MICROBIOLOGY-ANATOMY

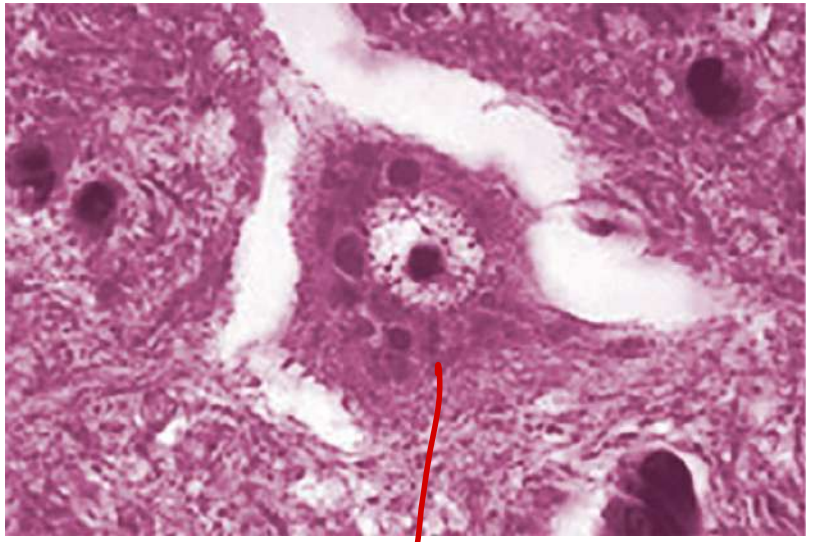
EXTRA-EDGE

Viral
Bact
Parasito – Myco
Gen

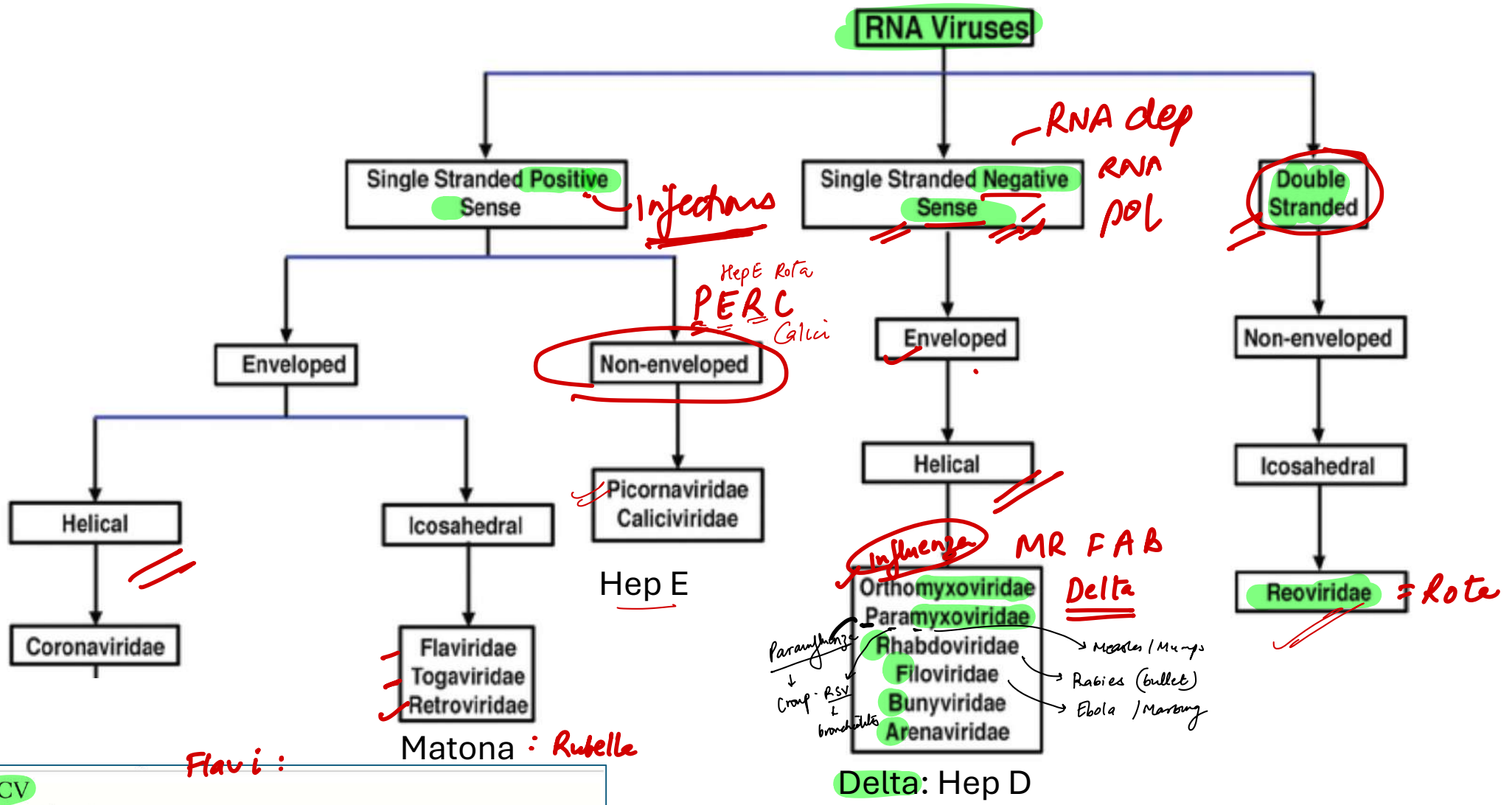
MICROBIOLOGY

19. A 25-year-old male presents with difficulty swallowing, hydrophobia, and aerophobia after being bitten by a bat. He develops spasms, agitation, and coma, eventually succumbing to respiratory failure. Histopathological examination of his brain is shown in the image. Which of the following best describes the viral genome of the pathogen?

A. Double-stranded DNA, enveloped
B. Single-stranded RNA, positive-sense, enveloped
C. Single-stranded RNA, negative-sense, enveloped
D. Single-stranded RNA, segmented, non-enveloped



Rabies



Flavi :

HCV
Yellow fever[a]
Dengue[a]
West Nile virus[a]—meningoencephalitis, acute asymmetric flaccid paralysis
Zika virus[a]

JE, KFD

Toga

Toga CREW—Chikungunya virus[a] (co-infection with dengue virus can occur), Rubella (formerly a togavirus), Eastern and Western equine encephalitis[a]

Picorna :

Poliovirus—polio-Salk/Sabin vaccines—IPV/OPV
Echovirus—aseptic meningitis
Rhinovirus—"common cold"
Coxsackievirus—aseptic meningitis; herpangina (mouth blisters, fever); hand, foot, and mouth disease; myocarditis; pericarditis
HAV—acute viral hepatitis

PERCH

Arena :

LCMV—lymphocytic choriomeningitis virus
Lassa fever encephalitis—spread by rodents

Bunya :

California encephalitis[a]
Sandfly/Rift Valley fevers[a]
Crimean-Congo hemorrhagic fever[a]
Hantavirus—hemorrhagic fever, pneumonia

Chandipura
kala
nroya

18. There is an outbreak of hepatitis A infection in a college hostel. Which of the following is false about this infection?

A. It does not cause hepatocellular carcinoma

B. The incubation period is 2-6 weeks

C. Caused by an enveloped ssRNA virus

D. Case fatality rate is 0.1%

A — feco-oral
E

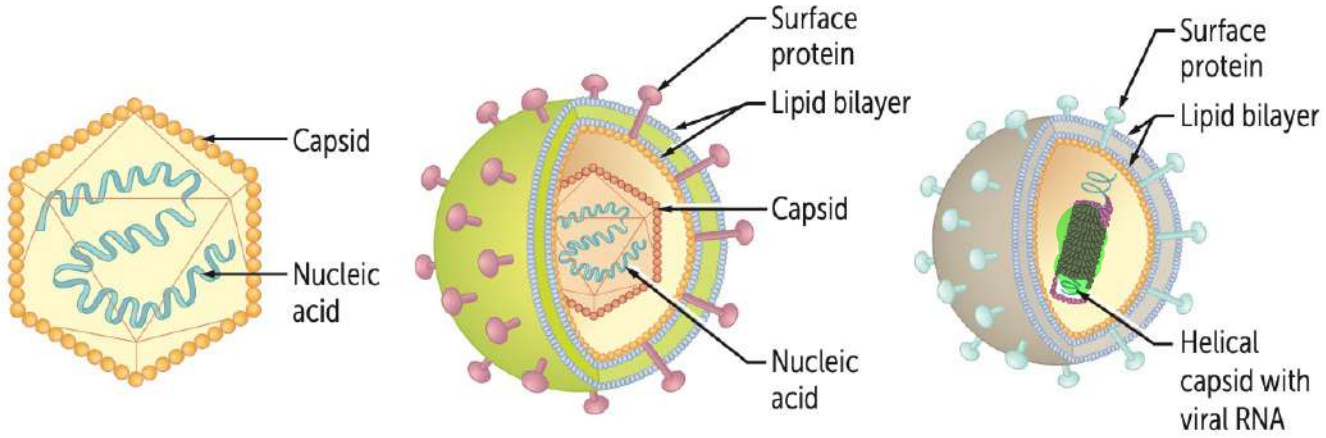
Hep A → Picorna non env
B → DNA enveloped
C → Flavi
D → -ve strand env
E → PERC non env

15. Identify morphology of coronavirus

A. Naked helically symmetrical viruses
B. Enveloped icosahedrally symmetrical viruses
C. Enveloped helically symmetrical viruses
D. Variably enveloped viruses with a complex symmetry

PERC

enveloped



Naked (nonenveloped) virus with icosahedral capsid

Polio
Hep A

Enveloped virus with icosahedral capsid

YF
Rubella

- Flavi
- Toga
- Retro
- Reo

Enveloped virus with helical capsid

All other RNA

MR FAB
- Corona

DNA - icosahedral except

Helical: Tobacco mosaic

Complex → Pox

186. A 30-year-old male presents to the emergency department with sudden-onset chest pain, fever, and significant intercostal muscle tenderness. He works in agriculture, and his symptoms started after eating street food. Upon examination, he shows signs of pleuritic chest pain and muscle stiffness. He reports a recent fever and generalized muscle aches. He also has a past medical history of diabetes. Given the context and clinical presentation, which of the following pathogens is most likely responsible for his condition?

A. Group A Coxsackievirus
B. Group B Coxsackievirus
C. Enterovirus
D. Human Herpesvirus 6 (HHV-6)

Group A Coxsackieviruses	Group B Coxsackieviruses
1. Aseptic meningitis (A7, A9) 2. Herpangina (vesicular Pharyngitis) 3. Hand foot and mouth disease (also by Enterovirus:71) 4. Acute hemorrhagic conjunctivitis-Caused by Coxsackie-A24 and Enterovirus 70	1. Aseptic meningitis (B1-6) 2. Pleurodynia (Epidemic myalgia or Bornholm disease 3. Myocarditis, pericarditis 4. Hepatitis and Pneumonia 5. Pancreatitis leading to Juvenile Diabetes mellitus - Coxsackie B4

25. A 6-month-old infant is brought to the emergency department with difficulty swallowing, a weak cry, and generalized weakness. The child's mother reports that the infant consumed honey several days ago. On examination, the infant is floppy, with a weak cry and poor muscle tone. The diagnosis of infant botulism is made. Which of the following adenovirus serotypes is most commonly associated with diarrhea in infants and would be a potential differential diagnosis for this case?

A. 40, 41
B. 8, 19, 37
C. 1, 2, 3, 5
D. 3, 7, 14

TABLE 58-2 Diseases associated with various serotypes of adenoviruses

Disease	Serotypes
Acute respiratory disease	4, 7, 14, 21
Acute febrile pharyngitis	
Endemic	1, 2, 5, 6
Epidemic	3, 4, 7
Pneumonia	1–3, 7
Pharyngoconjunctival fever	3, 4, 7
Acute follicular conjunctivitis	3, 4, 11
Epidemic keratoconjunctivitis	19, 37
Gastroenteritis and diarrhea	40, 41
Intussusception	1, 2, 5
Acute hemorrhagic cystitis	11, 21
Disseminated infection	5, 34, 35, 43–47

3 + 4 = 7 ≠ 11

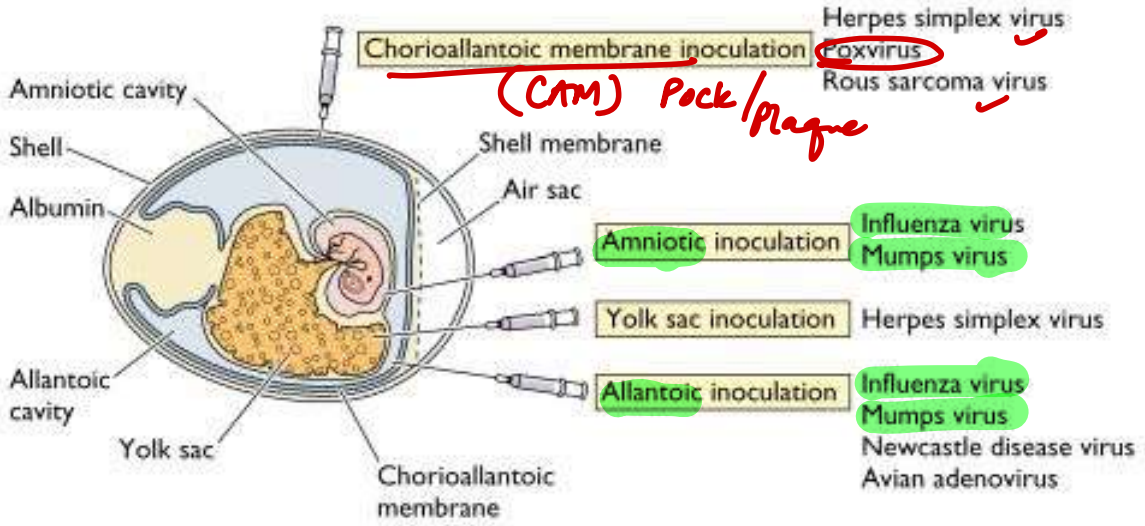
64. Which of the following is not a continuous cell line used for viral culture?

A. Vero
B. Hep2
C. WI-38
D. Hela

TABLE 53-3 Cell lines in common use

Cell lines	Examples
Primary cell culture	Rhesus monkey kidney cell culture Human amnion cell culture Chick embryo fibroblast cell culture
Diploid cell strains	Human embryonic lung cell strain (WI-38) Rhesus embryo cell strain (HL-8)
Continuous cell lines	Human carcinoma of cervix cell line (HeLa) Human epithelioma of larynx cell line (Hep-2) Human carcinoma of nasopharynx cell line (KB) Human synovial carcinoma cell line (McCoy) Sternal marrow cell line (Detroit-6) Human conjunctiva (C), intestine (I), liver (L), and kidney (K) cell line (Chang C/I/L/K) Vervet monkey cell line Baby hamster kidney cell line (Vero)

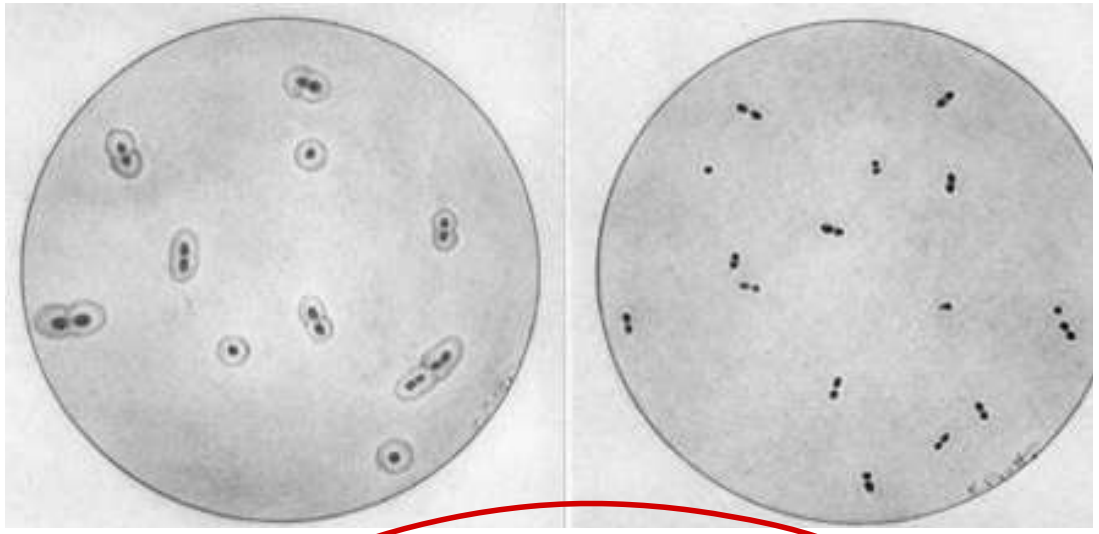
Animal inoculn / Suckling mice → Coxsackie.



