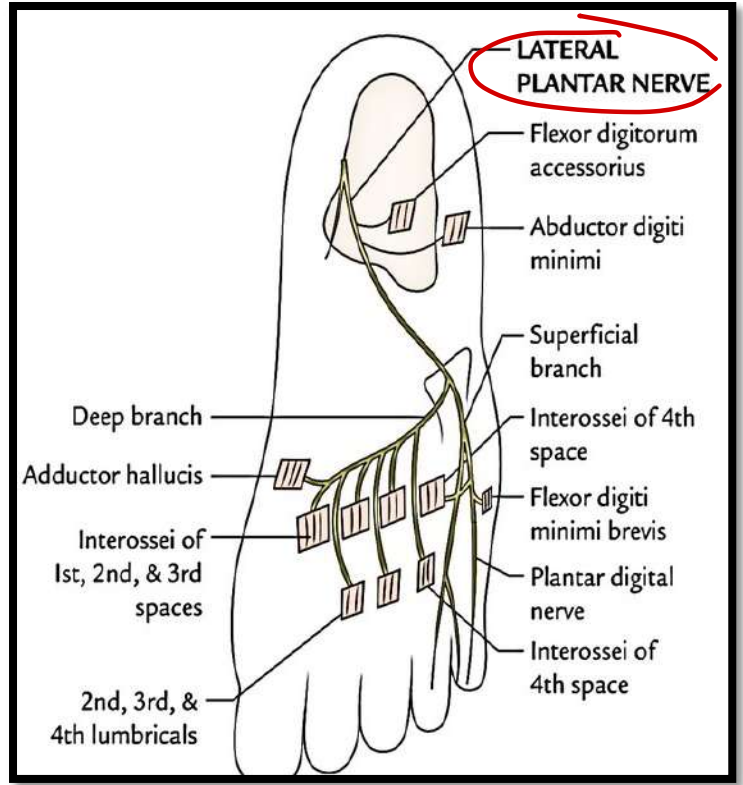
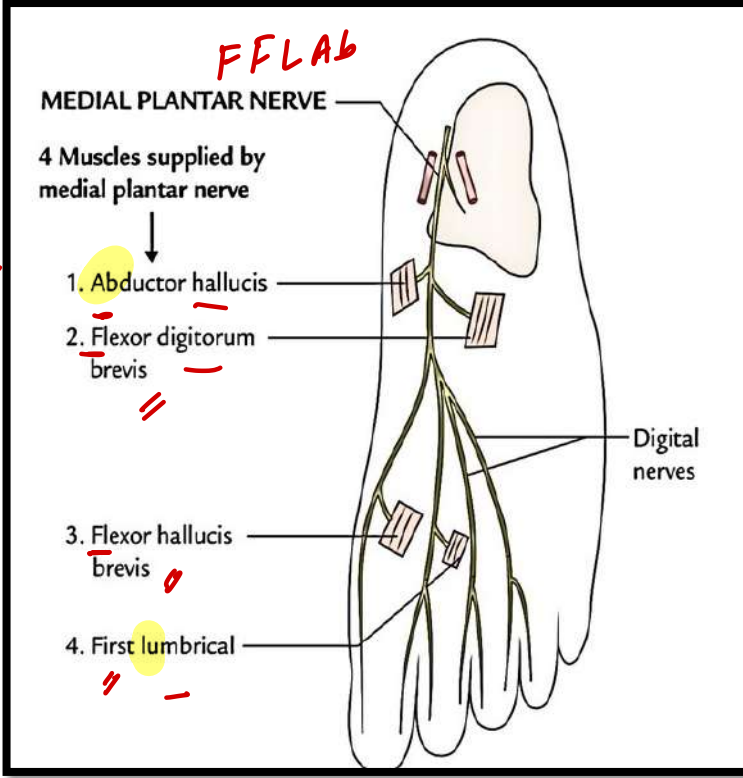
~~D. 2 and 4~~

*L A b F F*

# Ankle and foot



*Lat ankle*  
*mc → ATFL*  
*(plantar flexion inversion)*  
*↓*  
*Calcaneofibular*  
*(dorsiflex inversion)*  
*↓*  
*PTFL*  
*rare*  
*- stronger*

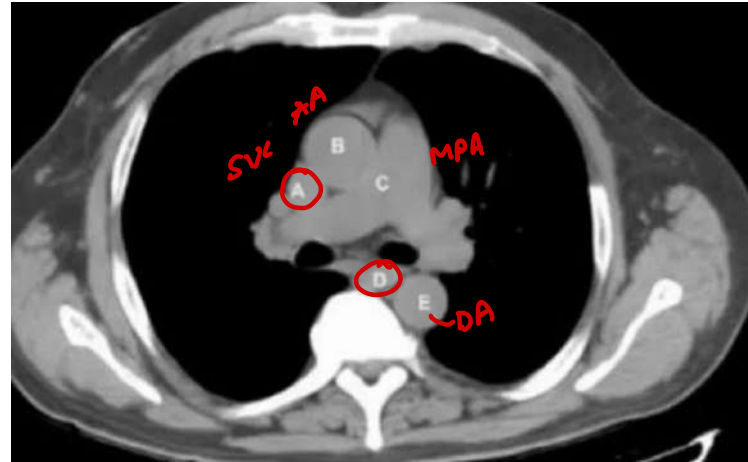


*SPRING*  
*→ Flatfoot*

*DELTOID - medial - EVERSION*  
*Tibio-N*    *Tibio-C*    *Tibio-talar*

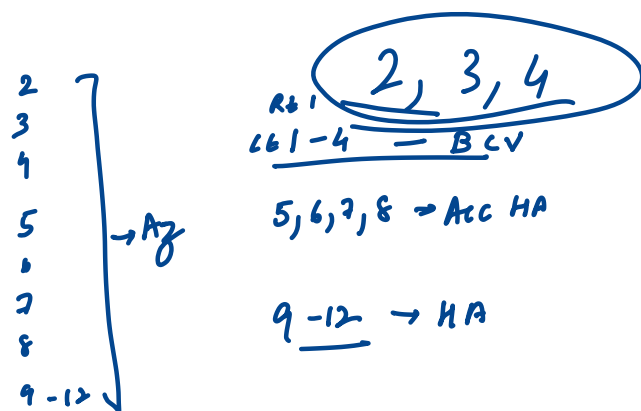
A chest CT scan is performed on a 35-year-old man who presented with chronic cough and weight loss. Which of the following structures labelled below is a derivative of the common cardinal veins?

- ~~A) A~~
- B) B
- C) C
- D) D



A 38-year-old male patient presents with a 6-month history of progressive dyspnea on exertion and occasional chest pain. Physical examination reveals elevated jugular venous pressure and a diastolic murmur heard at the left sternal border. An echocardiogram confirms the diagnosis of severe aortic regurgitation. During surgery to repair the aortic valve, the surgeon encounters the left superior intercostal vein. Which vessel is most likely to receive the blood drained by the left superior intercostal vein in this patient?

- A. Hemiazygos Vein
- B. Brachiocephalic Vein
- C. Azygos Vein
- D. Internal Thoracic Vein