Human fibroblast + CMV

1. The following phenomenon not be observed in?

A. Bacillus anthracis
B. Klebsiella pneumoniae
C. Neisseria gonorrheae
D. Hemophilus influenzae



SHiN

Quelling xn

Polysachharide capsule: + VACCINE = S.pneum / Hib / N.menin / Vi typhid
Grp B Strep, E.coli, Klebsiella, Pseudomonas, Salmonella

B
C.Pertussis
C.Perfringes
Cryptococcus – India Ink (Negrosin)

Hyaluronic acid: S. pyogenes
Polypeptide: B.anthrax
F1 protein: Y. pestis

In vivo biofilm-producing bacteria

↓ metabolism

Ab resistance

S epidermidis	Catheter and prosthetic device infections
Viridans streptococci (*S mutans, S sanguinis*)	Dental plaques, infective endocarditis
P aeruginosa	Respiratory tree colonization in patients with cystic fibrosis, ventilator-associated pneumonia Contact lens–associated keratitis
Nontypeable (unencapsulated) *H influenzae*	Otitis media

Hib x x

183. A 34-year-old male presents with a fluctuant mass in the jaw region and purulent discharge from multiple sinuses. The culture shows the colonies displayed in the given image below. Which of the following is a key feature of the causative organism?

A. Gram-negative obligate anaerobe

B. Gram-positive facultative anaerobe

C. Gram-positive obligate anaerobe

D. Acid-fast bacterium

Actinomyces

Obligate anaerobes

- Actinomyces
- Bacteroides
- Clostridium
- Fusobacterium

- Peptostreptococcus (aero-tolerant)

Lack catalase /SOD
Ineffective: Ag (microbes)

Facultative anaerobes

- Staphylococcus
- Streptococcus
- Enterobacteraceae
- Hemophilus
- Vibrio

Microaerophilic (2-10%)

- Helicobacter
- Campylobacter
- M.bovis

Obligate intracellular	*Rickettsia*, *Chlamydia*, *Coxiella* Rely on host ATP	Stay inside (cells) when it is Really Chilly and Cold
Facultative intracellular	*Salmonella*, *Neisseria*, *Brucella*, *Mycobacterium*, *Listeria*, *Francisella*, *Legionella*, *Yersinia pestis*	Some Nasty Bugs May Live FacultativeLY

12. Identify the microaerophilic bacteria from the list:

1. **Positive CLO test.**
2. **Gram-negative bacilli implicated in GBS**
3. **Gram-negative curved bacilli with 'fish-in-stream' appearance**
4. **Bacteria showing 'mercury drop' colonies.**
5. **LJ medium showing ruff, buff, tough colonies.**

A. 2 and 5

B. 3 and 4

C. 1 and 4

D. 1 and 2

Urease-positive organisms

Proteus, *Cryptococcus*, *H pylori*, *Ureaplasma*, *Nocardia*, *Klebsiella*, *S epidermidis*, *S saprophyticus*. Urease hydrolyzes urea to release ammonia and CO_2 → ↑ pH. Predisposes to struvite (magnesium ammonium phosphate) stones, particularly *Proteus*.

Pee CHUNKSS.

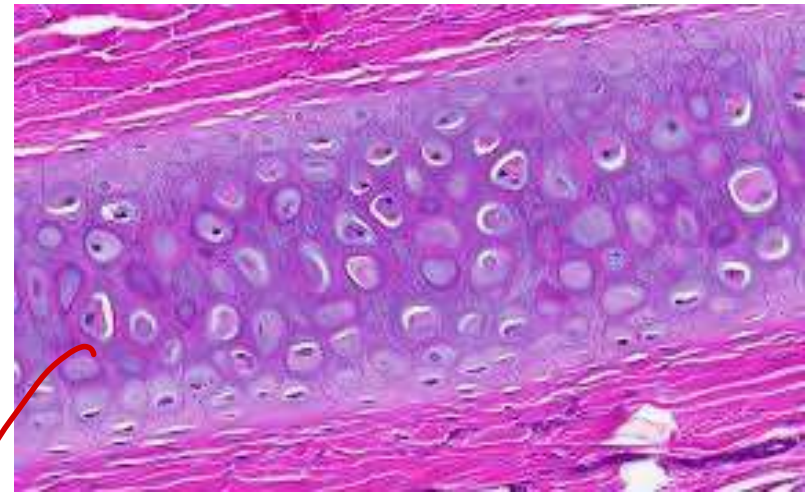
Trichophyton

3. Identify the staining method for a tissue biopsy of the painless ulcer shown below:

A. Fontana's method
B. Levaditi's method
C. Castaneda's method
D. Albert's method

2. Which of the following stains are used to visualize the specific fibers present in the following cartilage?

A. Bielchowsky stain — neurons
B. Verhoeff's stain
C. GMS Silver stain — fungi / PCP
D. Alcian Blue stain → acidic mucin → Barrett.



elastic cartilage

9. Which of the following is a pigment-producing species of mycobacteria?

A. M. ulcerans
B. M. scrofulaceum
C. M. avium intracellulare complex
D. M. xenopi

Runyon Classification

- Group 1: Photochromogens
  Mycobacterium kansasii, Mycobacterium marinum, Mycobacterium simiae
- Group 2: Scotochromogens
  Mycobacterium scrofulaceum, Mycobacterium szulgai, Mycobacterium gordonae
- Group 3: Nonphotochromogens
  Mycobacterium avium-intracellulare, Mycobacterium malmoense, Mycobacterium xenopi
- Group 4: Fast growers
  Mycobacterium fortuitum, Mycobacterium chelonae, Mycobacterium abscessus

TABLE 42-1 Human infections caused by atypical *Mycobacterium* species

Bacteria	Diseases
Mycobacterium kansasii	Pulmonary disease
Mycobacterium marinum	Swimming pool granuloma
Mycobacterium simiae	Pulmonary disease (rare)
Mycobacterium scrofulaceum	Lymphadenopathy
Mycobacterium gordonae	Pulmonary disease (rare)
Mycobacterium szulgai	Pulmonary disease and bursitis (occasional)
Mycobacterium xenopi	Chronic pulmonary disease
Mycobacterium avium complex	Pulmonary disease, lymphadenopathy, and disseminated disease
Mycobacterium ulcerans	Buruli ulcer
Mycobacterium fortuitum	Post-trauma chronic abscesses
Mycobacterium chelonae	Post-trauma chronic abscesses
Mycobacterium abscessus	Abscesses
Mycobacterium genevense	Disseminated diseases (AIDS-related)

13. Which of the following is not a characteristic feature of El Tor vibrio?

A. Resistant to El Tor phage V
B. Intrinsic resistance to polymyxin B
C. Voges-Proskauer test is positive
D. Not susceptible to group IV phage

TABLE 35-2 Biochemical characteristics of *Vibrio cholerae* biotypes

Properties	*Vibrio cholerae* biotype	
	Classical	Eltor
Hemolysis of sheep RBCs	–	+
Agglutination of chick erythrocytes	–	+
Voges–Proskauer test	–	+
Polymixin B sensitivity	+	–
Susceptibility to		
Mukerjee Group IV Phage	+	–
Eltor phage 5	–	+
Vibriostatic (O/129) agent	+	–

17. A 34-year-old man presents with a discharging wound post-operatively. Cultures reveal infection with MRSA. Which of the following is the gene implicated?

A. MecA
B. MecB
C. MecC
D. MecM

chromosomal coded

PBP → PBP 2a

penicillinase → plasmid encoded

MRSA - plasmid encoded

Dala → D lac

'jumping gene'

transposon

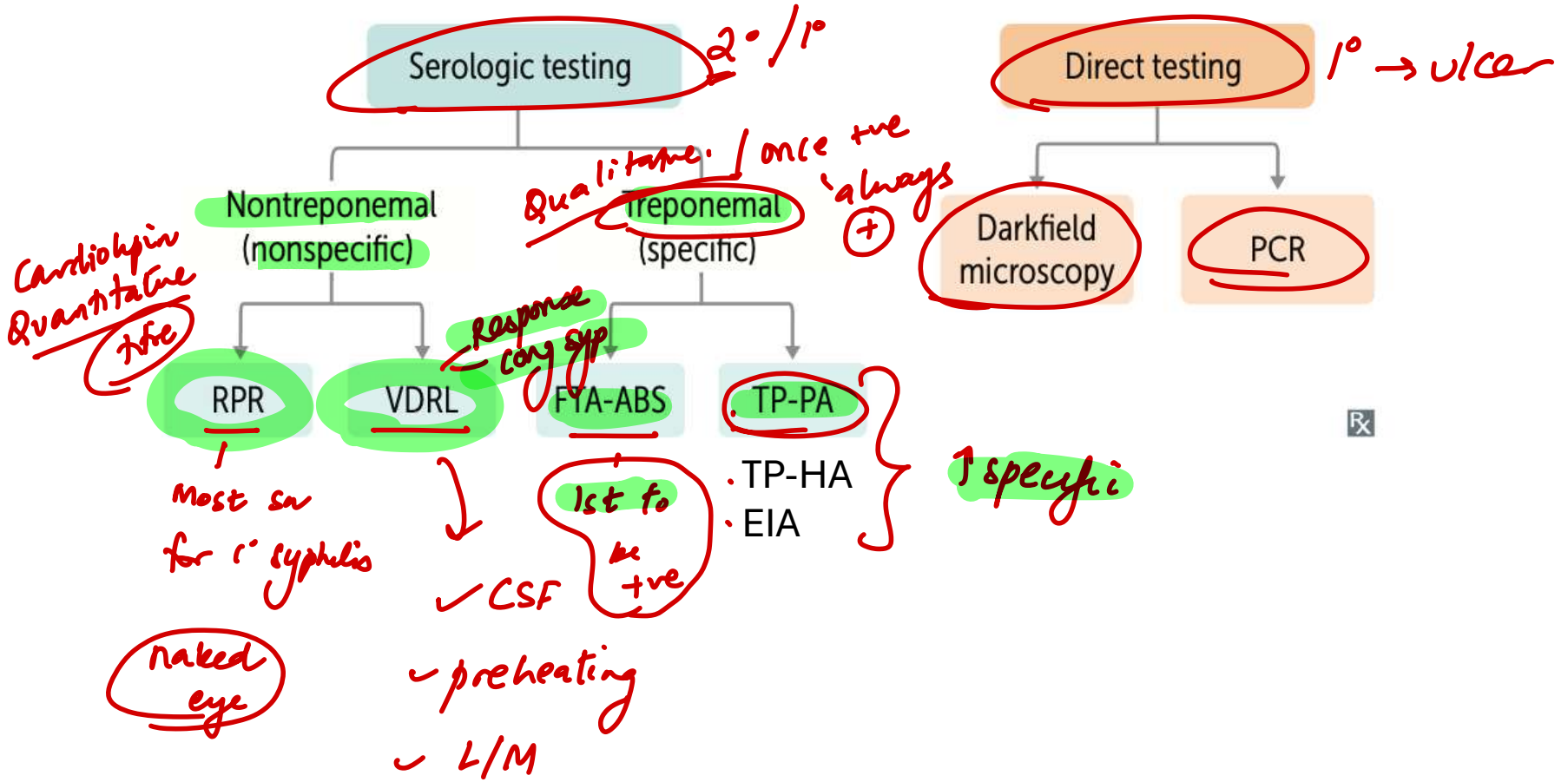
MRSA (methicillin-resistant *S aureus*)—important cause of serious healthcare-associated and community-acquired infections. Resistance due to altered penicillin-binding proteins (conferred by *mecA* gene). Some strains release Panton-Valentine leukocidin (PVL), which kills leukocytes and causes tissue necrosis.

14. Which of the following microbes is also referred to as Friedlander's bacillus?

A. Klebsiella pneumoniae
B. Corynebacterium diphtheria
C. Chlamydia trachomatis
D. Mycoplasma pneumoniae
E. H.aegypticus
F. H.influenzae

16. Which of the following is a false statement regarding the serological tests of syphilis?

A. Rapid plasma reagin test is a group specific treponemal test
B. VDRL test is the test of choice for response to therapy
C. VDRL is the test of choice for examining CSF
D. Treponemal tests are likely to remain reactive even after adequate therapy


Serologic testing
Direct testing
Nontreponemal (nonspecific)
Treponemal (specific)
Darkfield microscopy
PCR
RPR
VDRL
FTA-ABS
TP-PA
TP-HA
EIA

122. A throat swab taken from a patient who presented with fever, dysphagia and cervical lymphadenopathy was sent for culture on potassium tellurite agar. The resultant colonies had a poached egg appearance. Which among the following is the most likely organism implicated here?

A. Corynebacterium diphtheriae gravis
B. Corynebacterium diphtheriae mitis
C. Corynebacterium diphtheriae intermedius
D. Corynebacterium pseudotuberculosis

TABLE 27-2 Salient features of various biotypes of *Corynebacterium diphtheriae*

Features	Gravis	Intermedius	Mitis
Size	Short rods	Long rods	Long curved rods
Pleomorphism	+	+++	++++
Granules	Few or no	Few	Prominent
Staining reaction	Uniform	Irregular	Irregular
Colony	Daisy head	Frog's egg	Poached egg
On tellurite agar			
Surface	Malt	Shining	Glossy
Consistency	Brittle	Weak buttery	Buttery
Hemolysis	Variable	Nonhemolytic	Hemolytic
Starch fermentation	+	−	+
Phage types	14	3	4
Toxigenicity of strains	95%	99%	85%
Antigenic types	13	4	40
In broth medium	Pellicle formation and granular deposits	No pellicle, Granular deposit	Diffuse turbidity

Chlamydiae cannot make their own ATP. They are obligate intracellular organisms that cause mucosal infections. 2 forms:

- Elementary body (small, dense) is "enfectious" and enters cell via endocytosis; transforms into reticulate body.
- Reticulate body replicates in cell by fission; reorganizes into elementary bodies.

Chlamydia trachomatis causes neonatal and follicular adult conjunctivitis A, nongonococcal urethritis, PID, and reactive arthritis.

Chlamydophila pneumoniae and *Chlamydophila psittaci* cause atypical pneumonia; transmitted by aerosol.

Chlamydial cell wall lacks classic peptidoglycan (due to reduced muramic acid), rendering β-lactam antibiotics ineffective.

Chlamys = cloak (intracellular).

C psittaci—has an avian reservoir (parrots), causes atypical pneumonia.

Lab diagnosis: PCR, NAAT. Cytoplasmic inclusions (reticulate bodies) seen on Giemsa or fluorescent antibody–stained smear.

Treatment: doxycycline, azithromycin (for pregnant patients). Add ceftriaxone if concurrent gonorrhea testing is positive.

Chlamydia trachomatis serotypes

Types A, B, and C	Chronic infection, cause blindness due to follicular conjunctivitis in resource-limited areas.	ABC = Africa, Blindness, Chronic infection.
Types D–K	Urethritis/PID, ectopic pregnancy, neonatal pneumonia (staccato cough) with eosinophilia, neonatal conjunctivitis (1–2 weeks after birth).	D–K = everything else. Neonatal disease can be acquired during vaginal birth if pregnant patient is infected.
Types L1, L2, and L3	Lymphogranuloma venereum—small, painless ulcers on genitals → swollen, painful inguinal lymph nodes that ulcerate (buboes). Treat with doxycycline.	