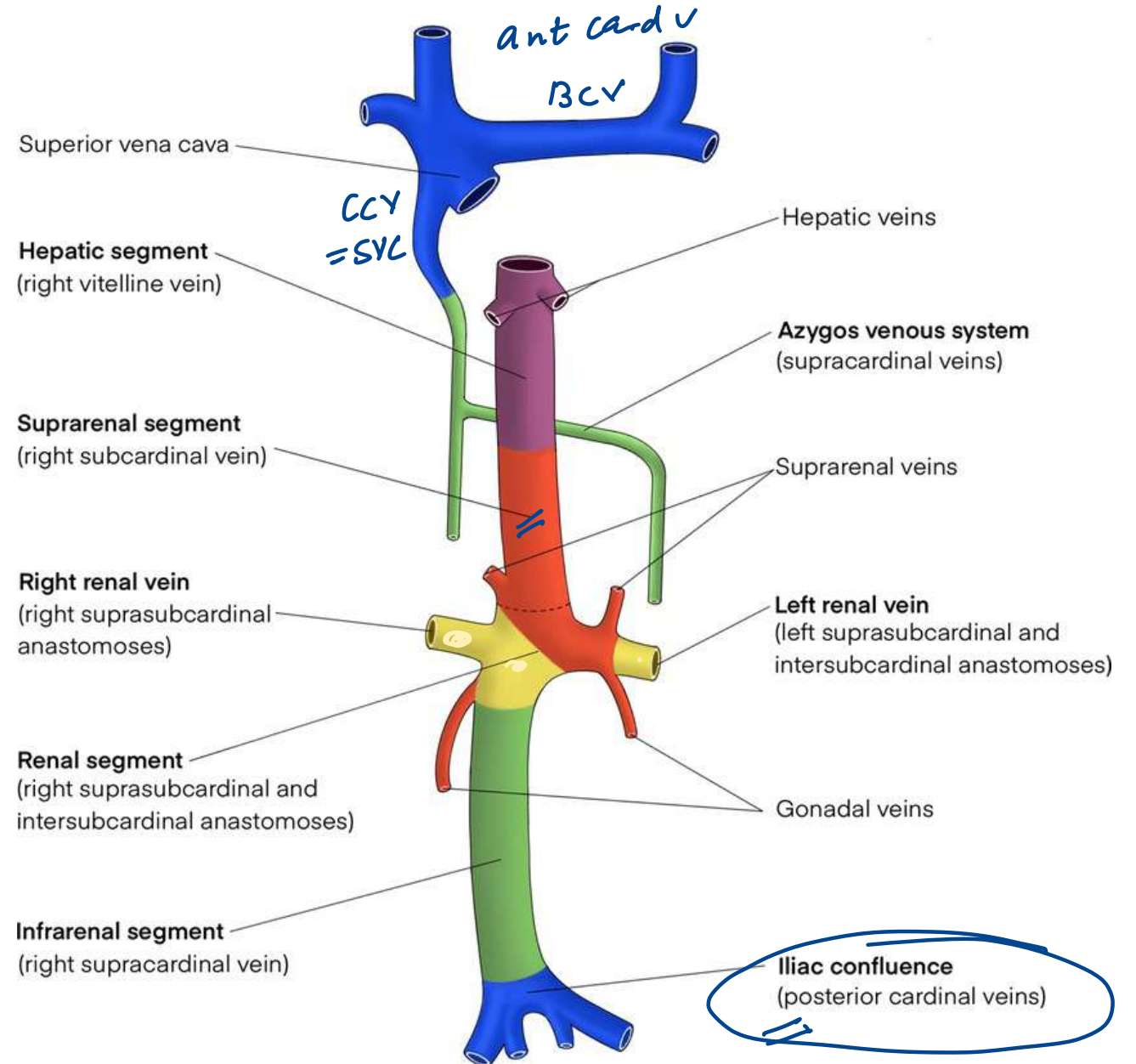
# Venous system derivatives

Supracardinal Vein: *azygos / hemiazygos*  
*infrarenal IVC*

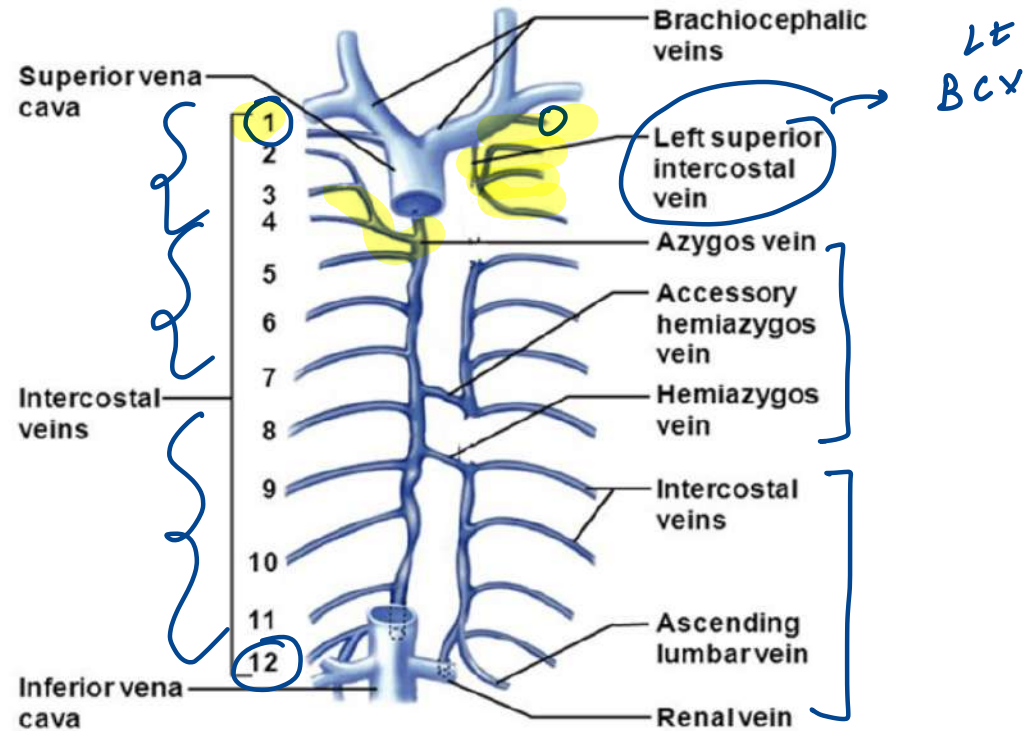
Subcardinal Vein: *suprarenal IVC*  
*lt renal v* — *Gonadal v (R,L)*  
*Adrenal v*

Sub-Supracardinal Anastomosis:  
*Rt renal v*  
*Renal IVC*

*● - subcar*  
*● - supra car*  
*● - anast*



# Azygos-Hemiazygos vein



*Azygos*

Formed by: Right Lumbar azygos, right subcostal, right ascending lumbar

Tributaries:

Right superior intercostal vein: 2,3,4 PICV

Right 5-11<sup>th</sup> PICV

Hemiazygos, Accessory hemiazygos-T8

T4->SVC

*Hemiazygos*

Formed by: left Lumbar azygos, left subcostal, left ascending lumbar

Tributaries:

Left 9-11<sup>th</sup> PICV

*Acc HA*

Tributaries:

Left 5-8<sup>th</sup> PICV

Which among the following does not constitute a part of superficial perineal pouch?

- A. Sphincter urethrae
- B. Bulbospongiosus
- C. Posterior scrotal nerves
- D. Duct of bulbourethral glands

Which of the following muscles is not involved in the formation of the perineal body?

- 1. Bulbospongiosus muscle
- 2. Superficial transverse perineal muscles
- 3. Deep transverse perineal muscles
- ~~4. Internal anal sphincter muscle~~

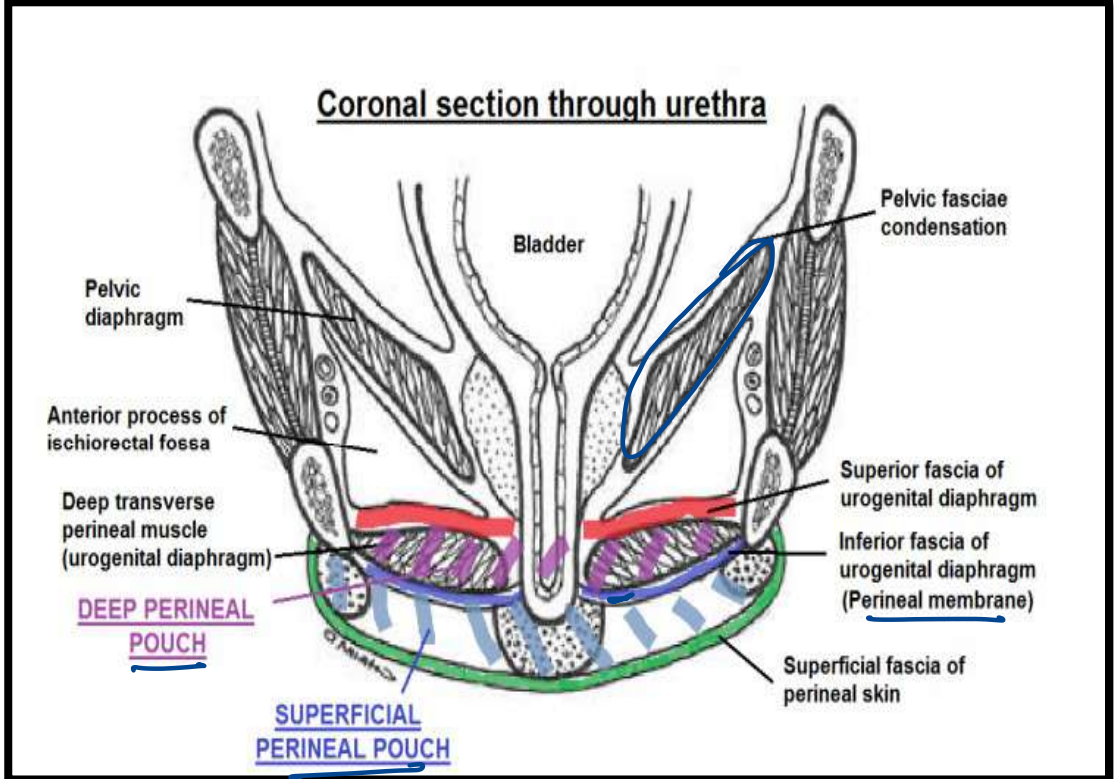
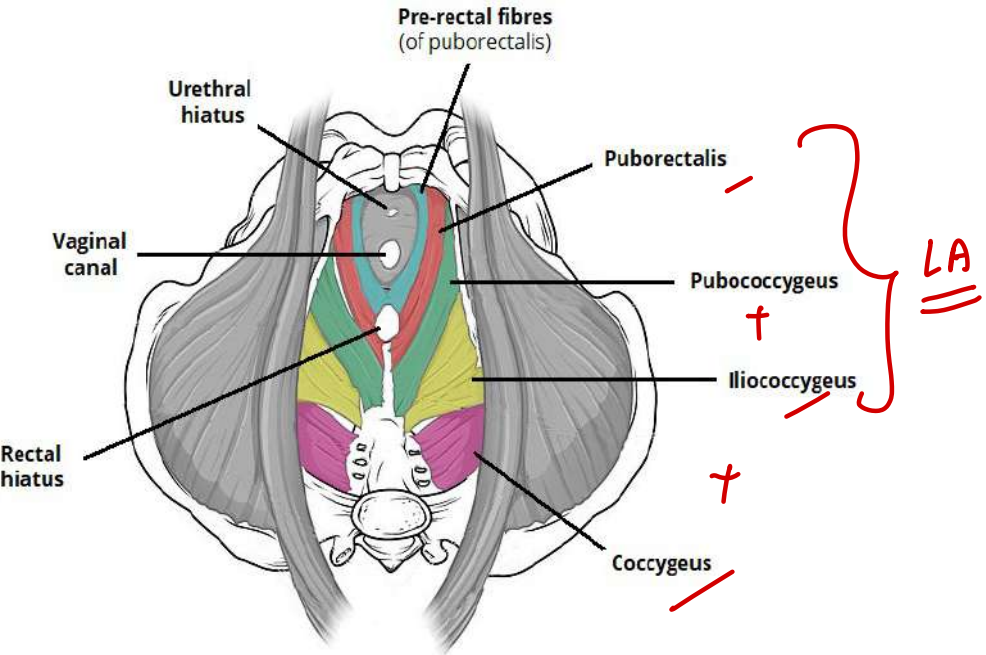
*ext anal sphincter*

A 46-year-old woman has a history of infection in her perineal region. A comprehensive examination reveals a tear of the superior boundary of the superficial perineal space. Which of the following structures would most likely be injured?

- A. Pelvic diaphragm
- B. Colles fascia
- C. Deep perineal fascia
- ~~D. Perineal membrane~~

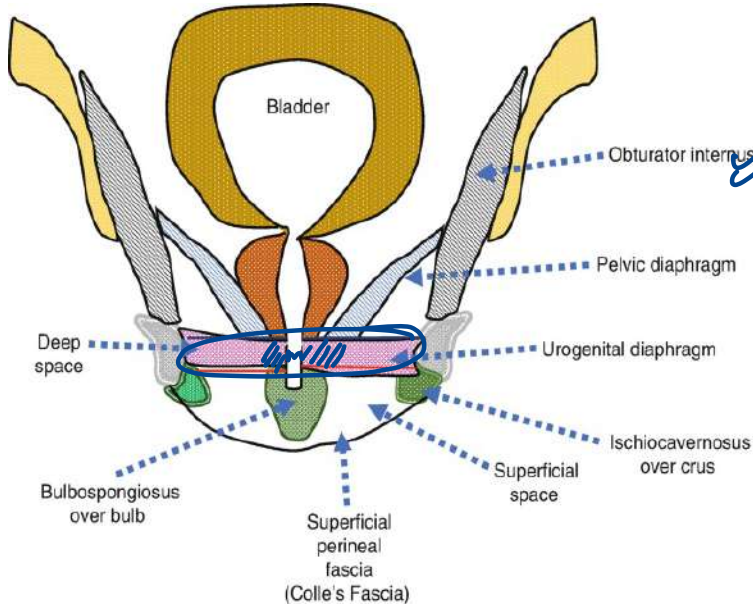
*Inf layer of VGD*

# PELVIS



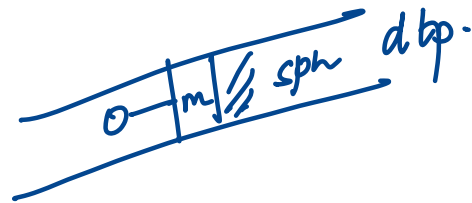
Pelvic D.  
DPP sup UGD  
 by UGD = Perineal membrane  
SPP → Collet

# DEEP PERINEAL POUCH

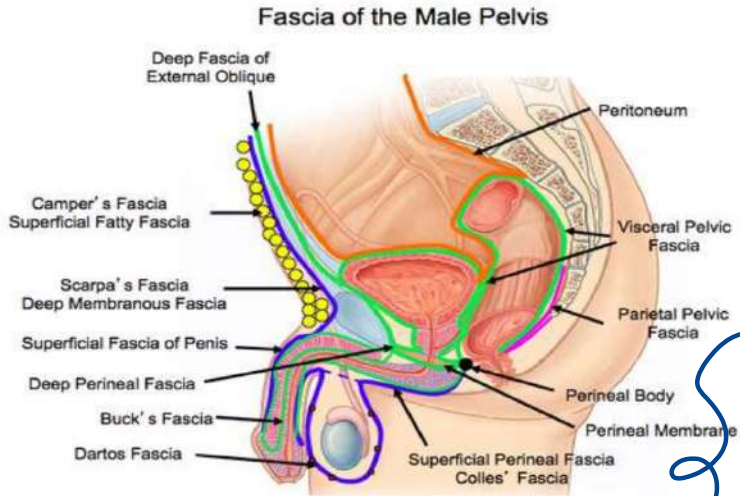


Deep perineal pouch:  
 Sphincter urethra  
 Deep transverse perinii

Male	Female
<ul style="list-style-type: none"> <li>Membranous urethra</li> <li>Bulbourethral (Cowper's) glands</li> </ul>	<ul style="list-style-type: none"> <li>Part of urethra</li> <li>Part of vagina</li> </ul>
<ul style="list-style-type: none"> <li>Internal pudendal artery</li> <li>Artery of bulb</li> <li>Urethral artery</li> <li>Perineal artery</li> </ul>	<ul style="list-style-type: none"> <li>Artery of bulb</li> <li>Urethral artery</li> </ul>
<ul style="list-style-type: none"> <li>Dorsal nerve of penis/ clitoris</li> </ul>	<ul style="list-style-type: none"> <li>Perineal nerve</li> </ul>



# SUPERFICIAL PERINEAL POUCH



## Male

- Root of penis (2 crura + bulb)
- Penile urethra in corpus spongiosum

- Two ischiocavernosus muscles
- Bulbospongiosus muscle
- Two superficial transverse perineal muscles

- Internal pudendal artery
- Dorsal artery of penis
- Deep artery of penis / clitoris
- Two scrotal arteries/ labial A

- Dorsal nerve of penis/ clitoris
- Two scrotal/ labial nerves

## Female

- Root of clitoris (2 crura)
- Two bulbs of vestibule
- Greater vestibular (Bartholin) glands

- Two ischiocavernosus muscles
- Bulbospongiosus muscle
- Two superficial transverse perineal muscles

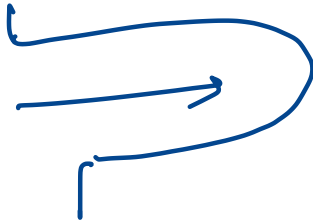
- Internal pudendal artery
- Dorsal artery of penis
- Deep artery of penis / clitoris
- Two scrotal arteries/ labial A

- Dorsal nerve of penis/ clitoris
- Two scrotal/ labial nerves

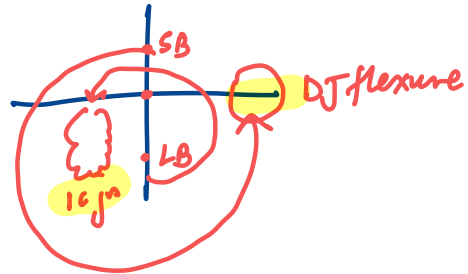
The caecum is found to be placed below the stomach and is midline. Which of the following abnormalities must have taken place while rotation of the gut?

- A. Malrotation
- B. Nonrotation
- C. Reverse Rotation
- D. Mixed Rotation

9-12wks



270° anticlockwise

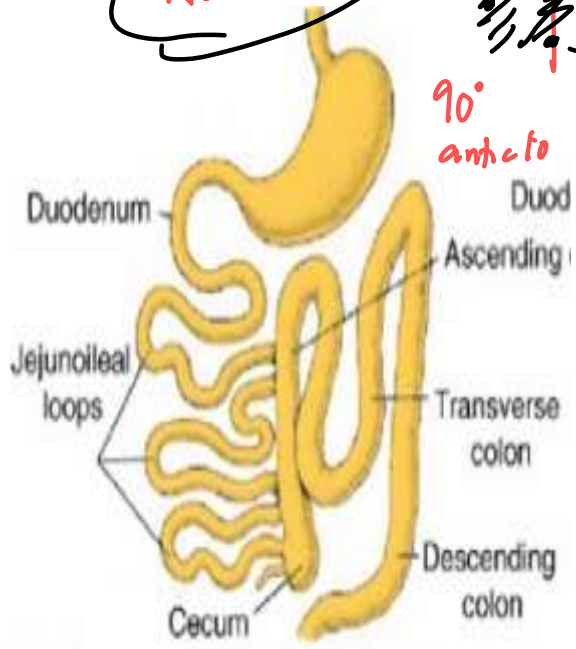


# ROTATION ABNORMALITIES

NON ROTN

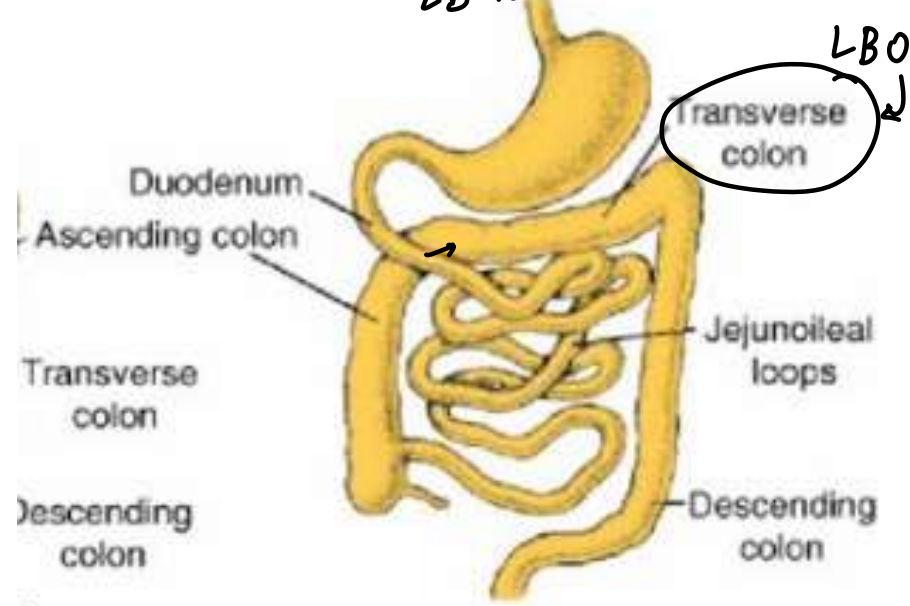


90°  
anti c to



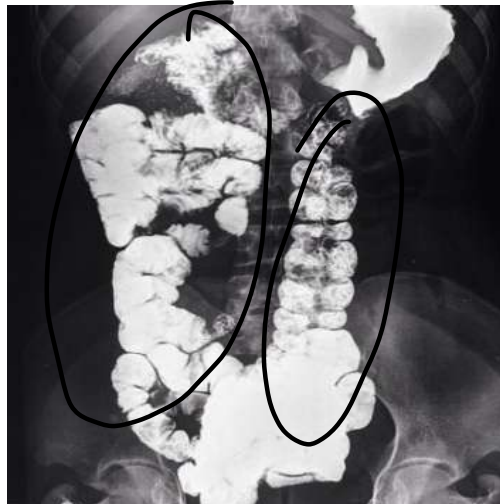
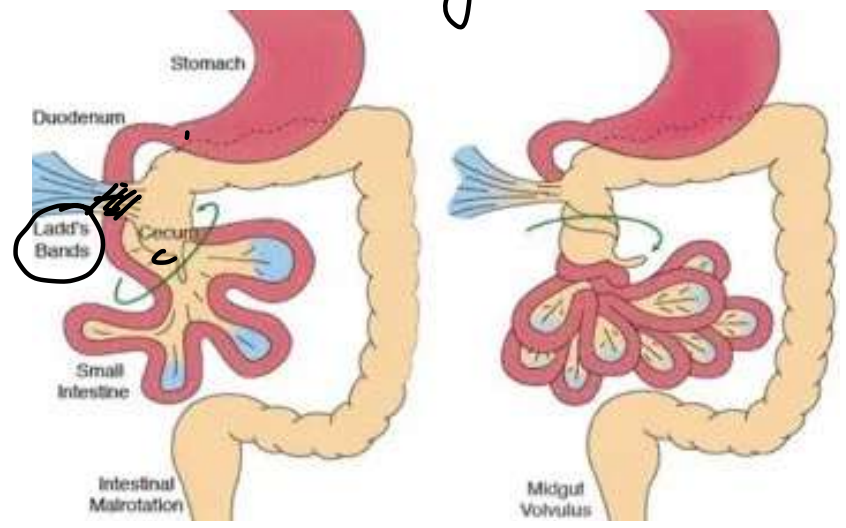
Reverse ROTN