	Salmonella typhi (ty-Vi)	*Salmonella* spp. except *S typhi*	*Shigella*
RESERVOIRS	Humans only	Humans and animals	Humans only
SPREAD	Hematogenous spread	Hematogenous spread is rare	Cell to cell; no hematogenous spread
H_2S PRODUCTION	Yes	Yes	No
FLAGELLA	Yes (salmon swim)	Yes (salmon swim)	No
VIRULENCE FACTORS	Endotoxin; Vi capsule (pronounce "tyVi")	Endotoxin	Endotoxin; Shiga toxin (enterotoxin)
INFECTIOUS DOSE (ID_{50})	High—large inoculum required; acid-labile (inactivated by gastric acids)	High	Low—very small inoculum required; acid stable (resistant to gastric acids)
EFFECT OF ANTIBIOTICS ON FECAL EXCRETION	Prolongs duration	Prolongs duration	Shortens duration (shortens *Shigella*)
IMMUNE RESPONSE	Primarily monocytes	PMNs in disseminated disease	Primarily PMN infiltration
GI MANIFESTATIONS	Constipation, followed by diarrhea	Diarrhea (possibly bloody)	Crampy abdominal pain → tenesmus, bloody mucoid stools (bacillary dysentery)
VACCINE	Oral vaccine contains live attenuated *S typhi* IM vaccine contains Vi capsular polysaccharide	No vaccine	No vaccine
UNIQUE PROPERTIES	Causes typhoid fever (salmon-colored truncal macular rash, abdominal pain, fever [pulse-temperature dissociation]; later GI ulceration and hemorrhage); treat with ceftriaxone or fluoroquinolone Carrier state with gallbladder colonization	Poultry, eggs, pets, and turtles are common sources Treatment is supportive; antibiotics are not indicated in immunocompetent individuals	4 F's: fingers, flies, food, feces In order of decreasing severity (less toxin produced): *S dysenteriae*, *S flexneri*, *S boydii*, *S sonnei* Invasion of M cells is key to pathogenicity; infectious dose is low

Salmonella
↓
Wilson Blair

Acid labile:
V.cholera, Rhinovirus

10. A 25-year-old HIV/AIDS man presents with fever, headache, photophobia and neck rigidity since the last 2 days. What is the empirical therapy of choice for this patient?

A. Cefepime + Vancomycin + Ampicillin
B. Ceftriaxone + Vancomycin
C. Isoniazid + Rifampicin + Pyrazinamide+ Ethambutol
D. Liposomal amphotericin B + Fluorocytosine

Common causes of meningitis

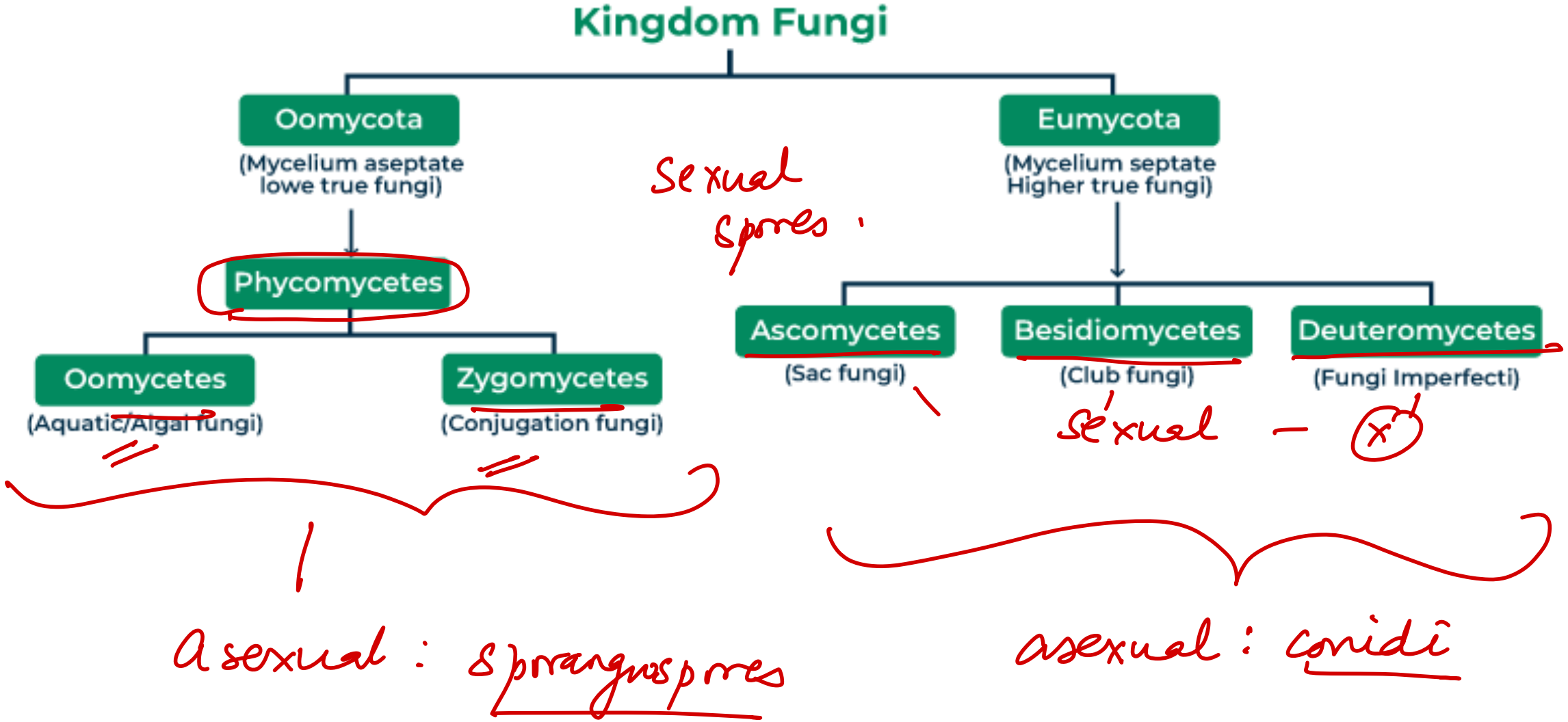
NEWBORN (0–6 MO)	CHILDREN (6 MO–6 YR)	6–60 YR	60 YR +
Group B *Streptococcus*	*S pneumoniae*	*S pneumoniae*	*S pneumoniae*
E coli	*N meningitidis*	*N meningitidis*	*N meningitidis*
Listeria	*H influenzae* type b	Enteroviruses	*H influenzae* type b
	Group B *Streptococcus*	HSV	Group B *Streptococcus*
	Enteroviruses		*Listeria*

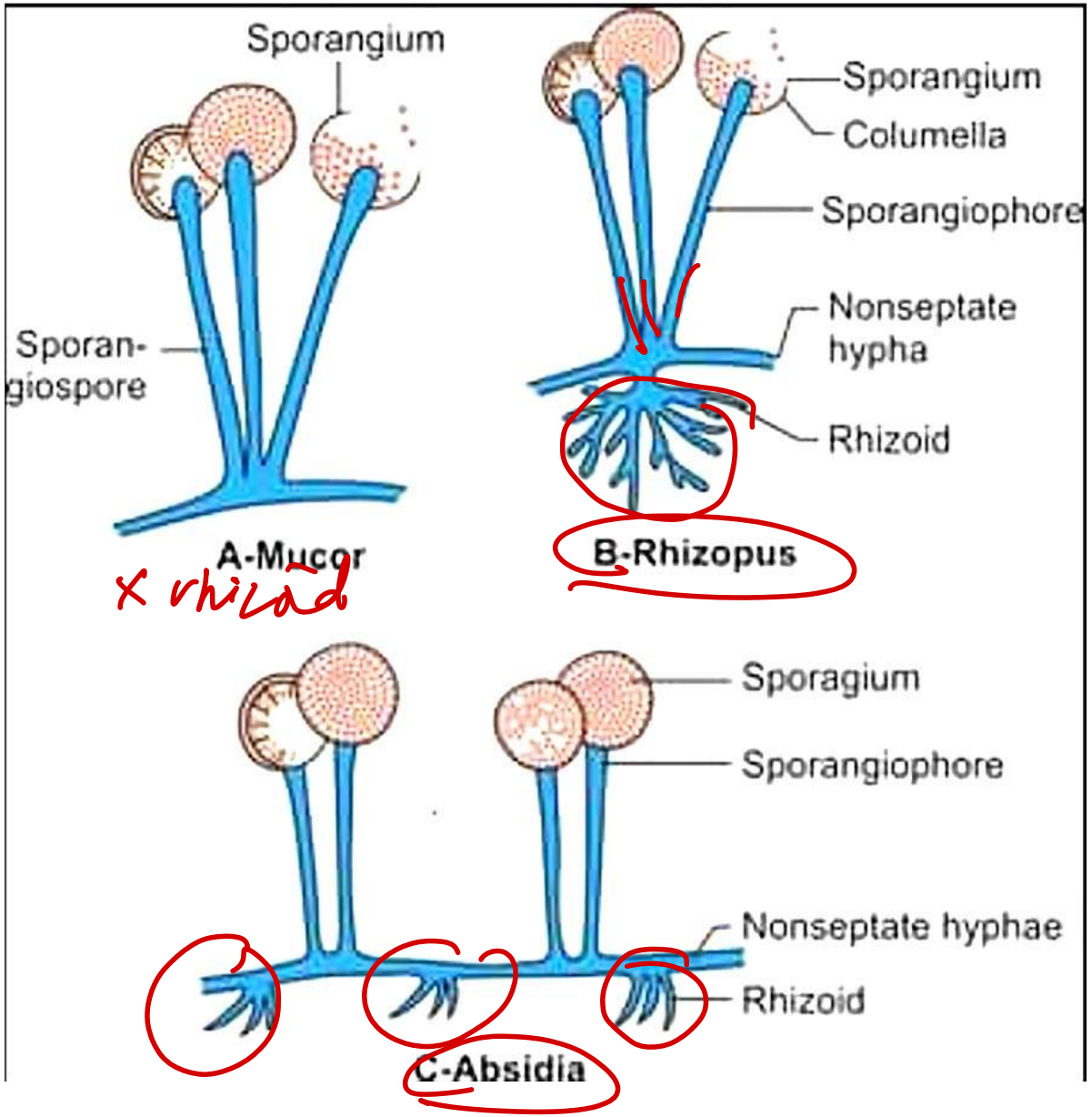
Give ceftriaxone and vancomycin empirically (add ampicillin if *Listeria* is suspected; add acyclovir if viral encephalitis is suspected).

Viral causes of meningitis: enteroviruses (especially coxsackievirus), HSV-2 (HSV-1 = encephalitis), HIV, West Nile virus (also causes encephalitis), VZV.

20. Which among the following is not a sexual spore?

A. Zygospore
B. Sporangiophore
C. Basidiospore
D. Ascospore


Kingdom Fungi
Oomycota
(Mycelium aseptate lowe true fungi)
Eumycota
(Mycelium septate Higher true fungi)
Sexual spores.
Phycomycetes
Oomycetes
(Aquatic/Algal fungi)
Zygomycetes
(Conjugation fungi)
Ascomycetes
(Sac fungi)
Besidiomycetes
(Club fungi)
Deuteromycetes
(Fungi Imperfecti)
Sexual – (x)
asexual : sporangiospores
asexual : conidi


Sporangium
Sporan-
giospore
A-Mucor
Sporangium
Columella
Sporangiophore
Nonseptate
hypha
Rhizoid
B-Rhizopus
Sporagium
Sporangiophore
Nonseptate hyphae
Rhizoid
C-Absidia

Nematode routes of infection

Ingested—*Enterobius*, *Ascaris*, *Toxocara*, *Trichinella*, *Trichuris*

Cutaneous—*Strongyloides*, *Ancylostoma*, *Necator*

Bites—*Loa loa*, *Onchocerca volvulus*, *Wuchereria bancrofti*

Schistosoma

Hookworm → C2M

Wuchereria

21. A 22-year-old man comes with complaints of intermittent bloody diarrhea for 3 weeks after consuming street food during his travel. He is febrile and has RUQ tenderness. Which of the following is the infective form of the likely protozoan causing this disease?

A. Trophozoite → trichomonas / Acanthameba / Naegleria.
B. Mature quadrinucleate cyst → E. histolytica / Giardia
C. Metacyclic trophozoite → Trypanosome.
D. Oocyst
E. Cyst → B. coli
F. Sporozoite – Plasmodium / Babesiosis → Toxo / cypto / cyclos / Isospora
G. Promastigote → L. donvani

QP inf

(x) immed inf in 5d

immed inf

22. Which of the following refers to a host in which the larval stage of the parasite remains viable without further development?

A. Definitive host → sexual
B. Intermediate host → asexual
C. Paratenic host → harbors larva
D. Reservoir host → harbors parasite adult

DH Not man	DH
Malaria	Anopheles
Babesia	Hard tick
Toxoplasma	Cat
E.Granulosus	Dog

TOXIN	SOURCE	ACTION	SYMPTOMS	TREATMENT
Histamine (scombroid poisoning)	Spoiled dark-meat fish such as tuna, mahi-mahi, mackerel, and bonito	Bacterial histidine decarboxylase converts histidine to histamine Frequently misdiagnosed as fish allergy	Mimics anaphylaxis: oral burning sensation, facial flushing, erythema, urticaria, itching; may progress to bronchospasm, angioedema, hypotension	Antihistamines Albuterol +/– epinephrine
Tetrodotoxin	Pufferfish	Binds fast voltage-gated Na^+ channels in nerve tissue, preventing depolarization	Nausea, diarrhea, paresthesias, weakness, dizziness, loss of reflexes	Supportive
Ciguatoxin	Reef fish such as barracuda, snapper, and moray eel	Opens Na^+ channels, causing depolarization	Nausea, vomiting, diarrhea; perioral numbness; reversal of hot and cold sensations; bradycardia, heart block, hypotension	Supportive

33. Which of the following tests is a type of ring precipitation test?

A. VDRL test
B. Rose Bengal test
C. Ascoli's thermoprecipitation test
D. Elek test

PRECIPITATION/FLOCCULATION:

Ring test: Ascoli, Lancefield

Slide: VDRL

Tube: Kahn

Immunodiffusion/ Gel: Elek test

Rocket electrophoresis

AGGLUTINATION

Slide: Blood grouping, Rose Bengal

Tube: Widal, Weil Felix, Paul-Bunnel, CAT, SAT, MAT

Coombs test

Indirect/Passive agglutination:

Latex-ASO, CRP, RF, HCG

Heme-Rose Waaler test

Complement fixation:

Wassermann, TPI

Sabin Feldman

5. What is the temperature used for this method of sterilisation?

A. 121°C for 15 minutes
B. 140°C for 120 minutes
C. 50°C for 120 minutes → ETO
D. 160°C for 120 minutes → Hot Air Oven.

4. Which of the following will be used to sterilise the instrument used to treat the following injury?

A. Ethylene oxide
B. Gamma rays
C. Hydrogen peroxide
D. Ultraviolet rays

Plasma sterilis

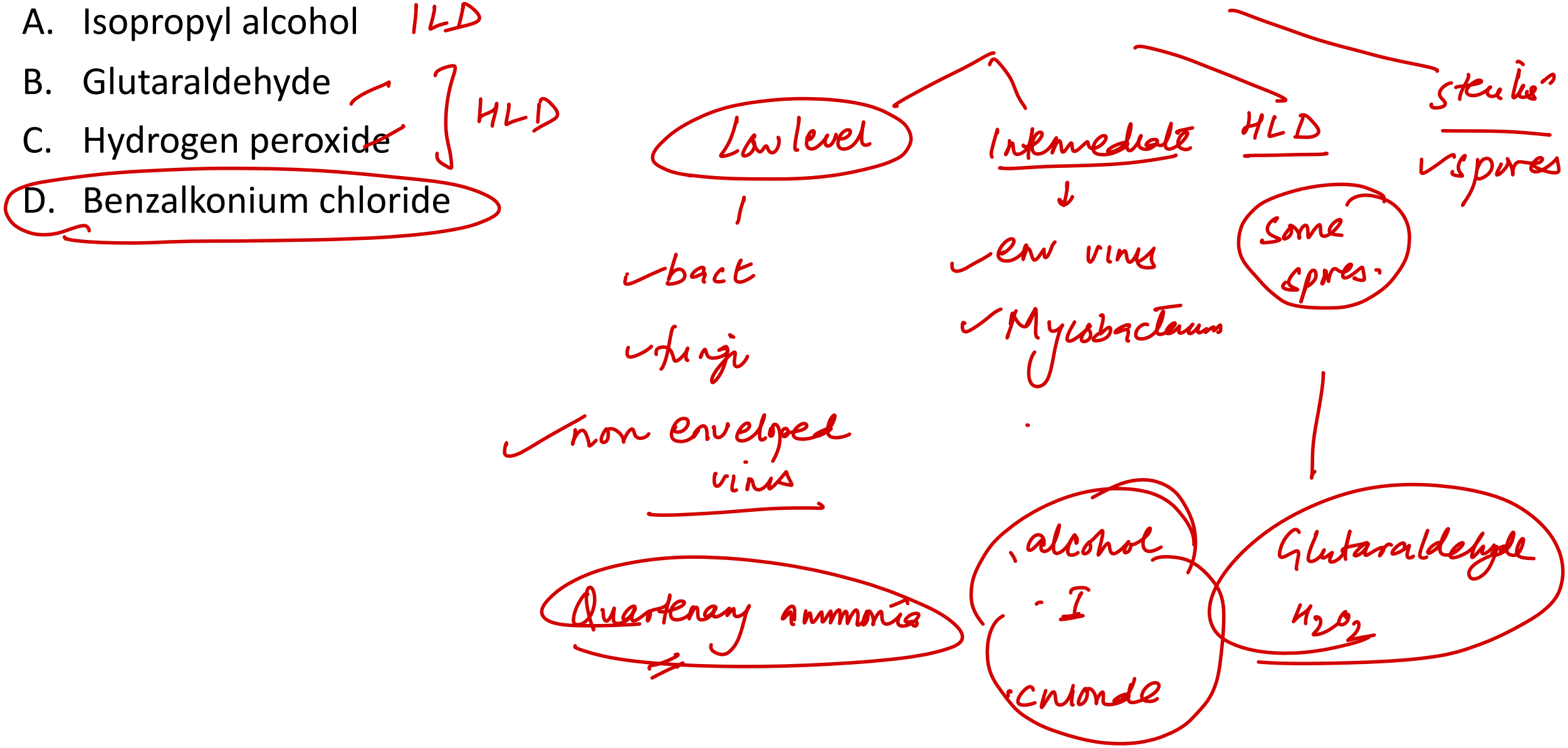
ACL

arthroscopes

urethro

6. Which among the following is a low-level disinfectant?

A. Isopropyl alcohol
B. Glutaraldehyde
C. Hydrogen peroxide
D. Benzalkonium chloride



2. Which of the following method of disinfection and sterilization can also kill spores?

1. Glutaraldehyde
2. Ethylene oxide
3. Pasteurization
4. Orthophthalaldehyde

A. 1, 3 and 4
B. 1, 2 and 4
C. 2,3 and 4
D. 1,2,3 and 4

Disinfectant	Activity	Advantages	Disadvantages	Recommendation
Glutaraldehyde	Broad spectrum microbicidal and sporicidal	Good compatibility	Requires activation Produces irritant fumes	For fibroscope and respiratory equipment
Orthophthaldehyde	Broad spectrum microbicidal and sporicidal	No activation required No fumes	Costly Stains equipment	For scopes Alternative to glutaraldehyde
Iodine compounds	Microbicidal spares M Tuberculosis and spores	Rapid action	Corrosive to metals, plastic and rubber Stains items	As an antiseptic
Alcohols	Wide microbicidal activity Non sporicidal	Non staining	Flammable	Hand disinfection For endoscopes
Phenols	Wide microbicidal activity Non sporicidal	Easily available Low cost	Irritant to skin Depigmentation	As surface disinfectant
Quaternary Ammonium compounds	Microbicidal spares M Tuberculosis, Not sporicidal, Not virucidal	Less irritant Good detergent property	Occupational asthma	As surface disinfectant For non-critical items
Peracetic acid	Broad spectrum microbicidal and sporicidal	No activation required Wide compatibility	Expensive Irritant to eye and skin	For fibroscopes
Chlorines	Wide microbicidal activity Non sporicidal	Low cost Fast acting	Corrosive to metals	Surface disinfectant To clean blood and body fluid spills
Hydrogen Peroxide	Broad spectrum microbicidal and sporicidal	No activation required	Serious eye damage Incompatible with some metals	Fogging of operating room For endoscopes
Formaldehyde	High level disinfectant	Non corrosive	Pungent odor and irritant fumes Carcinogenic	Withdrawn from use

ANATOMY

31. Arrange the following events of pre-embryonic development in order, from the earlier stage to the later stage:

1. Cavitation
2. Compaction
3. Implantation
4. Cleavage

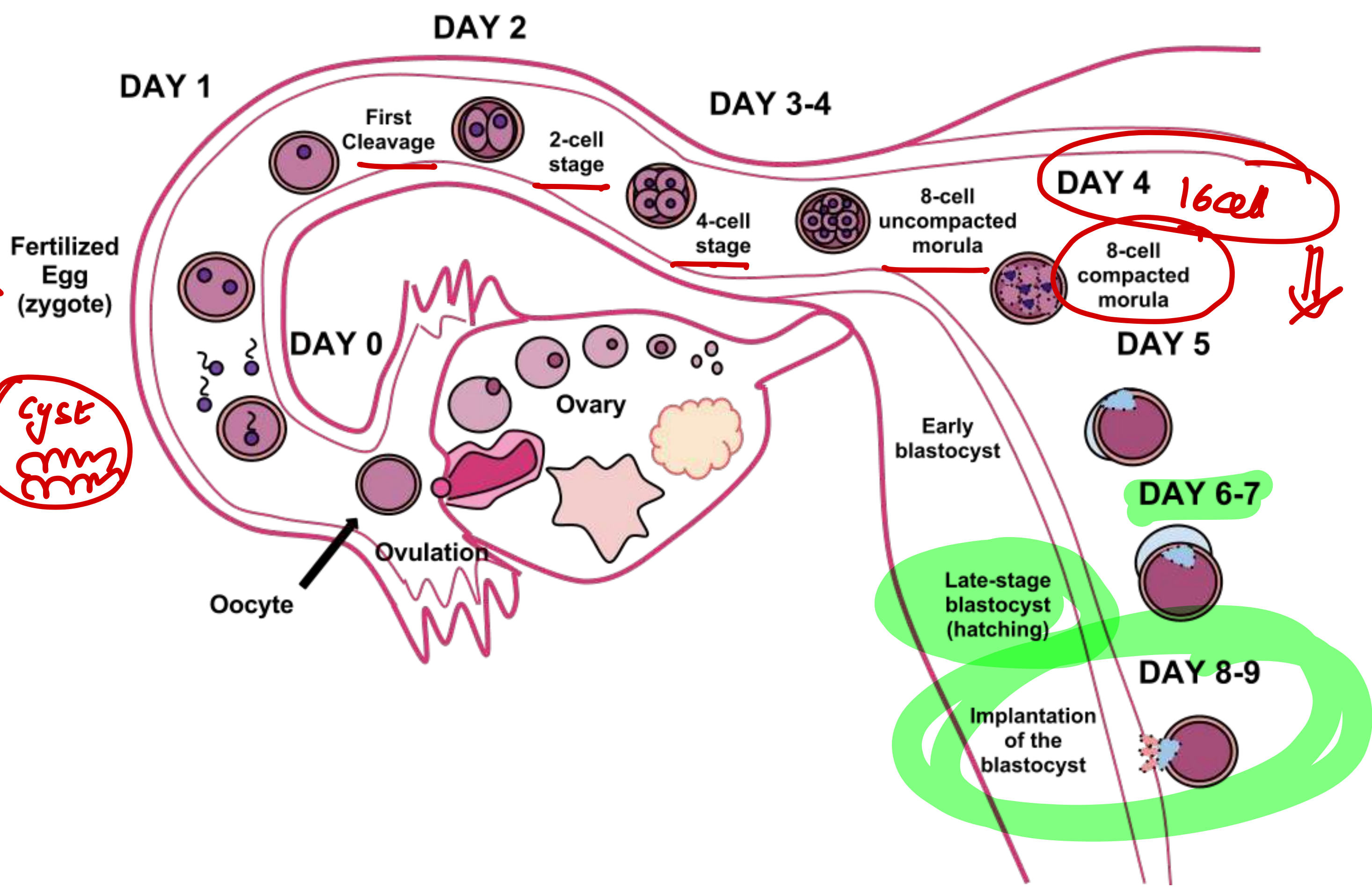
A. 2 - 4 - 1 - 3

B. 3 - 1 - 2 - 4

C. 4 - 2 - 3 - 1

D. 4 - 2 - 1 - 3

- Fertilisation
- Cleavage
- Compaction
- Differentiation
- Cavitation
- Hatching
- Implantation
- Bilaminar
- Gastrulation



33. The membranous labyrinth develops from which structure?

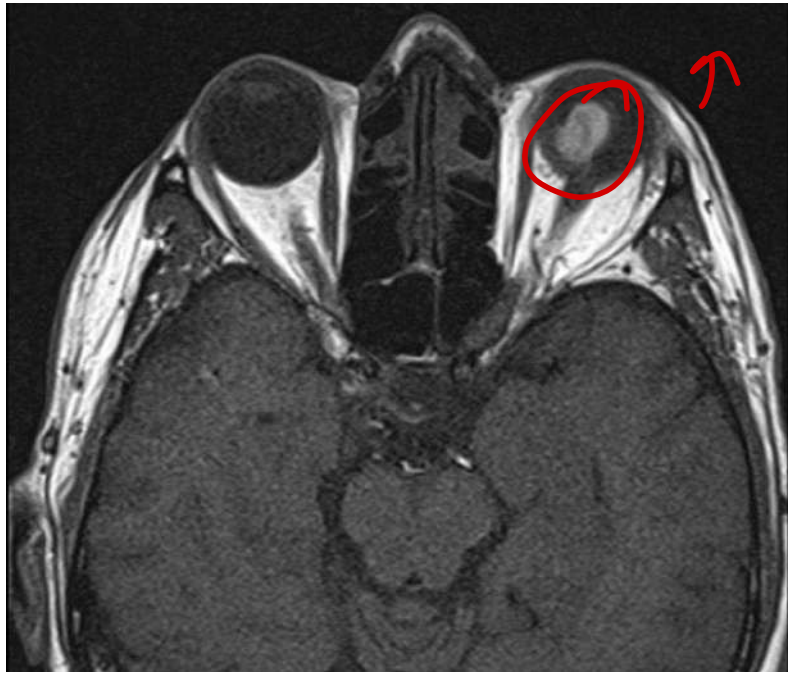
A. First pharyngeal pouch
B. First pharyngeal cleft
C. Otic vesicle
D. Meckel's cartilage

- Pinna → Hillock's (6) - 1st / 2nd arch.
- EAC 1st cleft - FA (arch)
- Middle ear, ET, antrum 1st pouch
- Malleus, incus - Arch 1st
- Stapes - 2nd Arch
- TM - all 3 - VH
- Stapes footplate - otic capsule e/ annular lig
- Membranous labyrinth - otic vesicle
- SCC, sup utricle → P S
- Saccule, cochlea → P I

CAP
ecto meso endo

50. What is the embryological origin of the cells involved in this condition?

A. Neural ectoderm
B. Mesoderm
C. Surface ectoderm
D. Neural crest



T/w MRI
melanin ↑

Neural crest

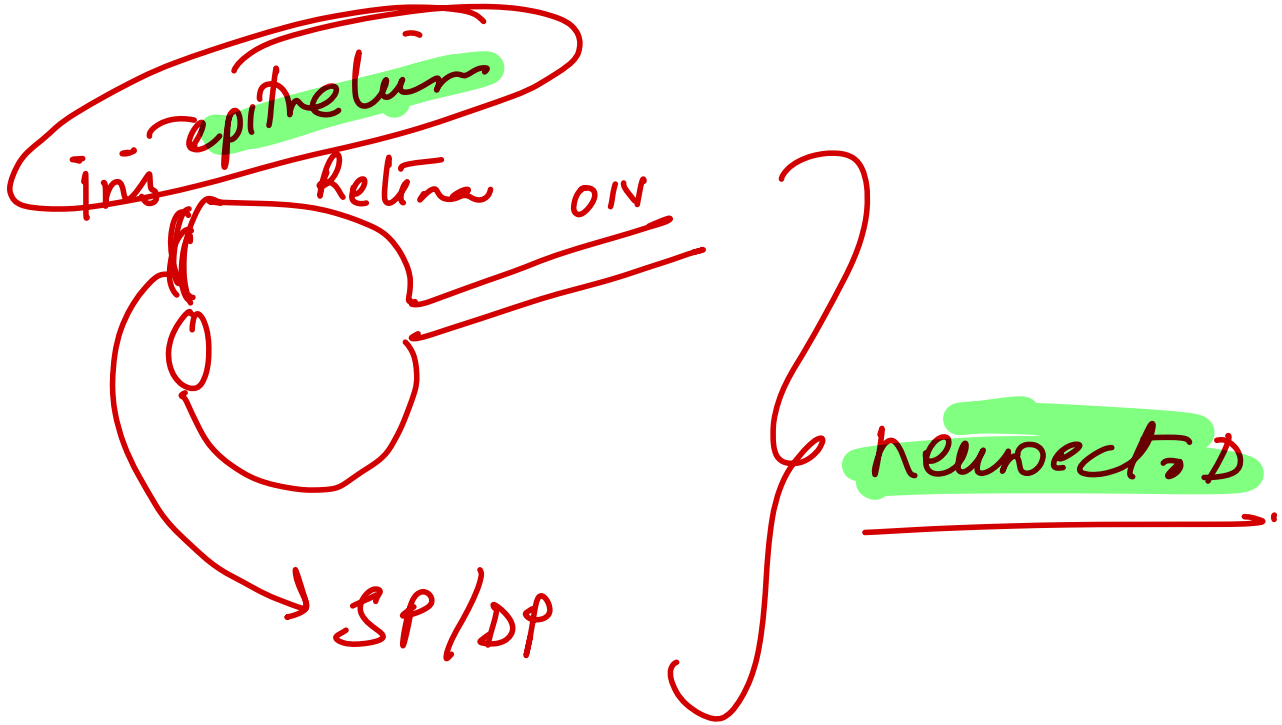
Corneal stroma, endothelium

Sclera (Except superotemporal)