LB 1st → SB later



Mixed ROTN

Subpyloric cecum

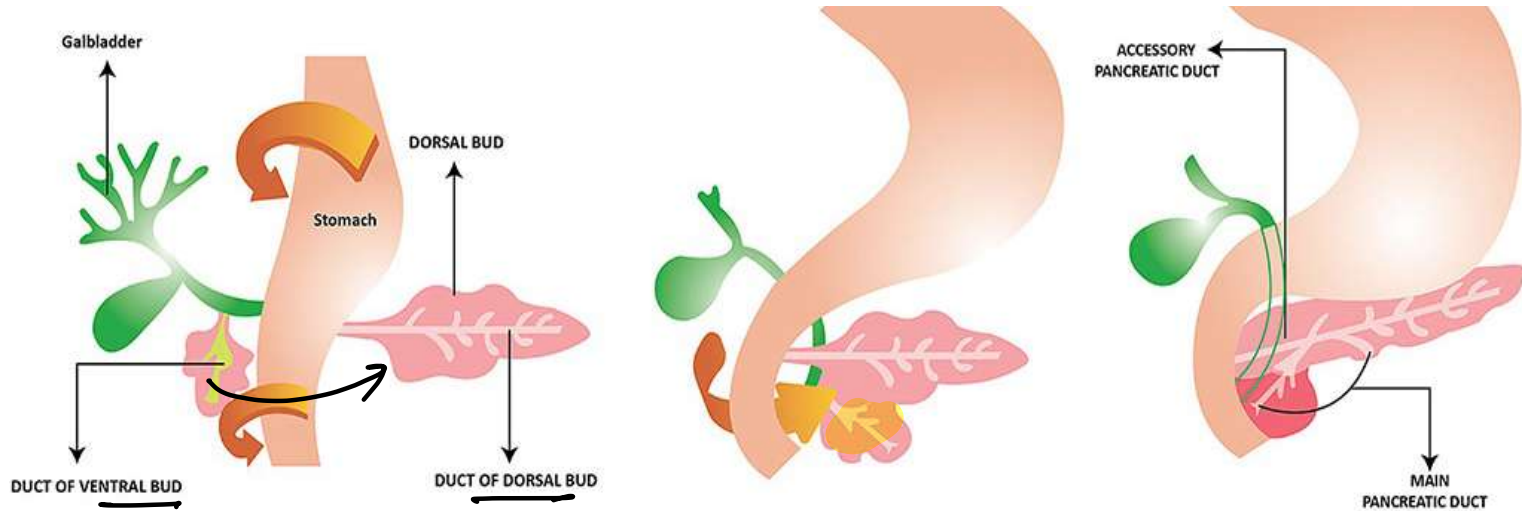


Midgut volvulus

D2 blocked  
D/D - Double bubble



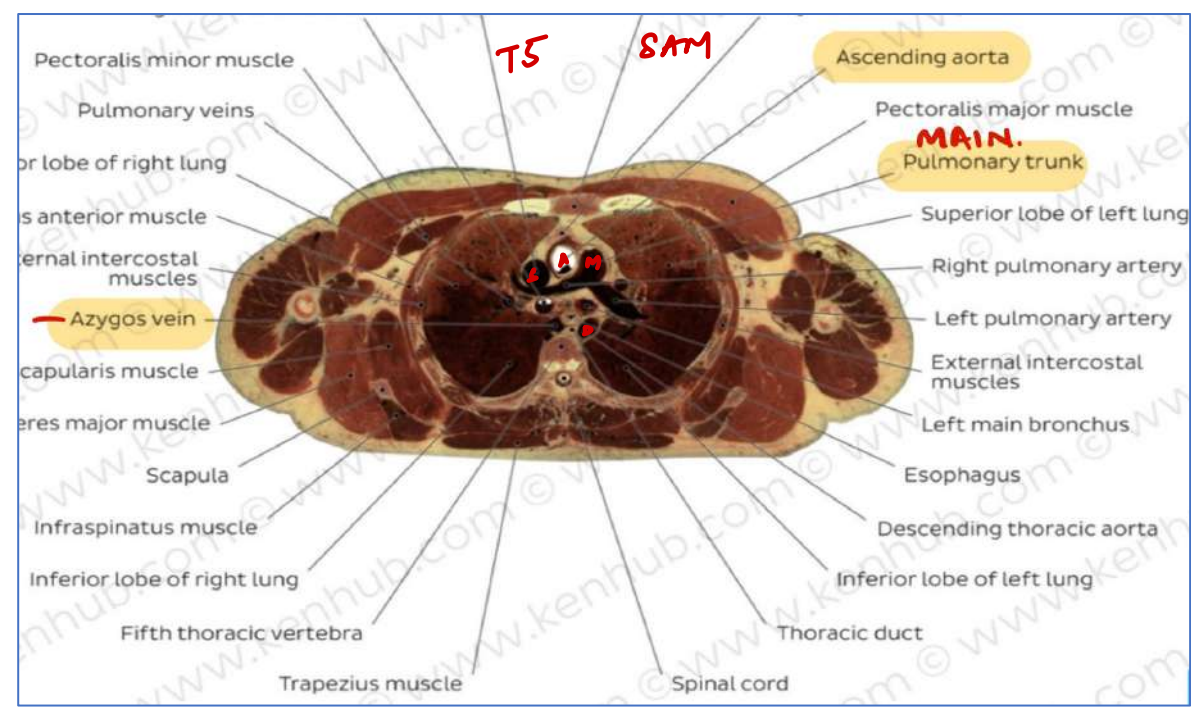
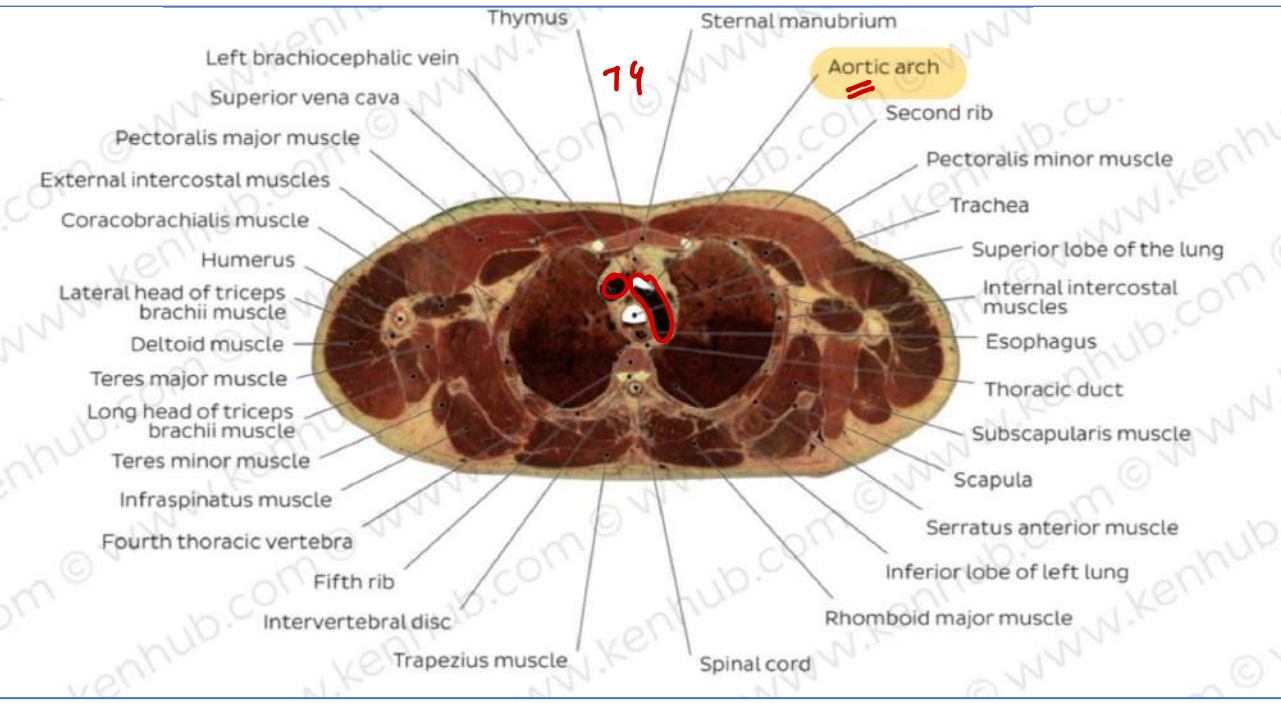
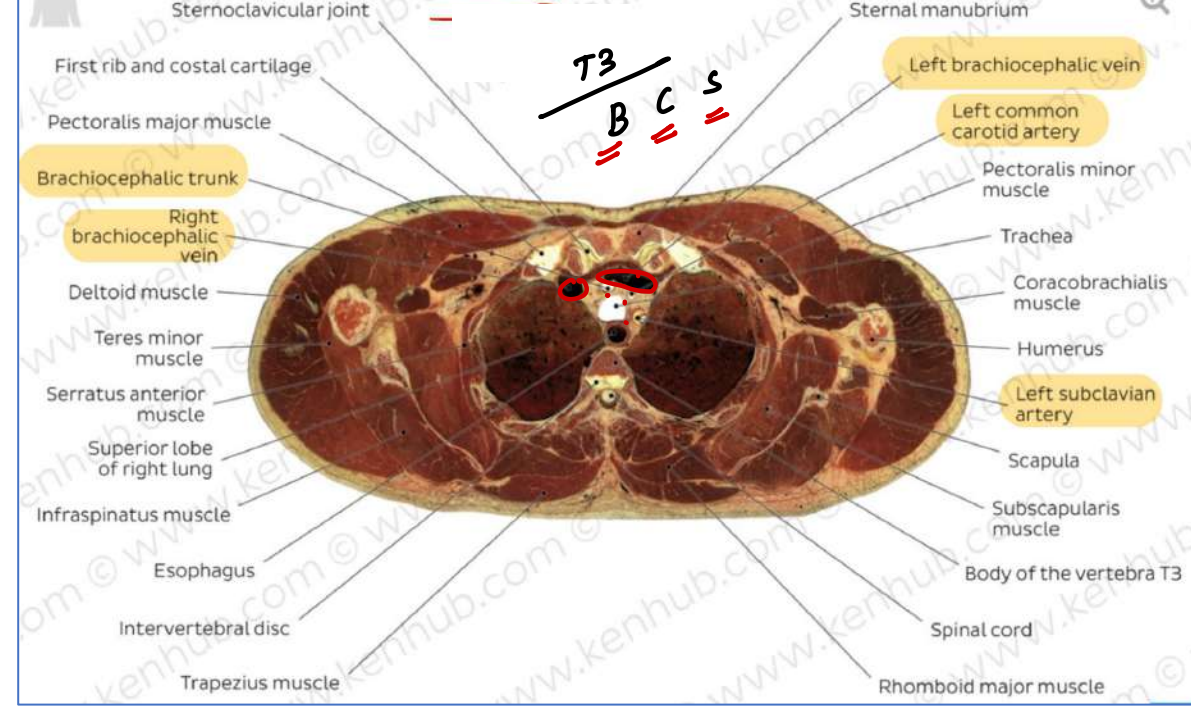
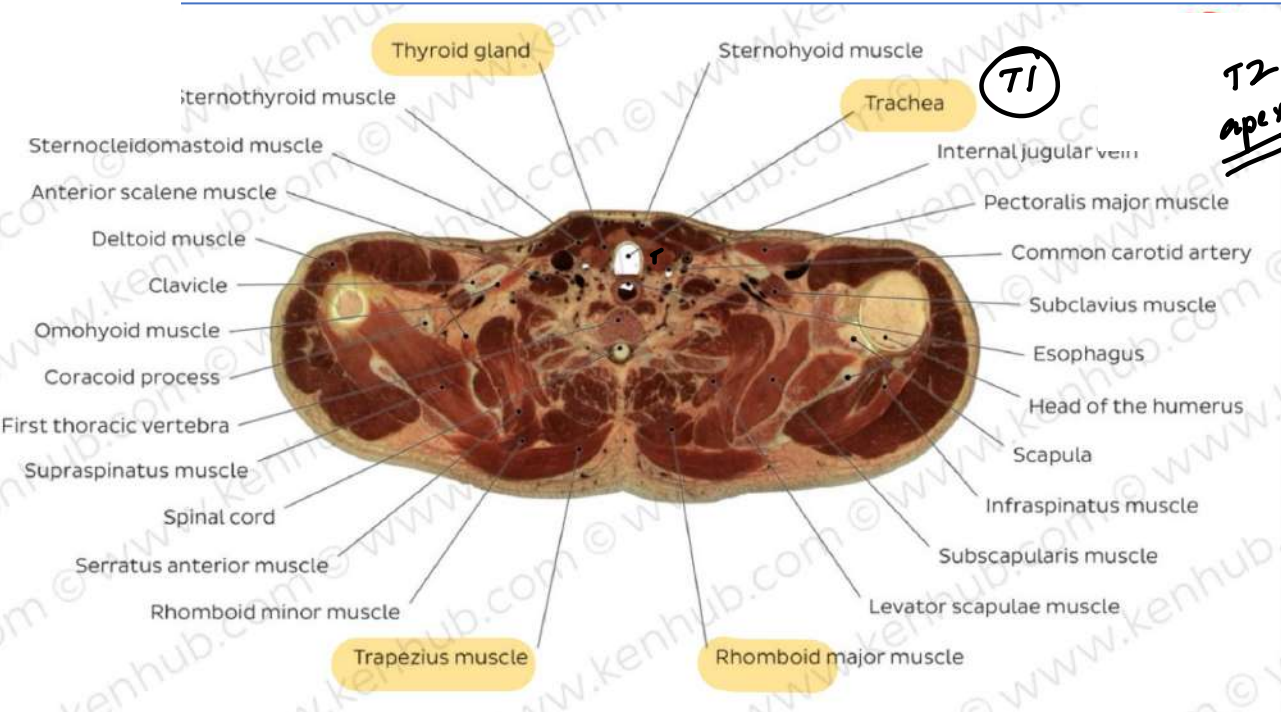
# PANCREAS EMBRYOLOGY