Iris, choroid stroma

Melanocytes

Ciliaris



27. Arrange the following stages of lung development in order from the earliest stage to the latest stage.

1. Canalicular stage

2. Alveolar stage

3. Pseudoglandular stage

4. Saccular stage

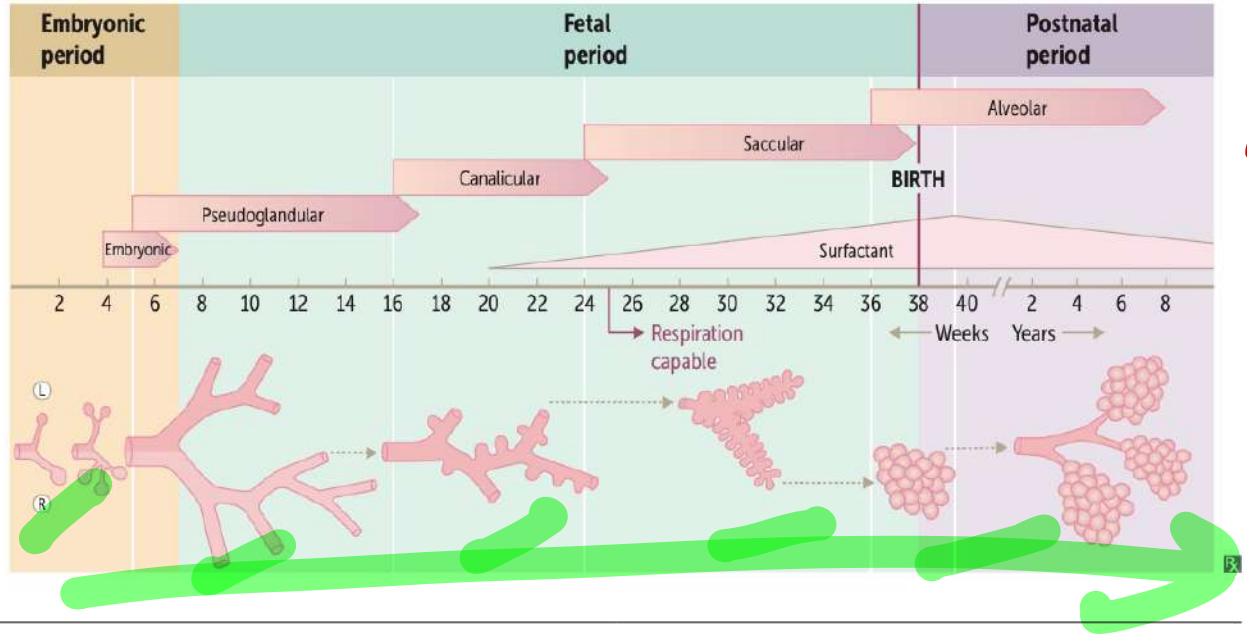
A. 3-1-4-2

B. 1-3-2-4

C. 3-4-1-2

D. 4-3-1-2

STAGE	STRUCTURAL DEVELOPMENT	NOTES
Embryonic (weeks 4–7)	Lung bud → trachea → bronchial buds → mainstem bronchi → secondary (lobar) bronchi → tertiary (segmental) bronchi.	Errors at this stage can lead to tracheoesophageal fistula, tracheal atresia/stenosis and pulmonary agenesis.
Pseudoglandular (weeks 5–17)	Endodermal tubules → terminal bronchioles. Surrounded by modest capillary network.	Respiration impossible, incompatible with life.
Canalicular (weeks 16–25)	Terminal bronchioles → respiratory bronchioles → alveolar ducts. Surrounded by prominent capillary network.	Airways increase in diameter. Pneumocytes develop starting at week 20 (surfactant synthesis). Respiration capable at week 25.
Saccular (week 24–birth)	Alveolar ducts → terminal sacs. Terminal sacs separated by 1° septae.	
Alveolar (week 36–8 years)	Terminal sacs → adult alveoli (due to 2° septation).	In utero, "breathing" occurs via aspiration and expulsion of amniotic fluid → ↑ pulmonary vascular resistance through gestation. At birth, air replaces fluid → ↓ pulmonary vascular resistance.



→ 20 wks = surfactant begins

AF: 28 wks

mature: 34 wks

32. Which of the following brainstem nuclei is not derived from the alar plate?

A. Inferior olivary → afferent
B. Substantia nigra aff
C. Dentate aff
D. Hypoglossal motor

30. In which layer of the cerebral cortex is the outer band of Baillarger seen?

A. External pyramidal layer
B. Internal granular layer
C. Internal pyramidal layer
D. External granular layer

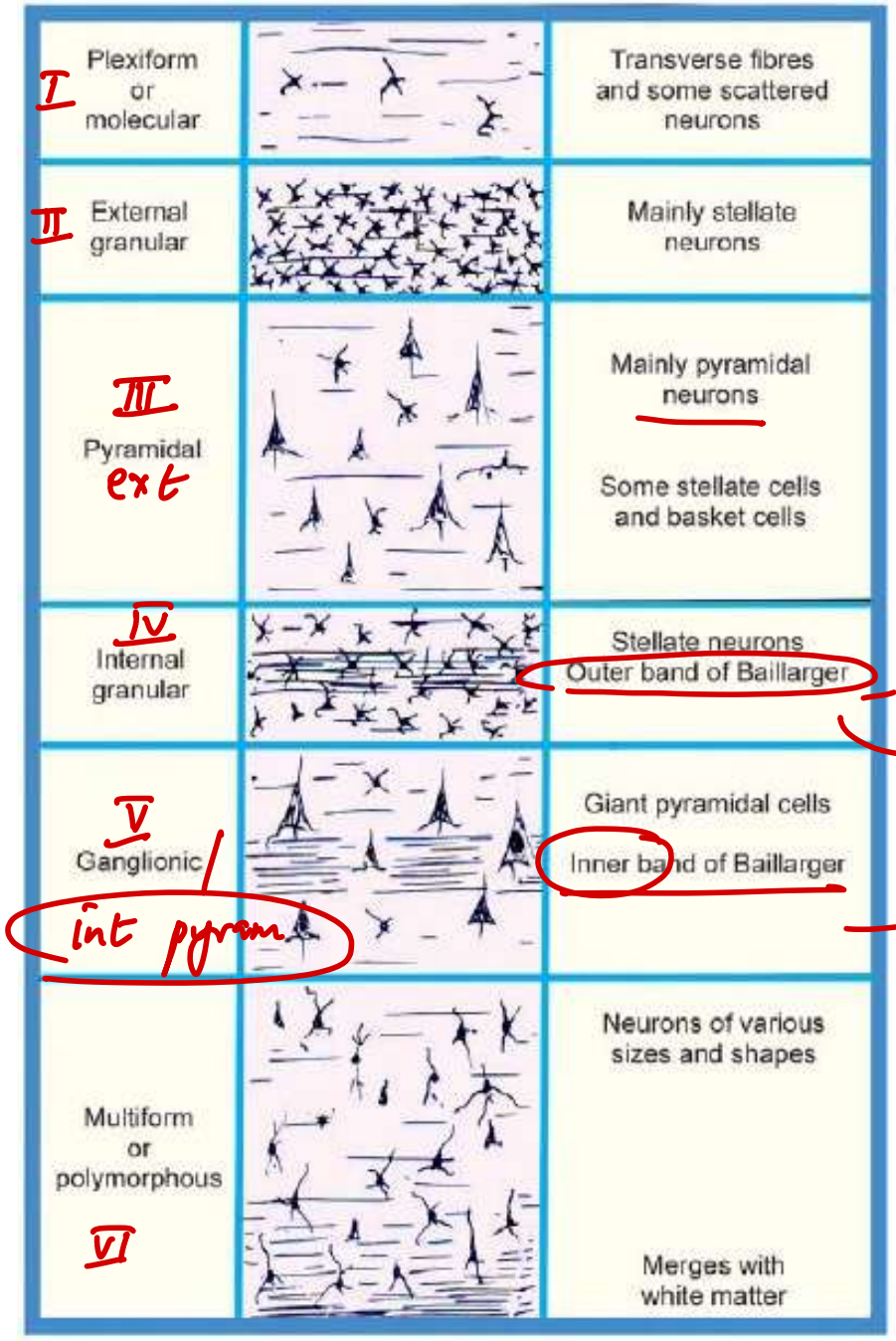


Fig. 15.2. Laminae of cerebral cortex.

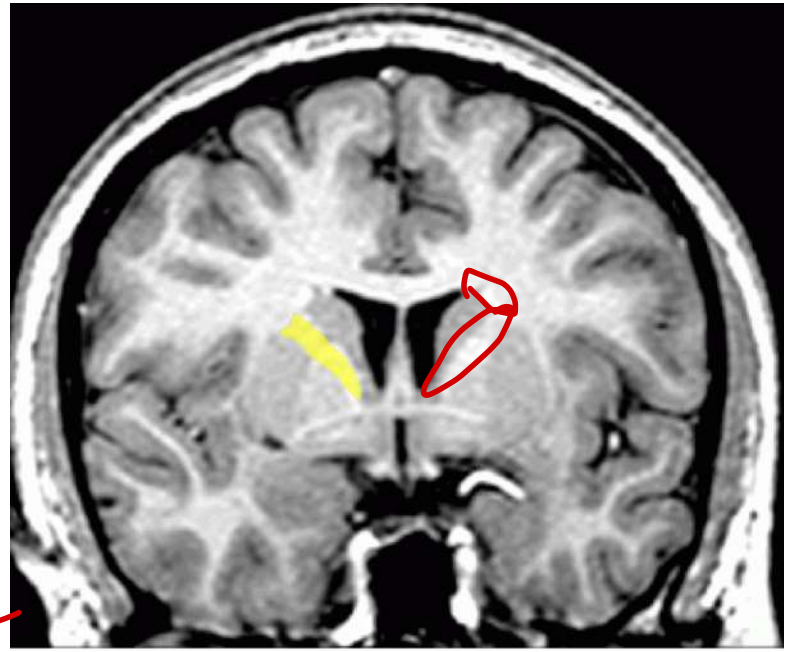
layers of cx

Input from VPL/VPM/LGB
stripe of Gennari
└ naked eye

→ C/S, C/B tract

36. Which of the following is not the blood supply of the marked structure?

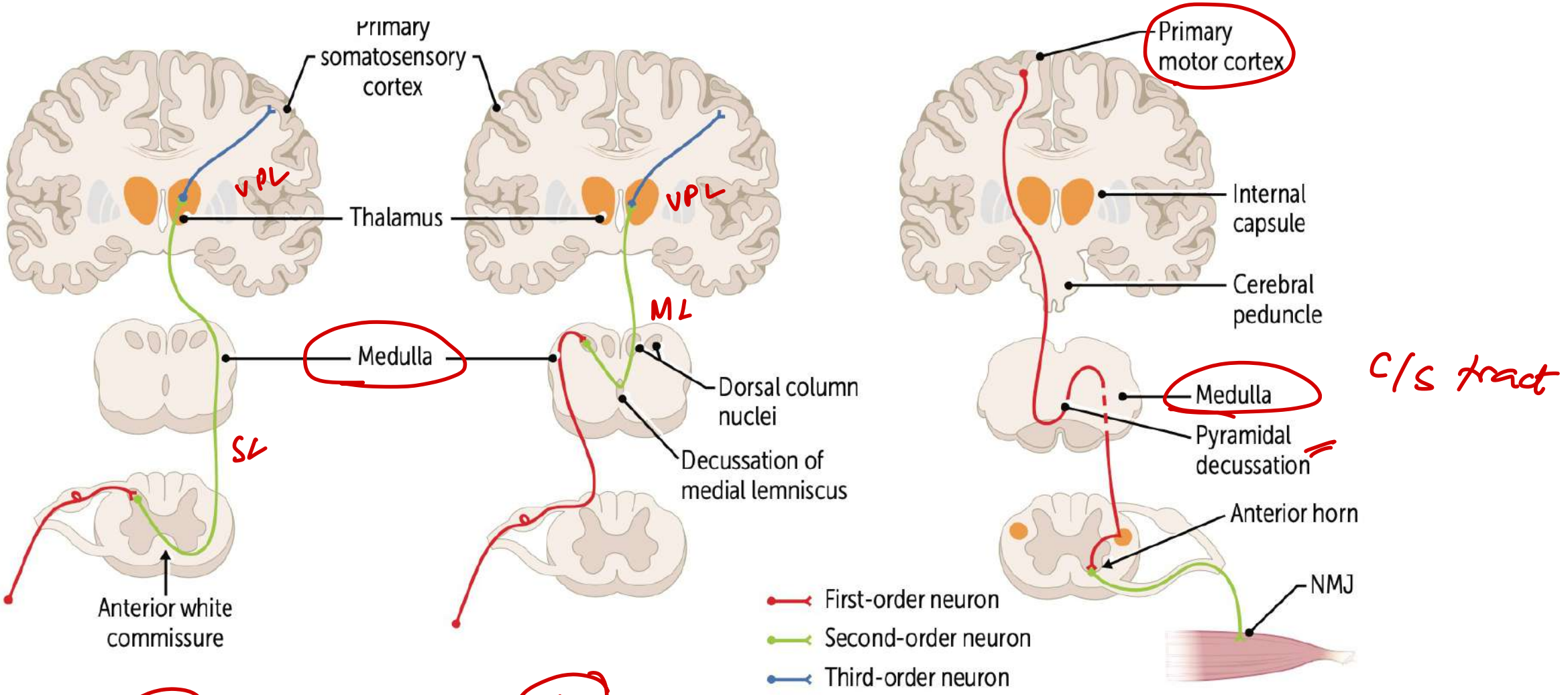
A. Middle cerebral artery
B. Recurrent artery of Heubner
C. Anterior choroidal artery
D. Posterior cerebral artery



PLIC
Rec artery of Heubner
Genu
Heub
Charcot
Charcot (MCA)
ant choroidal A
PCA ±
+ ant choroidal A
Sub Retro

37. Which of the following descending tracts in the spinal cord remains uncrossed?

A. Tectospinal tract
B. Rubrospinal tract
C. Vestibulospinal tract
D. Olivospinal
E. Pyramidal tract (c/s)


Primary somatosensory cortex
VPL
Thalamus
VPL
ML
Medulla
Dorsal column nuclei
Decussation of medial lemniscus
SL
Anterior white commissure
Primary motor cortex
Internal capsule
Cerebral peduncle
Medulla
Pyramidal decussation
Anterior horn
NMJ
First-order neuron
Second-order neuron
Third-order neuron
C/S tract
ST
DC
ascending

38. All of the following tracts pass through inferior cerebellar peduncle except

A. Posterior spinocerebellar

B. Anterior spinocerebellar → SCP

C. Cuneocerebellar

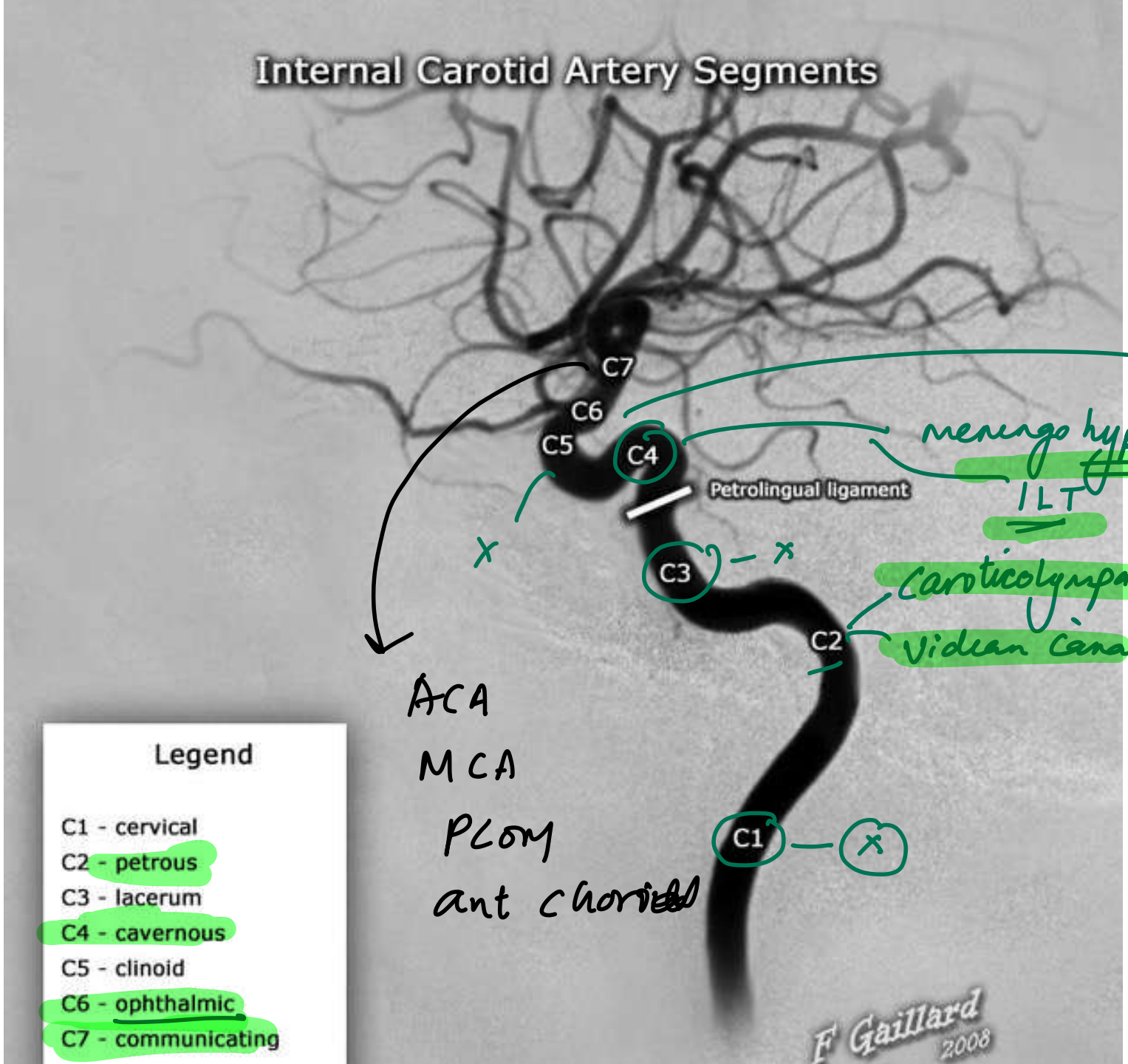
D. Olivocerebellar

trigemino
reticulo
vestibulo

	input	output
SCP	ant spinocereb	D-R-T tract (dentate rubro thalamus (VA/VL))
MCP	cortico/ponto	–
ICP	Remaining all	fastigial → vestibulo / Reticulo