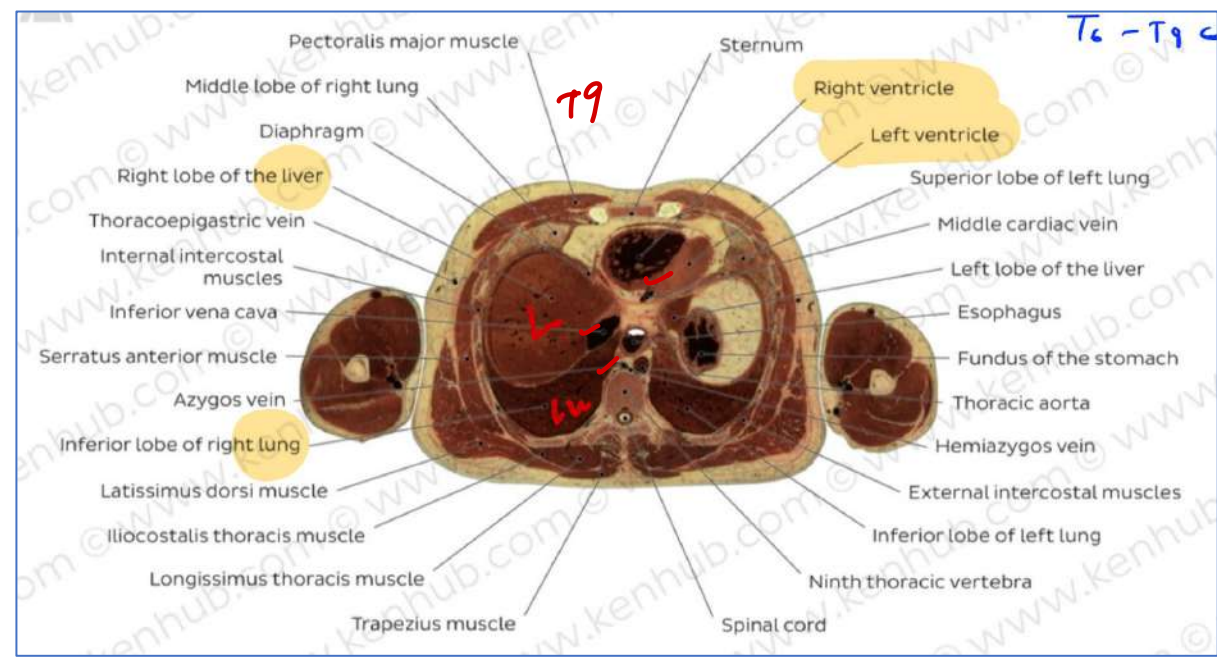
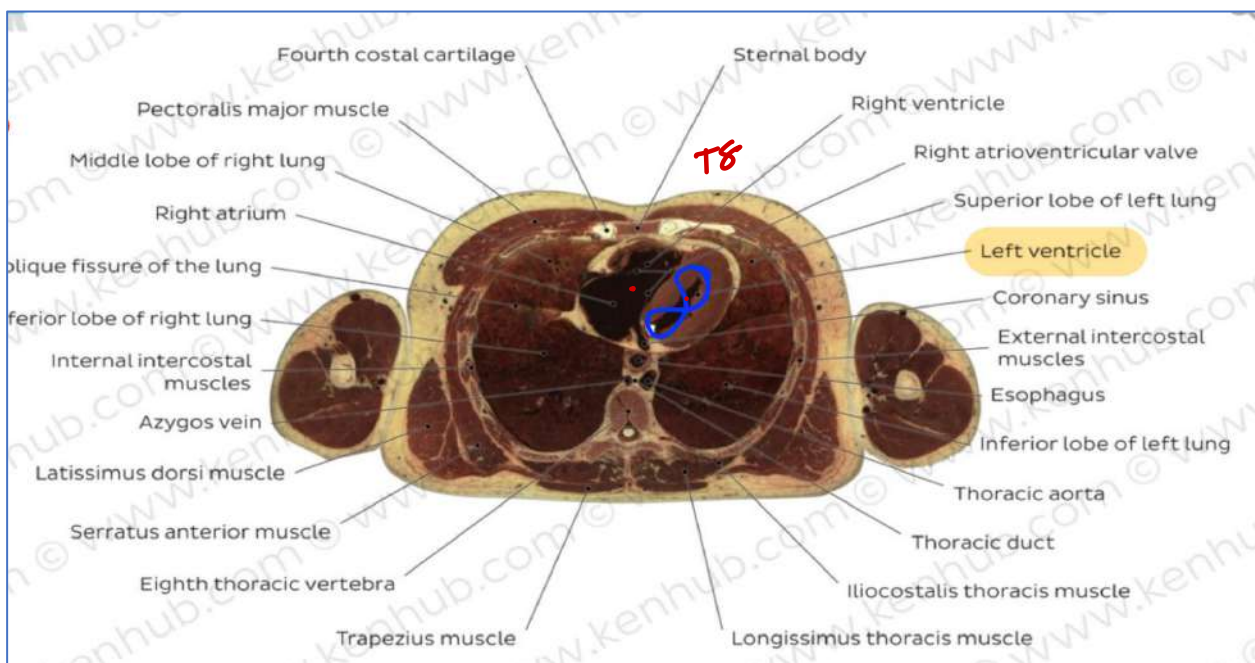
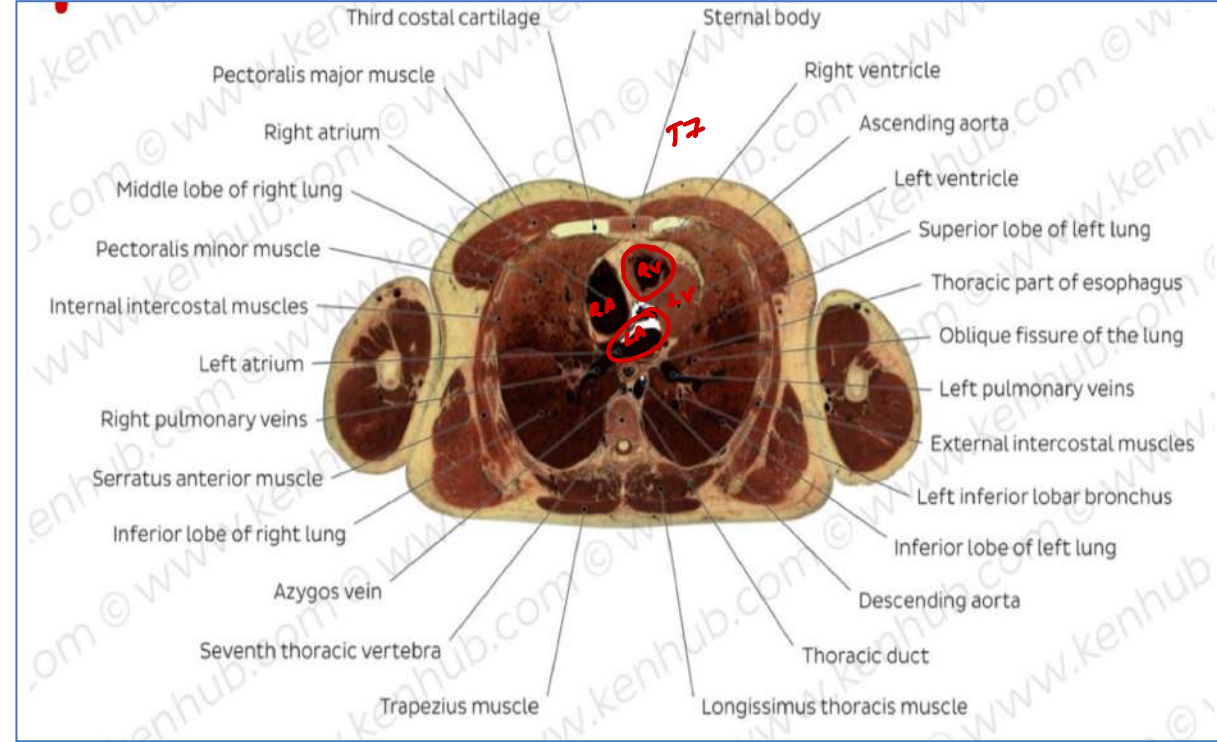
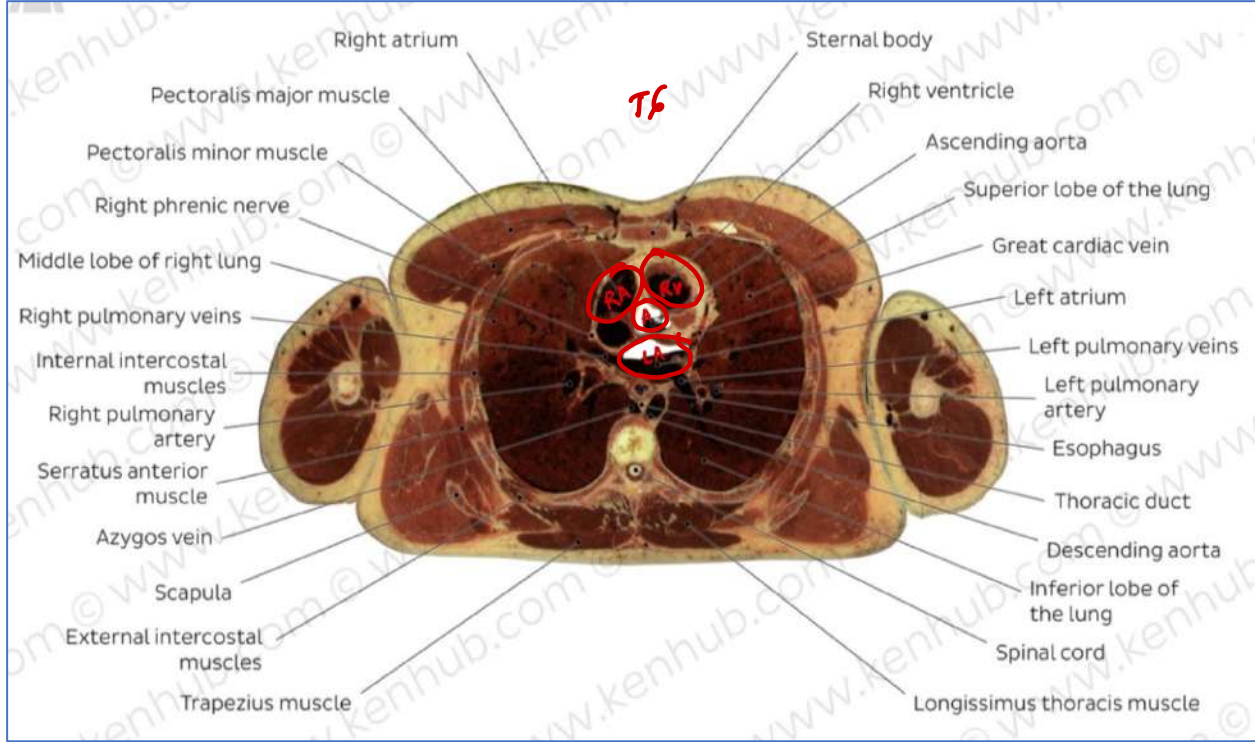