39. Which of the following branches of internal Carotid artery are given off in the cervical region?

A. Pharyngeal branches
B. Pterygoid branch
C. Caroticotympanic branch
D. None of the above



ophtalmic / sup hypo

meningo hypop trunk

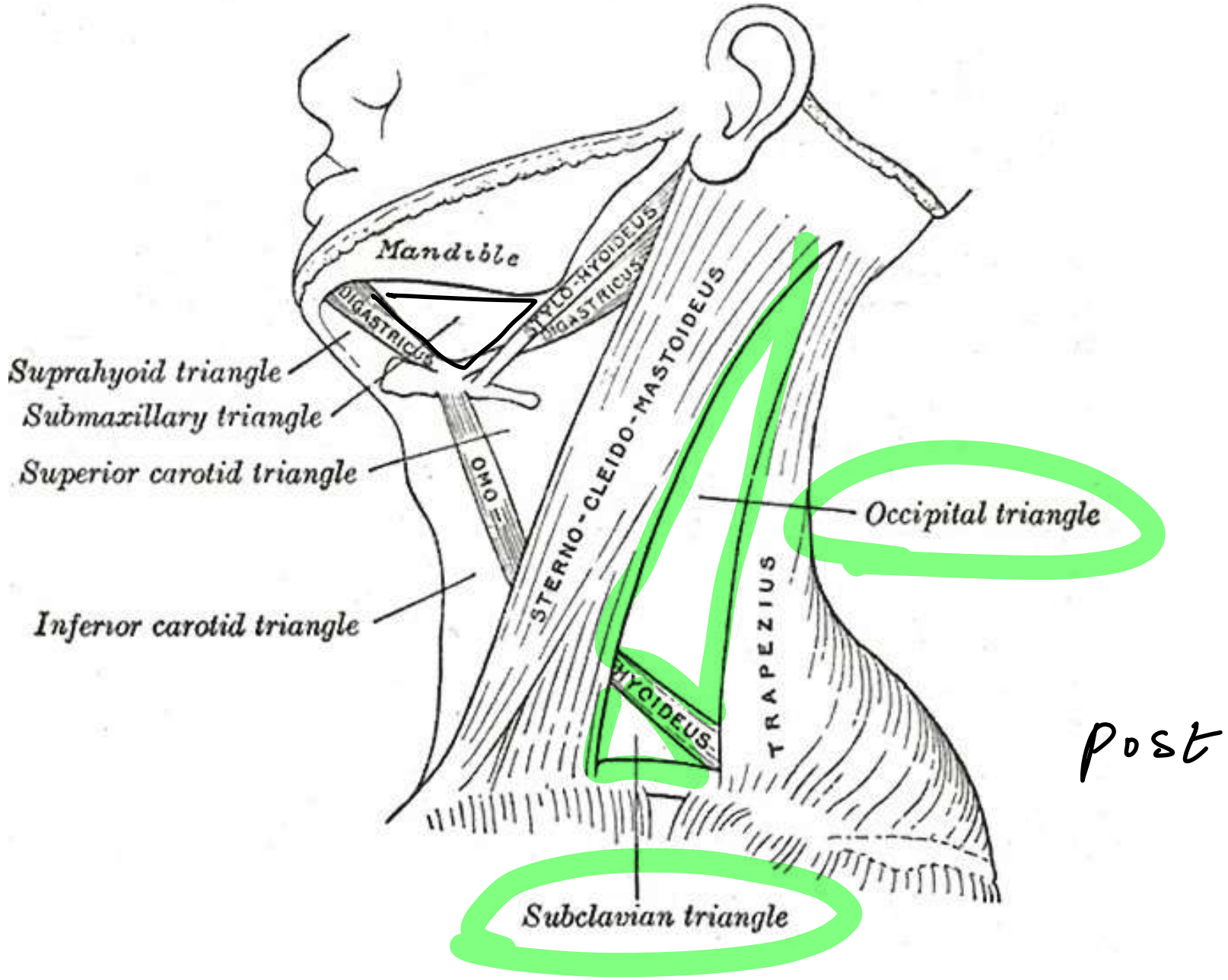
ILT

carticotympanic

vidian canal

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

A. Subclavian triangle
B. Submental triangle
C. Digastric triangle
D. Carotid triangle


Mandible
DIGASTRICUS
STYLO-HYOIDEUS
DIGASTRICUS
Suprahyoid triangle
Submaxillary triangle
Superior carotid triangle
OMO
STERNO-CLEIDO-MASTOIDEUS
Occipital triangle
Inferior carotid triangle
HYOIDEUS
TRAPEZIUS
Subclavian triangle

ant

post

28. Which of the following properties of the eustachian tube predisposes to higher incidence of acute otitis media in children than adults?

A. More angulated at isthmus - adult
B. Rigid cartilage - adult
C. Dense elastin in the cartilage - adult
D. Wider and shorter tube

Ostmann's pad of fat ↓ in infants

7. Which of the following blood vessels does not contribute to the blood supply of the abnormal structure?

1. Internal carotid artery
2. External carotid artery
3. Facial artery
4. Lingual artery
5. Maxillary artery

A. 1 only
B. 1 and 5
C. 1 and 3
D. 3, 4 and 5

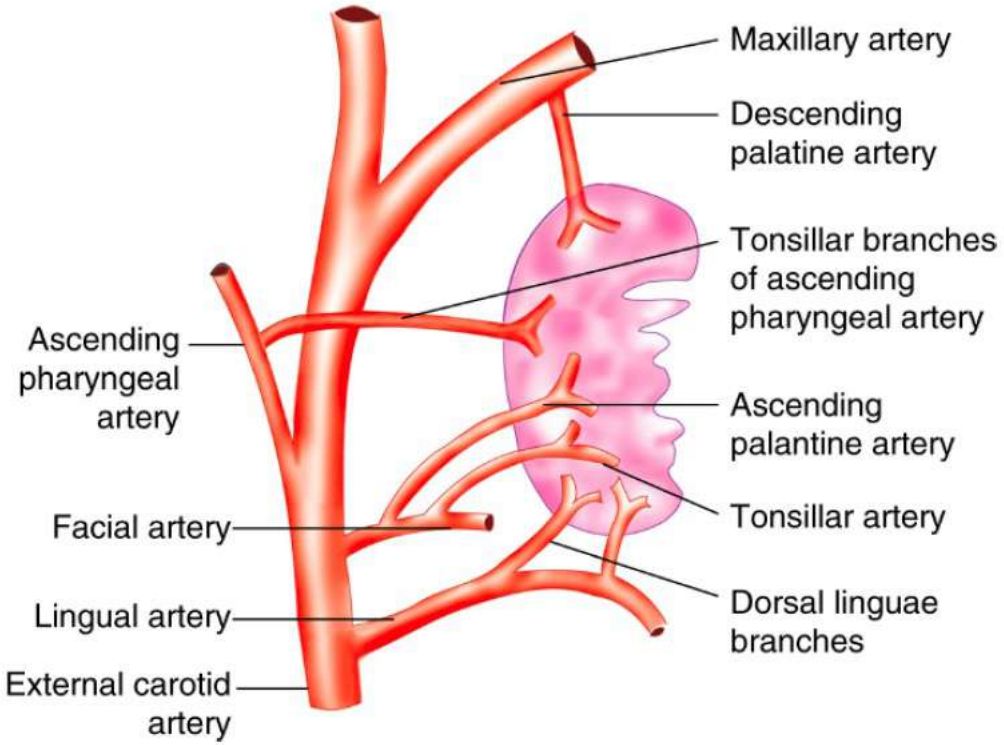


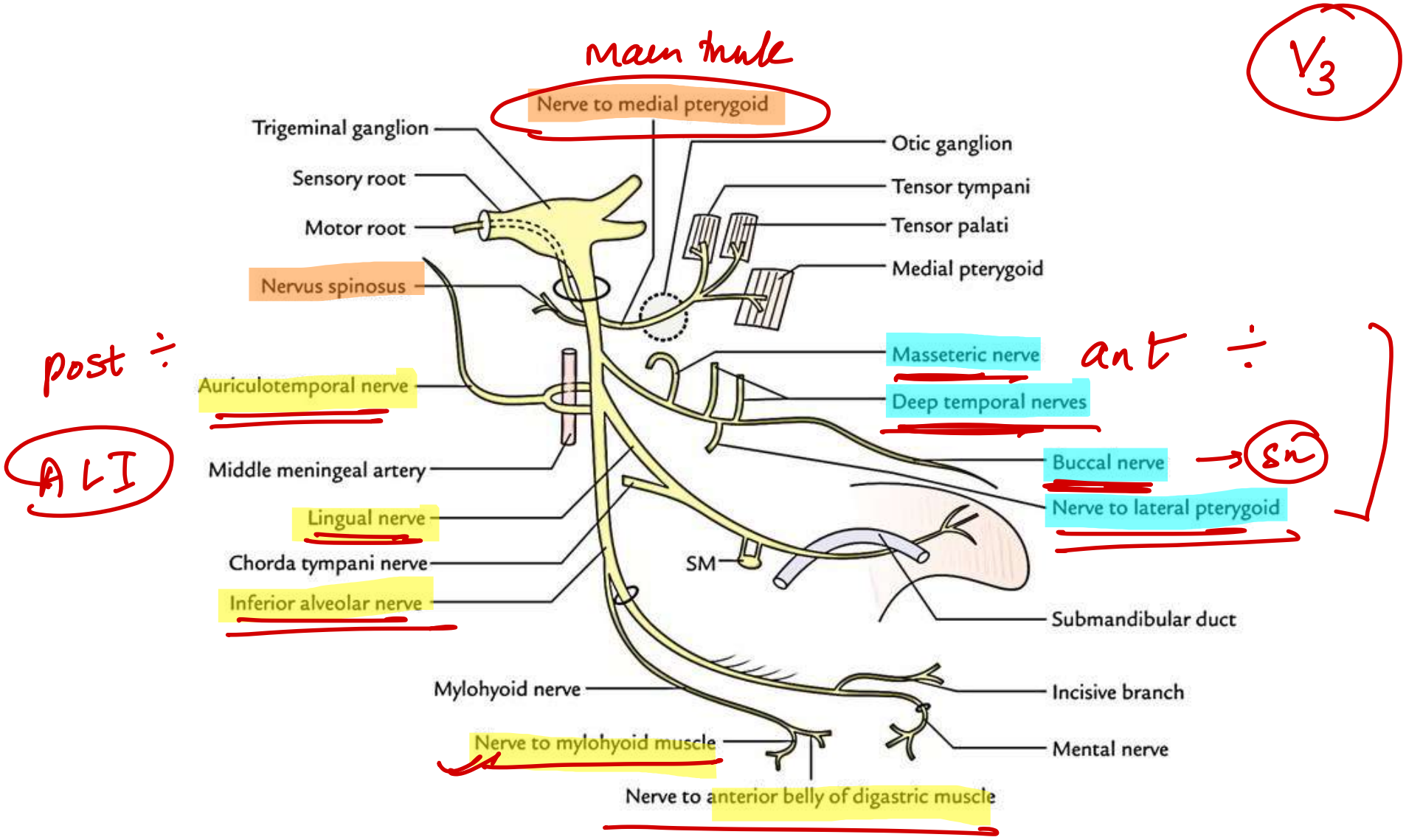
Figure 51.3. Arterial supply of tonsil.

The tonsil is supplied by five arteries (Figure 51.3).

1. Tonsillar branch of facial artery. This is the main artery.
2. Ascending pharyngeal artery from external carotid.
3. Ascending palatine, a branch of facial artery.
4. Dorsal linguae branches of lingual artery.
5. Descending palatine branch of maxillary artery.

25. A 40-year-old man presents with difficulty chewing on one side. On examination, there is reduced movement of the mandible due to impaired muscle function. Which of the following nerves, a branch of the anterior division of the mandibular nerve, is most likely affected?

A. Masseteric
B. Lingual
C. Auriculotemporal
D. Meningeal


main trunk
V3
Nerve to medial pterygoid
Trigeminal ganglion
Sensory root
Motor root
Nervus spinosus
Otic ganglion
Tensor tympani
Tensor palati
Medial pterygoid
post ÷
ant ÷
Masseteric nerve
Auriculotemporal nerve
Deep temporal nerves
Buccal nerve
SN
ALI
Middle meningeal artery
Nerve to lateral pterygoid
Lingual nerve
Chorda tympani nerve
SM
Inferior alveolar nerve
Submandibular duct
Mylohyoid nerve
Incisive branch
Nerve to mylohyoid muscle
Mental nerve
Nerve to anterior belly of digastric muscle

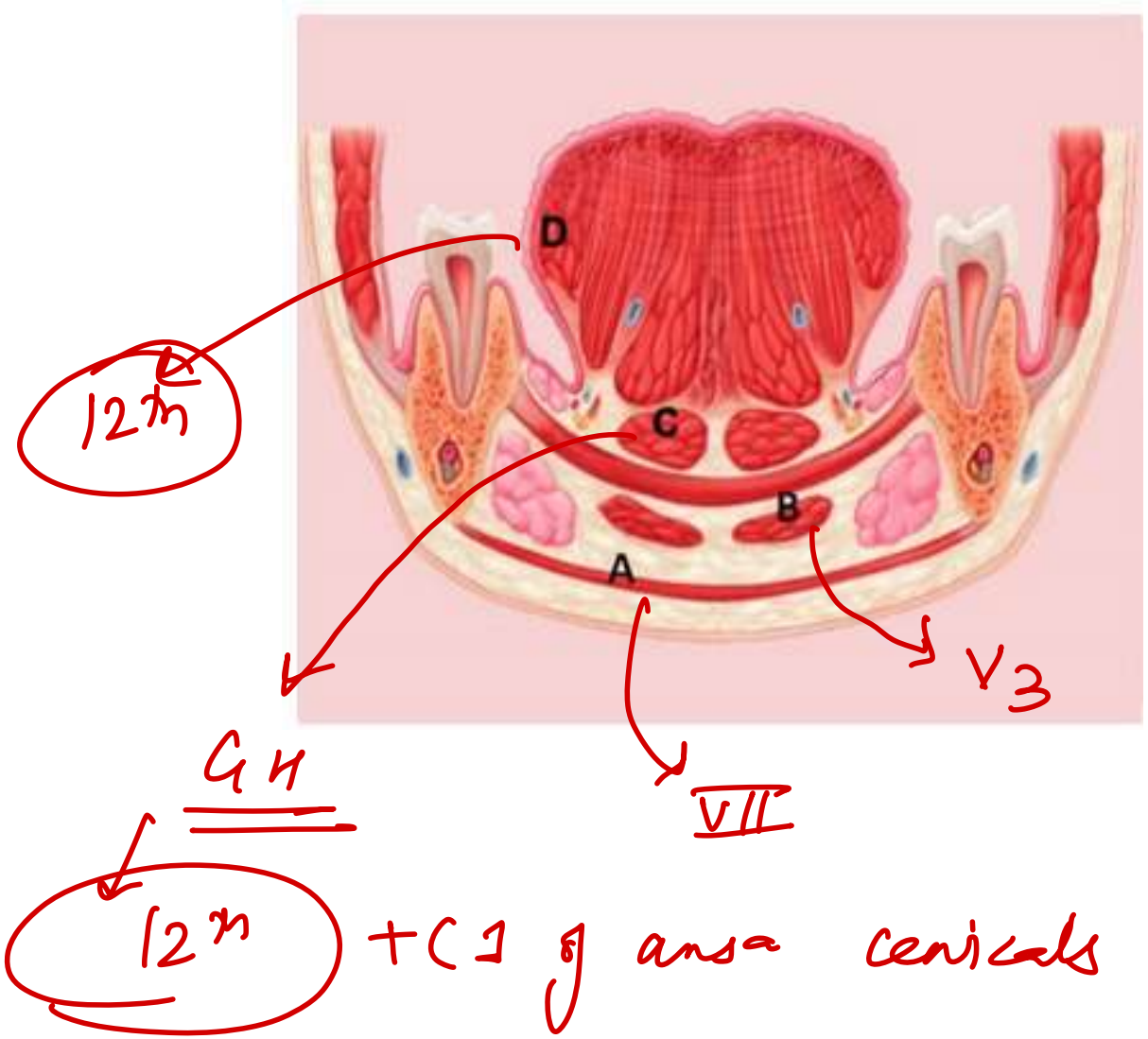
62. Identify the incorrectly matched pair with respect to its nerve supply of the marked structures in the given image:

A) Facial Nerve

B) Trigeminal Nerve

C) Glossopharyngeal Nerve

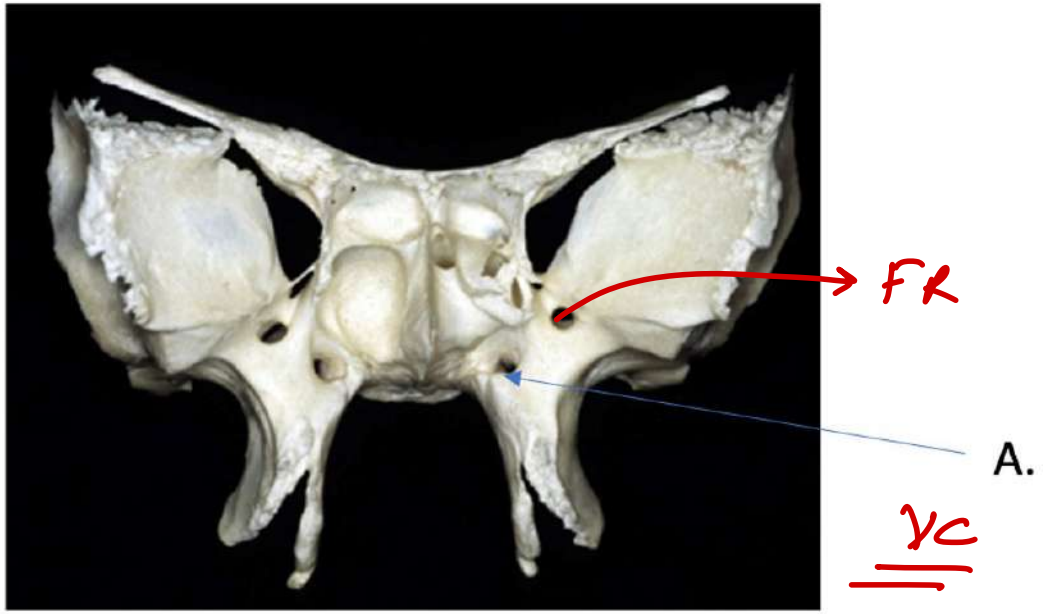
D) Hypoglossal Nerve

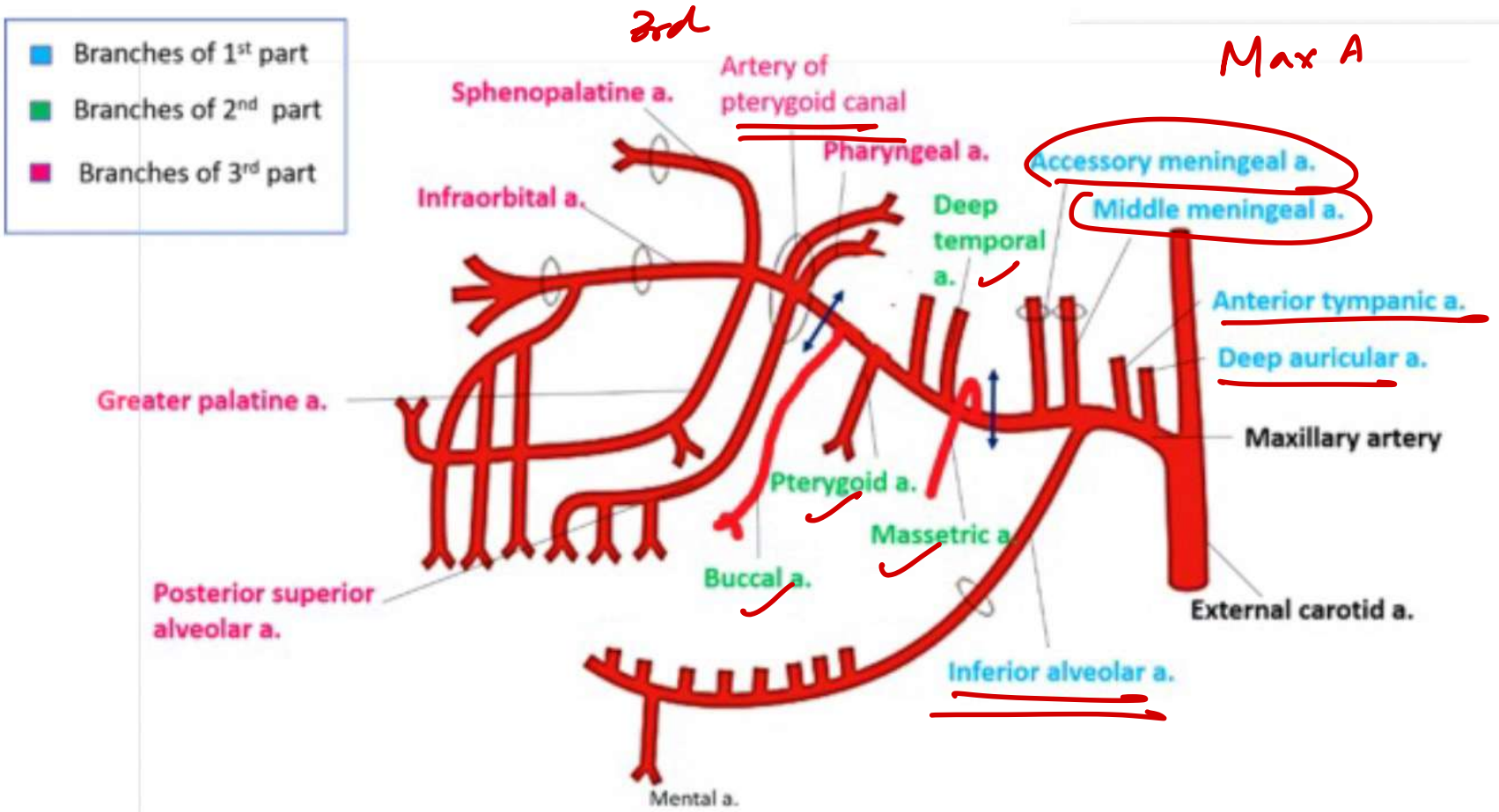



Vertical muscle intersecting Styloglossus the superior longitudinal muscle
Hyoglossus
Genioglossus
Geniohyoid
Mylohyoid
Digastric, anterior belly
Styloglossus
Buccinator
Submandibular duct
Sublingual gland, posterior pole
Lingual nerve
Submandibular gland superficial part
Platysma

43. The artery passing through the structure marked A is a branch of which part of the maxillary artery?

A. First part
B. Second part
C. Third part
D. Fourth part

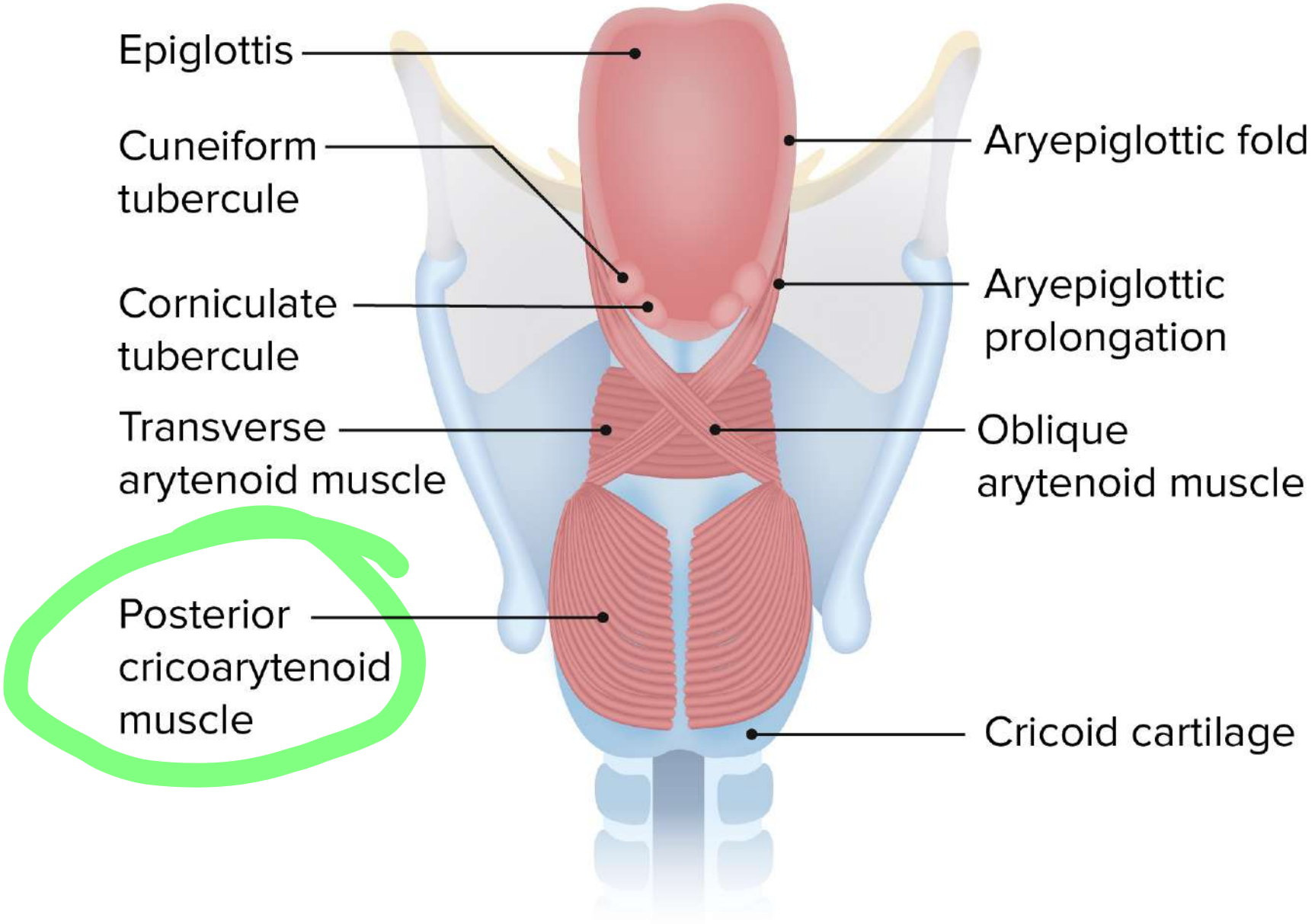



Branches of 1st part
Branches of 2nd part
Branches of 3rd part
Sphenopalatine a.
Artery of pterygoid canal
Pharyngeal a.
Infraorbital a.
Deep temporal a.
Accessory meningeal a.
Middle meningeal a.
Anterior tympanic a.
Deep auricular a.
Greater palatine a.
Maxillary artery
Pterygoid a.
Massetric a.
Buccal a.
Posterior superior alveolar a.
External carotid a.
Inferior alveolar a.
Mental a.

42. Which of the following muscle causes opening of laryngeal inlet?

A. Vocalis
B. Thyroepiglotticus
C. Cricoarytenoid
D. Thyroarytenoid

Muscles acting on the larynx	
Movement	Muscle
Elevation of larynx	Thyrohyoid, mylohyoid
Depression of larynx	Sternohyoid, sternothyroid
Opening inlet of larynx	Thyroepiglottic
Closing inlet of larynx	Aryepiglottic
Abductor of vocal cords	Posterior cricoarytenoid only
Adductor of vocal cords	Lateral cricoarytenoid (whisper), transverse and oblique arytenoids
Tensor of vocal cords	Cricothyroid
Relaxor of vocal cords	Thyroarytenoid and vocalis (modulator)


Epiglottis
Cuneiform tubercule
Corniculate tubercule
Transverse arytenoid muscle
Posterior cricoarytenoid muscle
Aryepiglottic fold
Aryepiglottic prolongation
Oblique arytenoid muscle
Cricoid cartilage

41. A 40-year-old man with a history of tobacco chewing presented with a non-healing ulcer over the tip of the tongue. Biopsy revealed squamous cell carcinoma. Which of the following would be the sentinel lymph nodes?

A. Submandibular lymph nodes → ant 2/3 tongue marginal

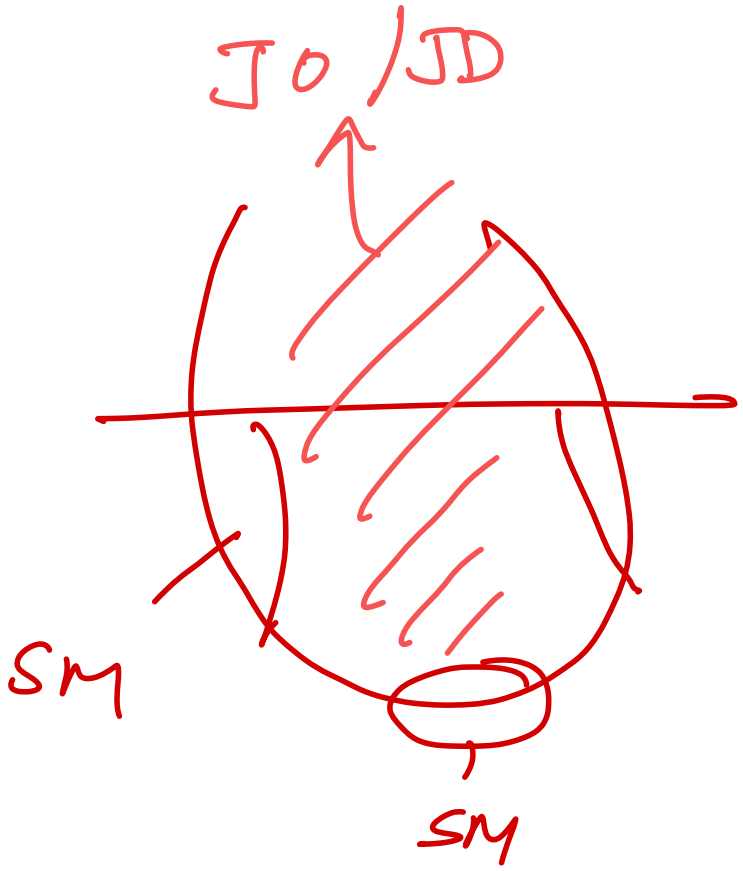
B. Submental lymph nodes - Tip

C. Deep cervical lymph nodes → Root (level 2)

D. Jugulo-omohyoid lymph nodes

→ ant 2/3 central

→ post 1/3



48. A pedestrian crossing the road is met with a road traffic accident. He has presented to the emergency with left foot drop. Power in tibialis anterior, extensor digitorum longus, and extensor hallucis longus is 0/5. While power in tibialis posterior, gastrocnemius is 4/5. What is the likely site of injury?