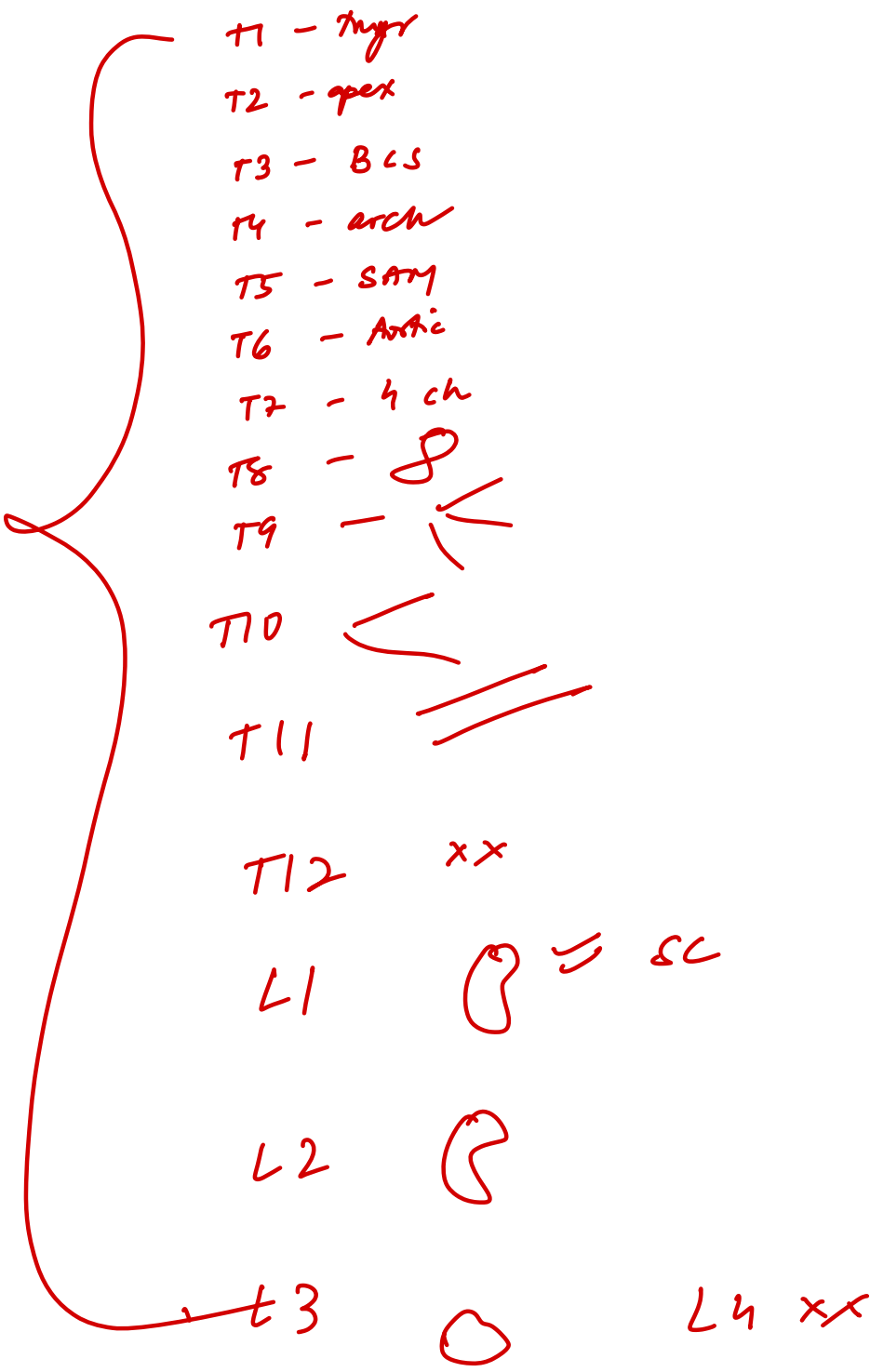
*Rotn +*  
*Fusion +*  
 Annular panc  
 panc divisum  
 recurrent  
 pancreas

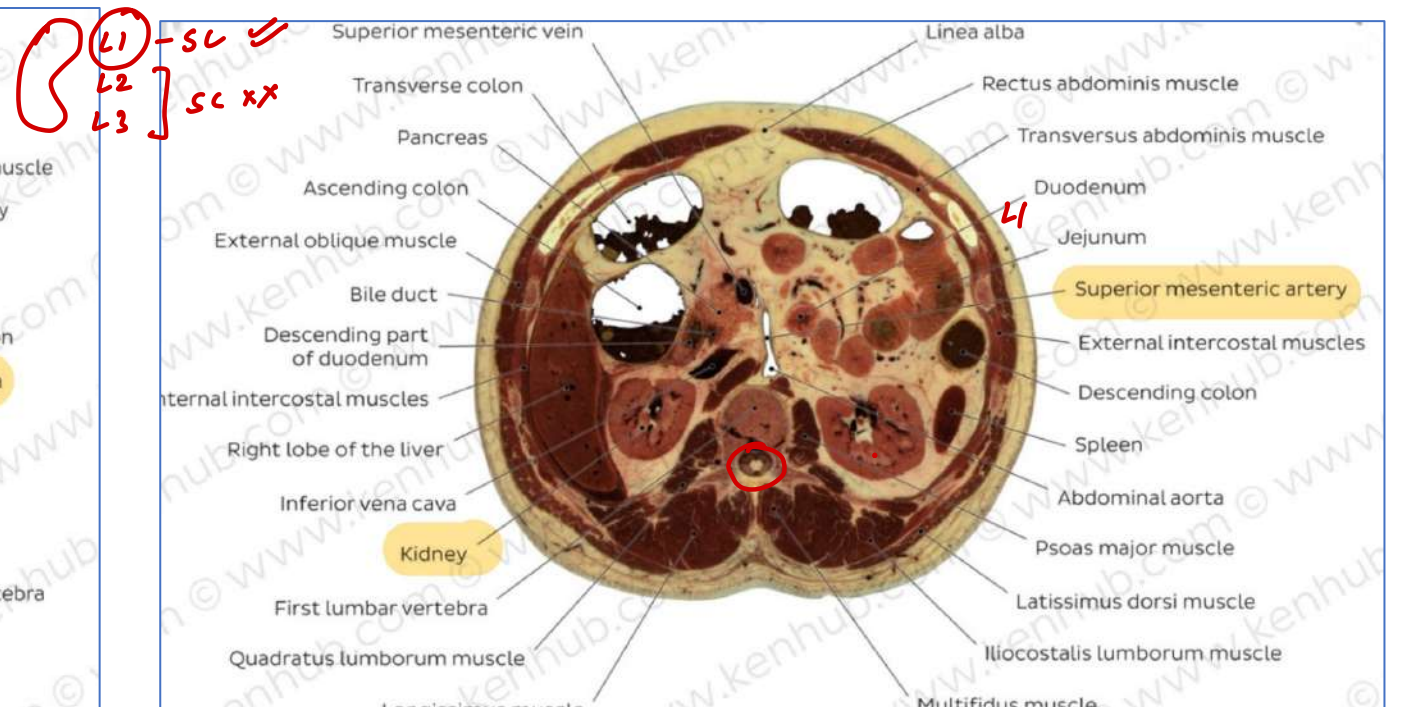
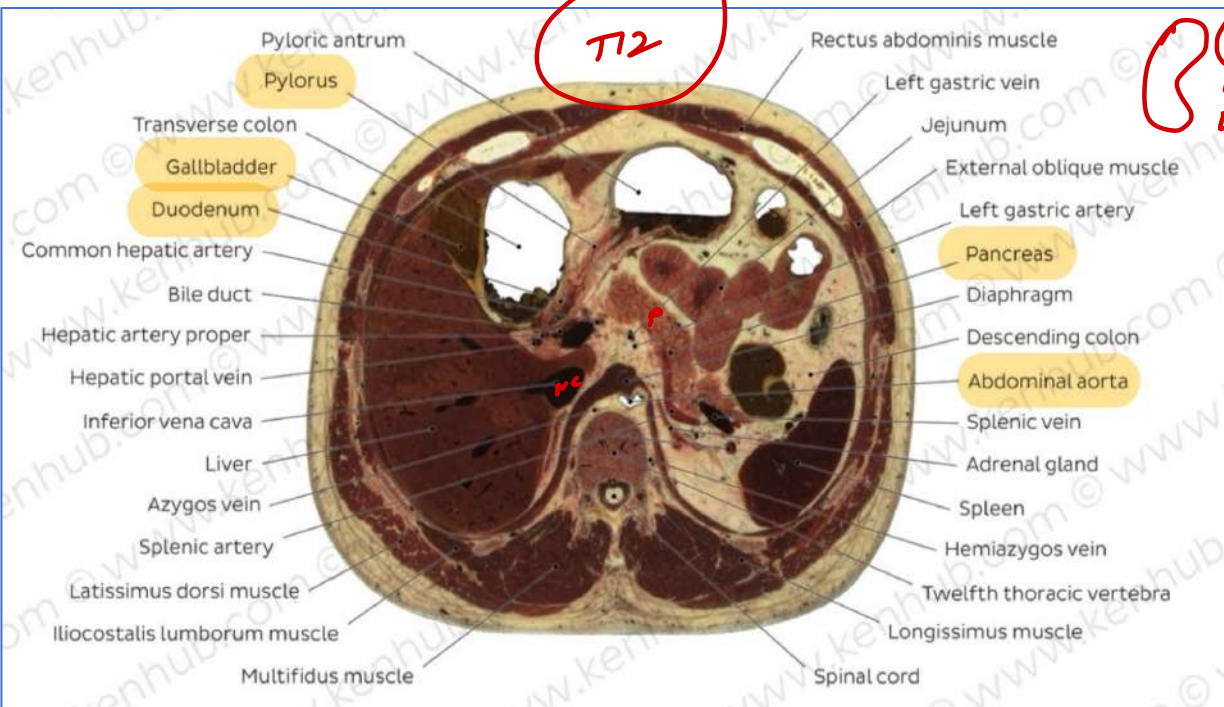
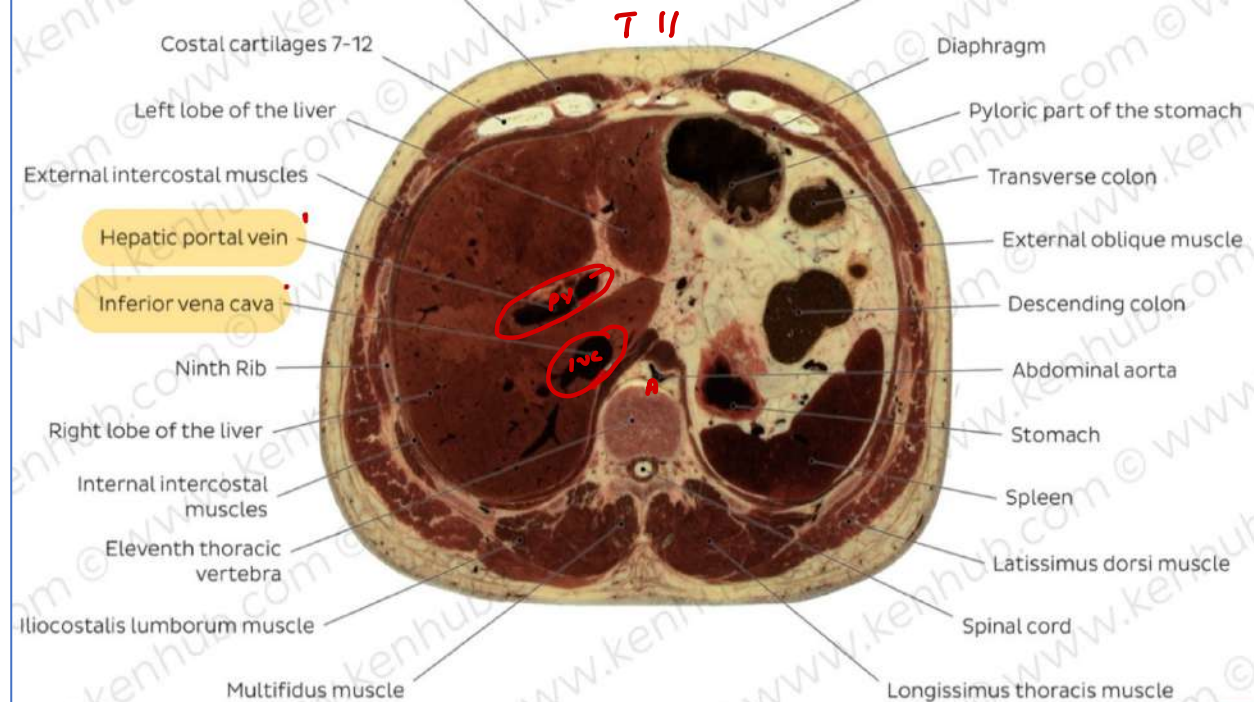
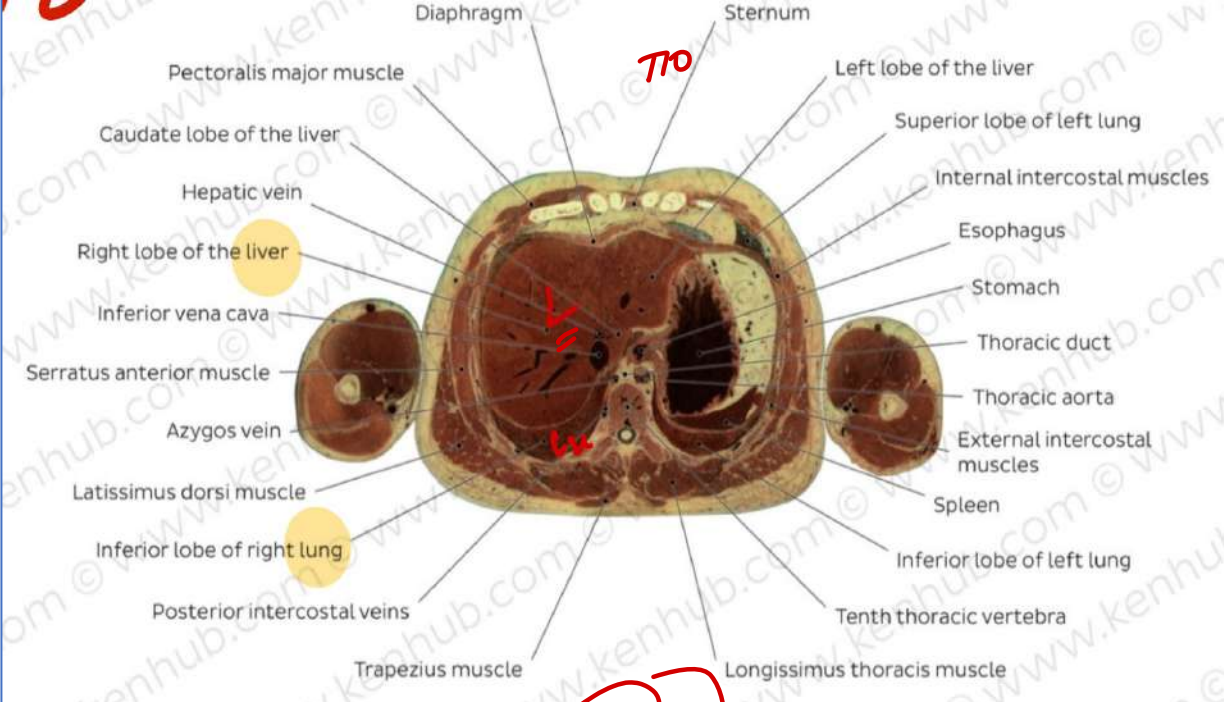
- **Ventral = Uncinate + Inferior Head + MPD**
- **Dorsal = Rest of pancreas**

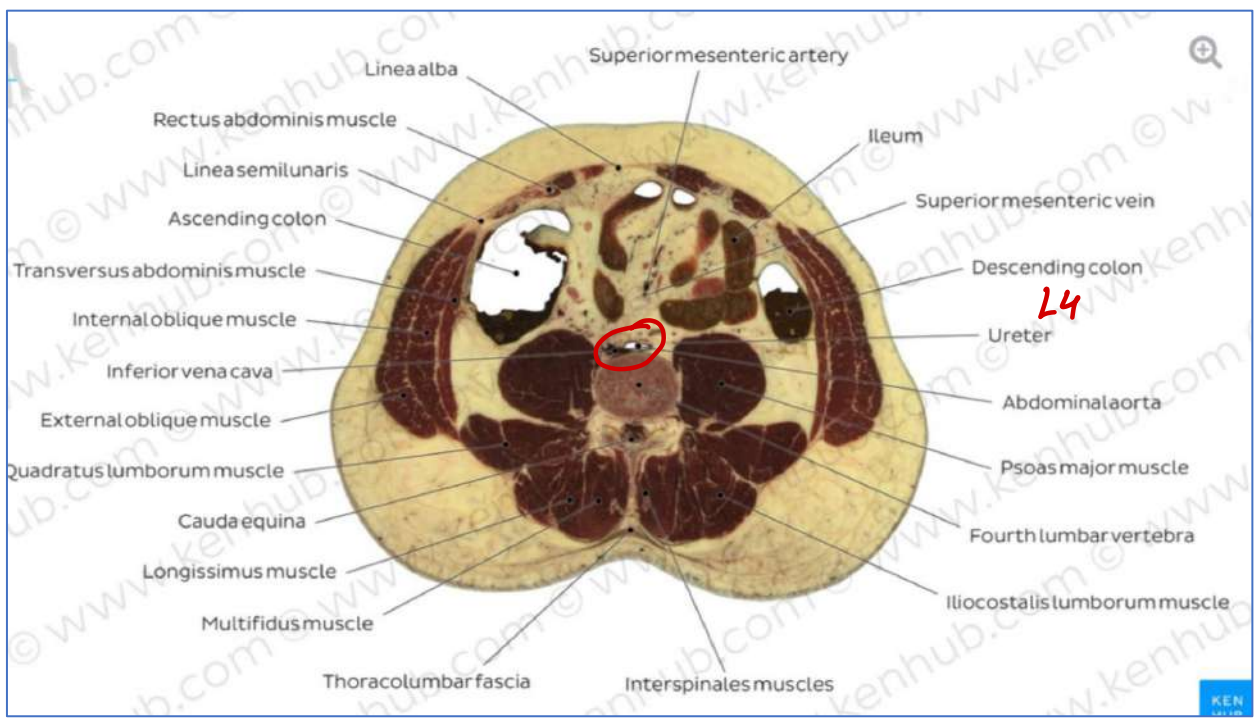
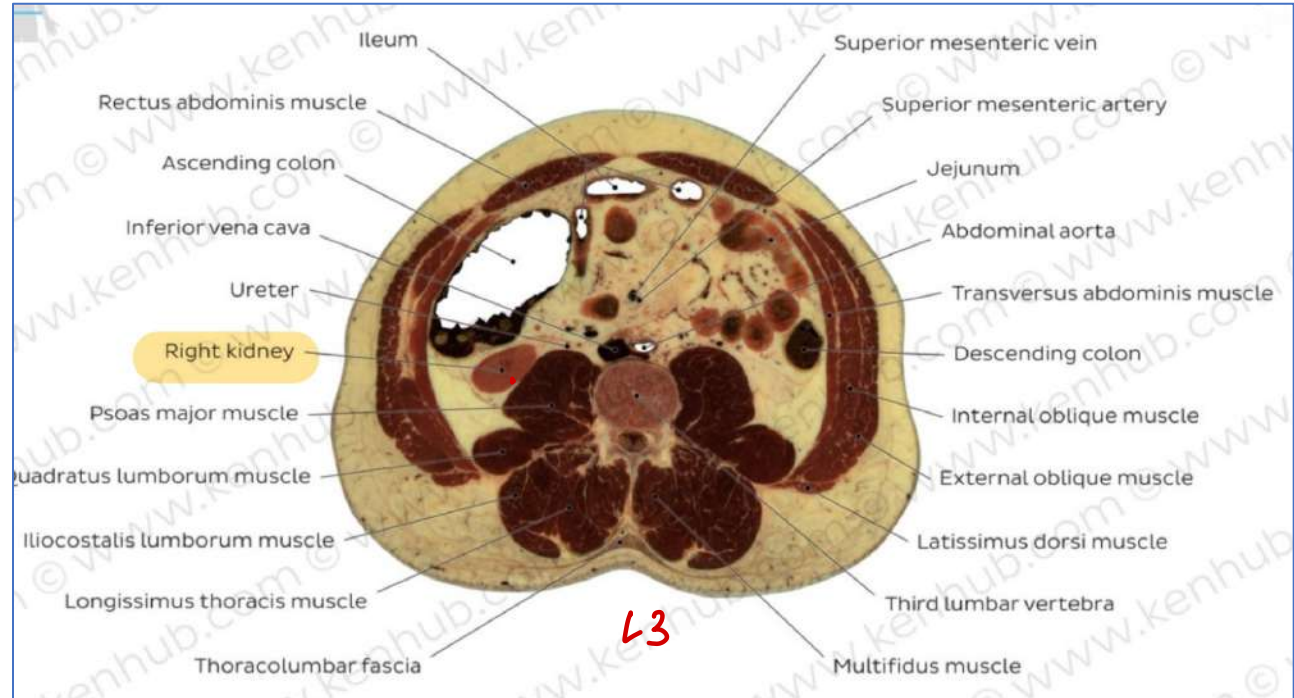
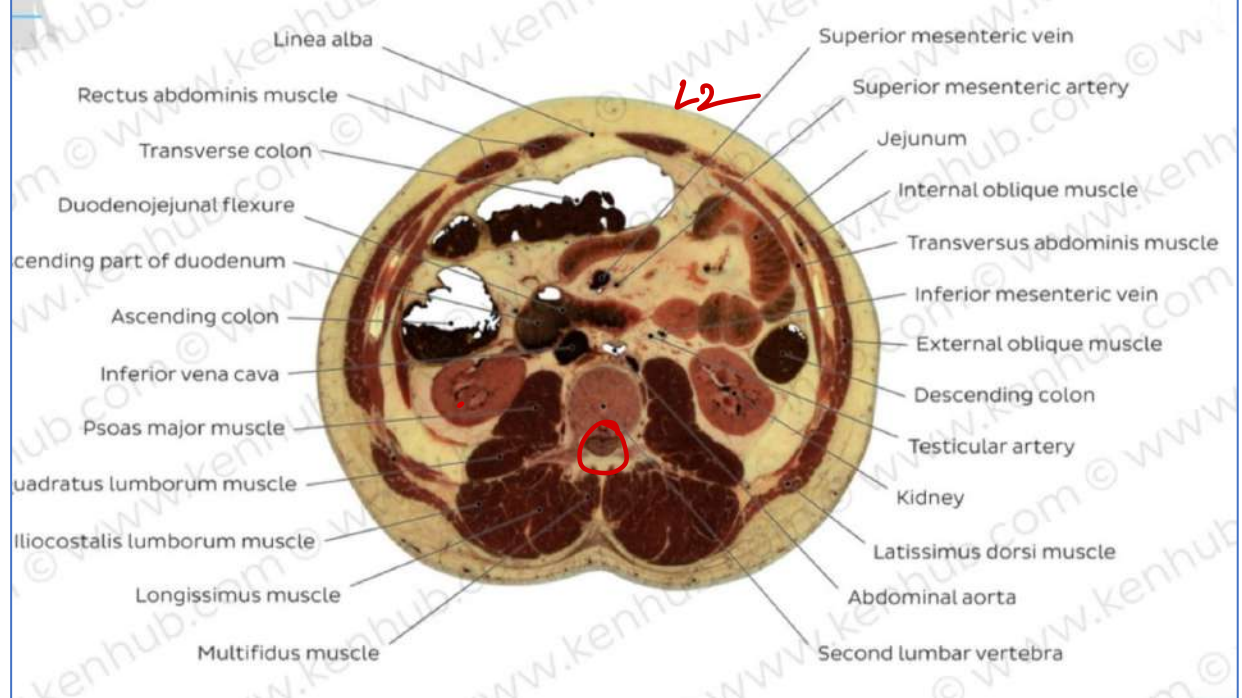


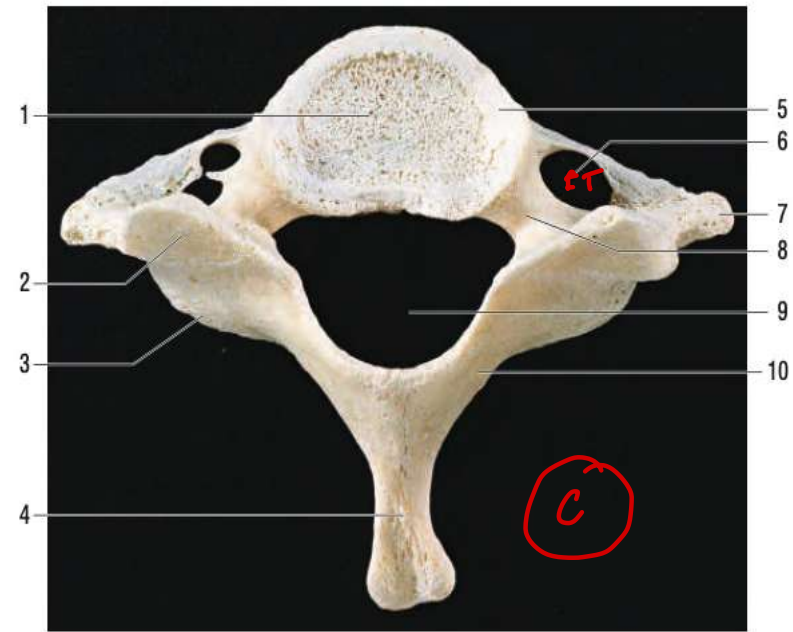




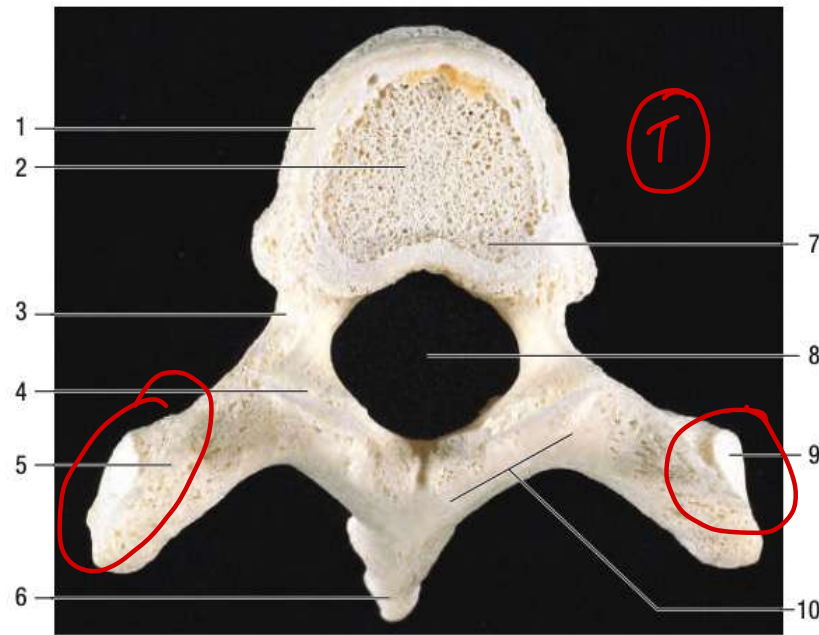




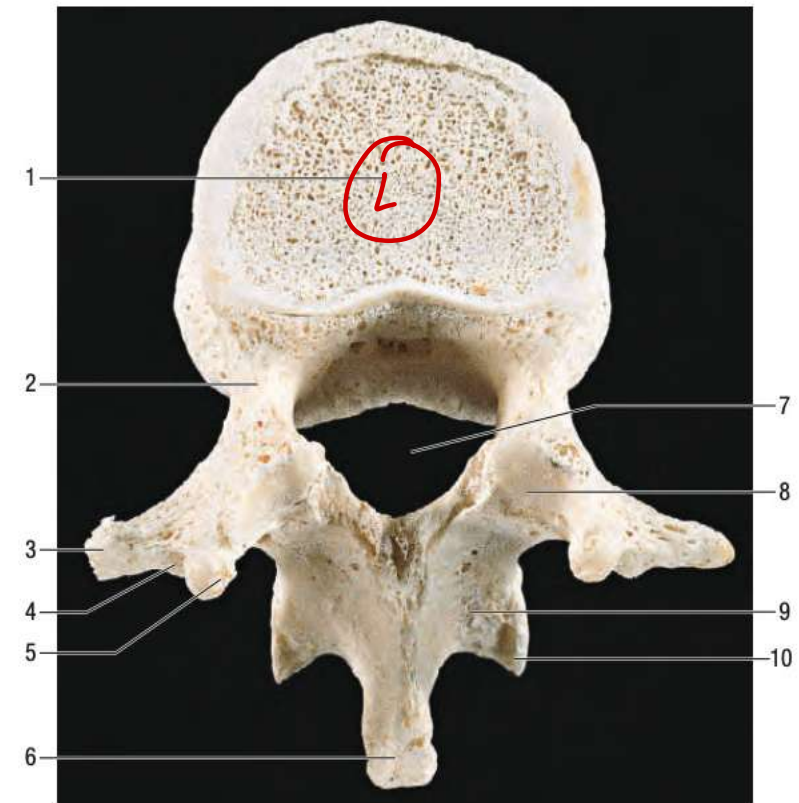




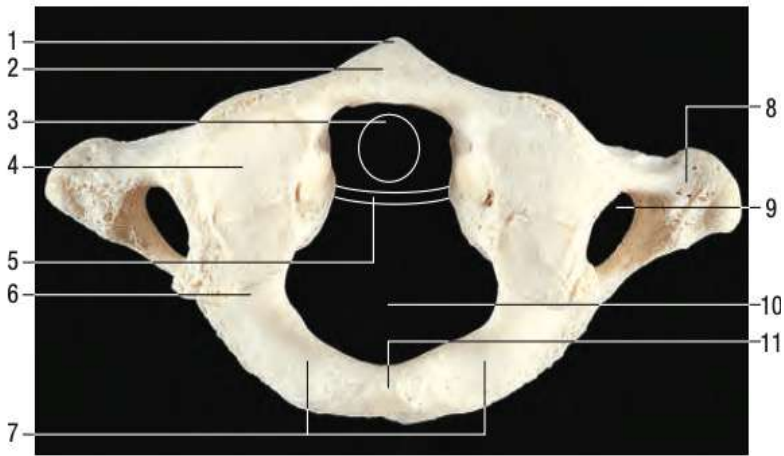
**Fig. 43.40** The seventh cervical vertebra, superior aspect. Key: 1, body; 2, superior articular facet; 3, inferior articular process; 4, spinous process; 5, uncinat process; 6, foramen transversarium (foramina are asymmetrical in this specimen); 7, transverse process; 8, pedicle; 9, vertebral foramen; 10, lamina.



**Fig. 43.22** The fourth thoracic vertebra, superior aspect. Key: 1, bone derived from anular epiphysis; 2, vertebral body – bone derived from centrum; 3, pedicle; 4, superior articular facet; 5, transverse process; 6, spinous process; 7, vertebral body – bone derived from neural arch; 8, vertebral foramen; 9, costal facet; 10, lamina.



**Fig. 43.43** The first lumbar vertebra, superior aspect. Key: 1, body; 2, pedicle; 3, transverse process; 4, accessory process; 5, mammillary process; 6, spinous process; 7, vertebral foramen; 8, superior articular facet; 9, lamina; 10, inferior articular facet.



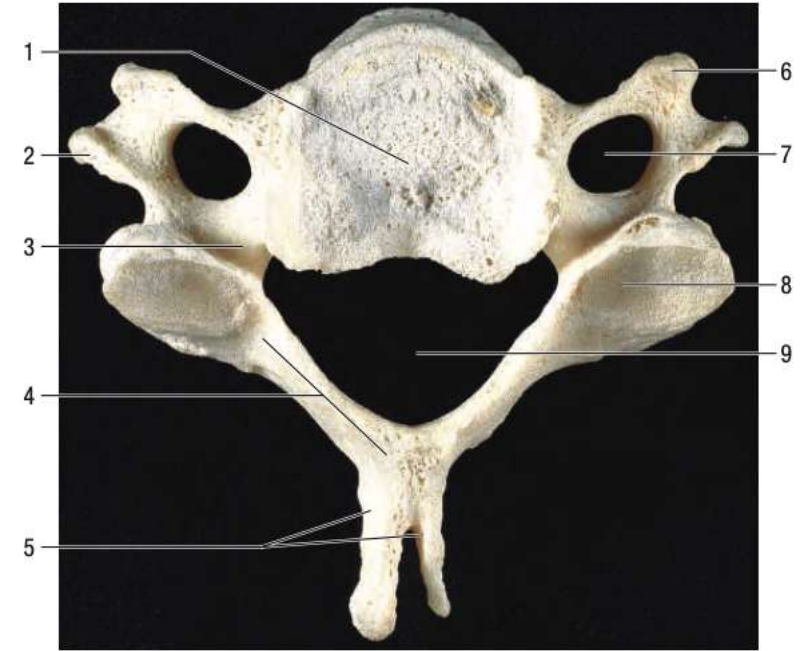
**Fig. 43.32** The first cervical vertebra (atlas), superior aspect. Key: 1, anterior tubercle; 2, anterior arch; 3, outline of dens; 4, superior articular facet, on lateral mass (bipartite facet in this specimen); 5, outline of transverse ligament; 6, groove for vertebral artery and C1 (beneath bony overhang from lateral mass here); 7, posterior arch; 8, transverse process; 9, foramen transversarium; 10, vertebral foramen; 11, posterior tubercle.

C1  
=



**Fig. 43.36** The second cervical vertebra (axis), superior aspect. Key: 1, dens - attachment of apical ligament; 2, superior articular facet on lateral mass; 3, dens - attachments of alar ligaments; 4, foramen transversarium; 5, pedicle; 6, spinous process; 7, body; 8, transverse process; 9, vertebral foramen; 10, inferior articular process; 11, lamina.

C2  
=



**Fig. 43.29** The fourth cervical vertebra, superior aspect. Key: 1, body; 2, posterior tubercle of transverse process; 3, pedicle; 4, lamina; 5, bifid spinous process; 6, anterior tubercle of transverse process; 7, foramen transversarium; 8, superior articular facet; 9, vertebral foramen.

C4