A. Supracondylar fracture of left femur

B. Fracture neck of left fibula

C. Posterior dislocation of femur head

D. Left ankle fracture

CPN → DPN

Nerve	Muscle Group	Muscles Supplied	Main Actions
Superficial Peroneal Nerve (SPN)	Lateral compartment of leg	- Peroneus (Fibularis) longus- Peroneus (Fibularis) brevis	Eversion of foot
Deep Peroneal Nerve (DPN)	Anterior compartment of leg	- Tibialis anterior- Extensor hallucis longus- Extensor digitorum longus- Peroneus (Fibularis) tertius	Dorsiflexion of ankleToe extension
	Dorsum of foot	- Extensor digitorum brevis- Extensor hallucis brevis	Extension of toes
Tibial Nerve	Posterior compartment of leg (superficial)	- Gastrocnemius- Soleus- Plantaris	Plantarflexion of foot
	Posterior compartment of leg (deep)	- Popliteus- Flexor digitorum longus- Flexor hallucis longus- Tibialis posterior	Plantarflexion, toe flexion, inversion
	Sole of foot (via medial plantar nerve)	- Abductor hallucis- Flexor digitorum brevis- Flexor hallucis brevis- 1st lumbrical	Toe flexion, abduction of hallux
	Sole of foot (via lateral plantar nerve)	- Abductor digiti minimi- Quadratus plantae- 2nd–4th lumbricals- Adductor hallucis- Flexor digiti minimi brevis- Interossei (dorsal & plantar)	Toe abduction/adduction, lateral toe flexion

SGN: Gl medius, minimus, TFL
N to OI: SG
N to piriformis Pyramis

IGN: Gl. maximus
N to QF: IG

46. Which of the following muscles causes external rotation of the hip joint?

A. Gluteus medius → Abductor + IR
B. Gluteus maximus → Extension + ABER
C. Tensor fascia lata → IR
D. Adductor longus → adductor

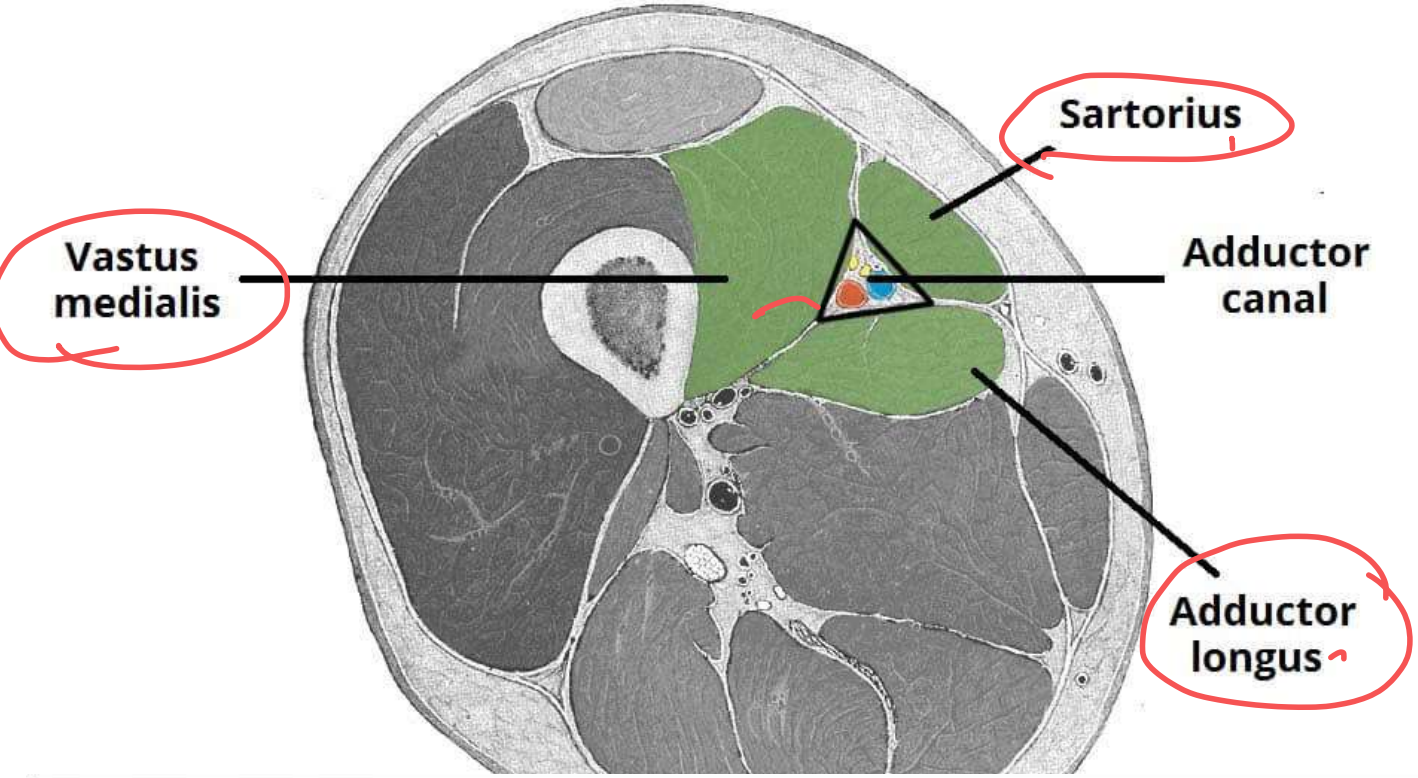
flexor : iliopsoas.

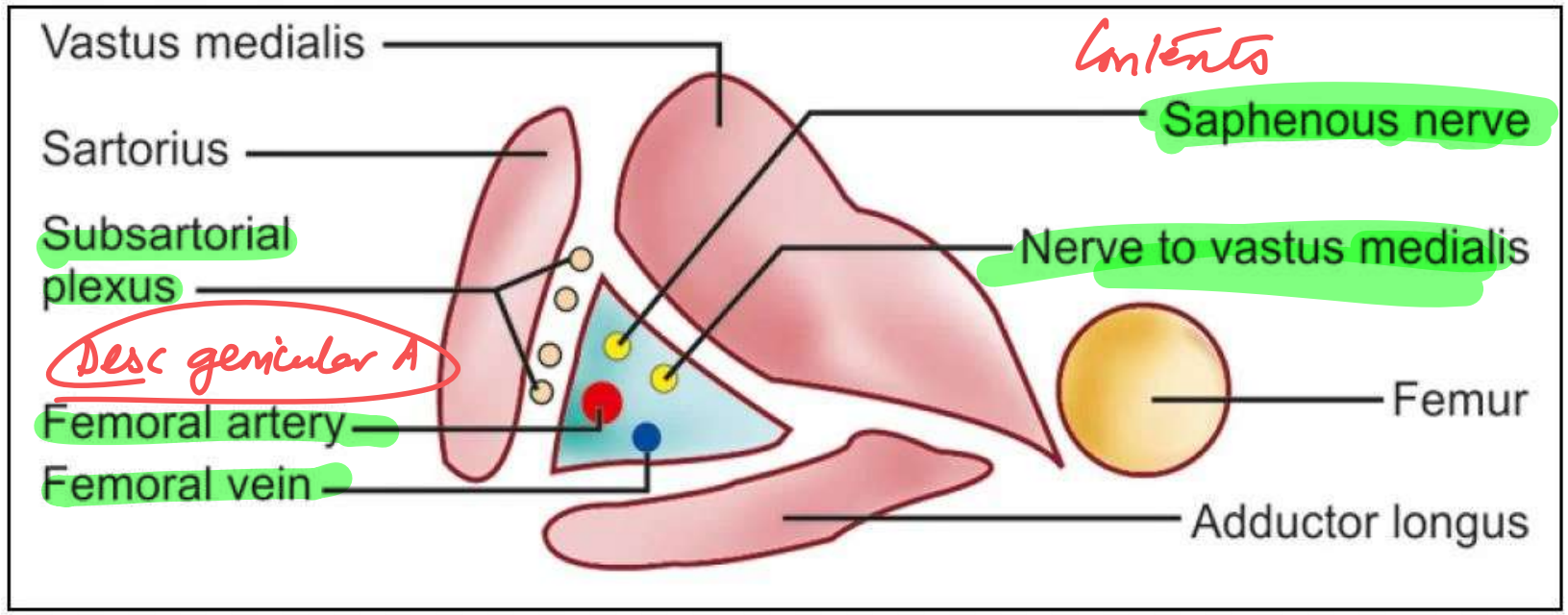
Nerve	Muscle Supplied
Median nerve	Pronator teres
	Flexor carpi radialis (FCR)
	Palmaris longus
	Flexor digitorum superficialis (FDS)
	Thenar muscles (except adductor pollicis)
	1st and 2nd lumbricals
AIN	Flexor pollicis longus (FPL)
	Pronator quadratus
	Lateral half of FDP (index, middle)

Muscles Supplied by Ulnar Nerve
Flexor carpi ulnaris, medial half of FDP
Hypothenar group, medial 2 lumbricals, all interossei, adductor pollicis, deep head of FPB, palmaris brevis

47. The hunter's canal lies beneath which muscle?

A. Vastus medialis
B. Adductor longus
C. Sartorius
D. Adductor magnus

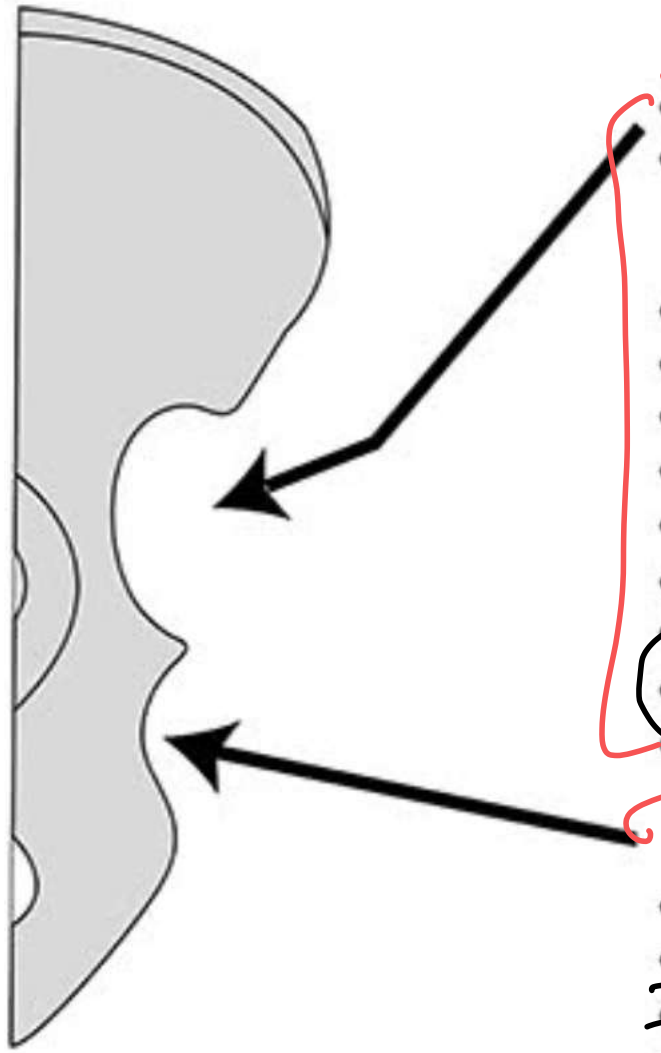

Sartorius
Vastus medialis
Adductor canal
Adductor longus


Vastus medialis
Sartorius
Subsartorial plexus
Desc genicular A
Femoral artery
Femoral vein
Saphenous nerve
Nerve to vastus medialis
Femur
Adductor longus

49. Which of the following structures do not pass through both greater and lesser sciatic foramens?

A. Pudendal nerve
B. Tendon of obturator internus — lesser
C. Nerve to obturator internus
D. Internal pudendal vessels

STRUCTURES PASSING THROUGH THE GREATER & LESSER SCIATIC FORMINA



VIA GREATER SCIATIC FORAMEN

- Superior gluteal vessels
- Superior gluteal nerve

PIRIFORMIS

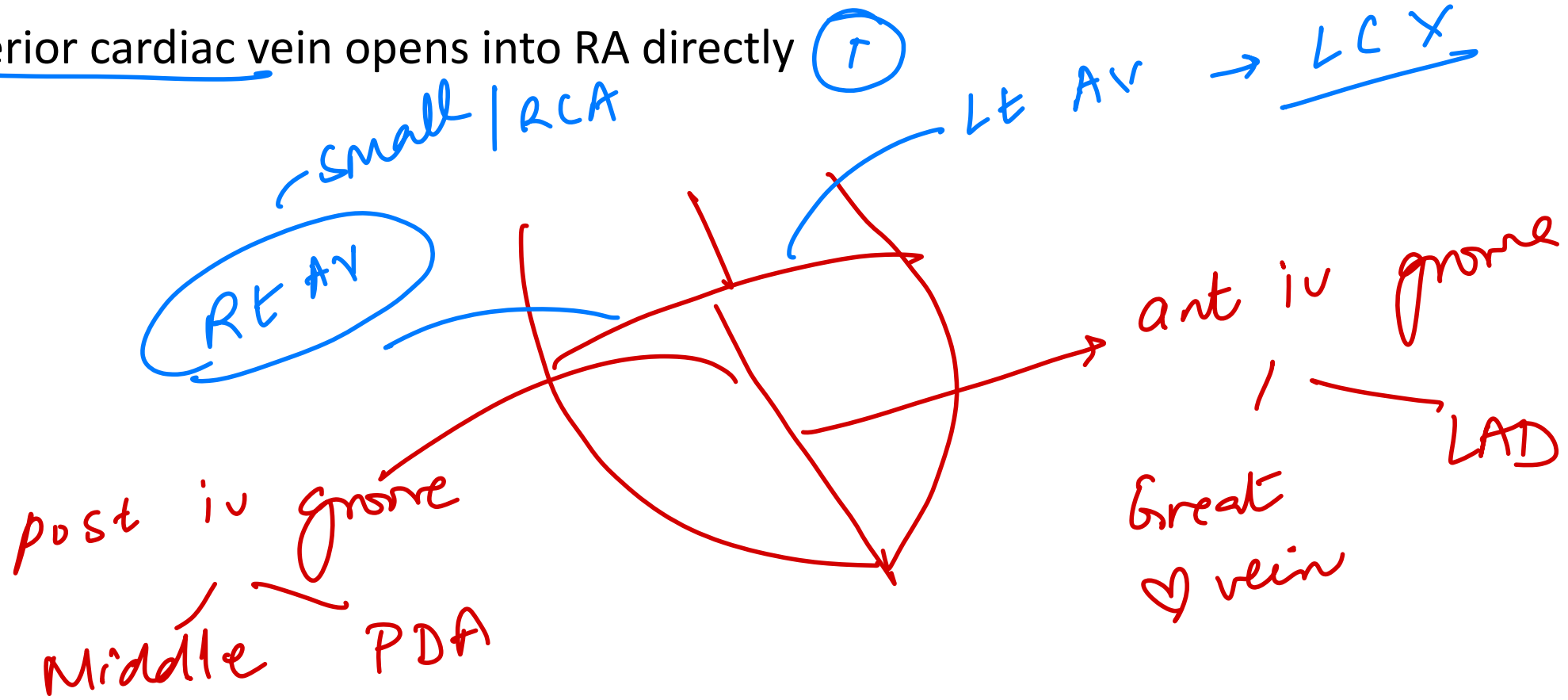
- Inferior gluteal vessels
- Inferior gluteal nerve
- Sciatic nerve
- Perforating cutaneous nerve
- Posterior femoral cutaneous nerve
- Nerve to quadratus femoris
- Nerve to obturator internus
- Pudendal nerve
- Internal pudendal vessels

VIA LESSER SCIATIC FORAMEN

- Tendon of obturator internus
- Nerve to obturator internus
- Internal pudendal vessels
- Pudendal nerve

26. Which among the following is wrong about the venous drainage of the heart?

A. Coronary sinus is guarded by the thebesian valve
B. Middle cardiac vein lies in the posterior atrioventricular groove
C. Great cardiac vein accompanies left anterior descending artery
D. Anterior cardiac vein opens into RA directly



29. You should not insert the needle below which level in midaxillary line so as not to damage the liver?

A. 6th rib

B. 10th rib

C. 8th rib

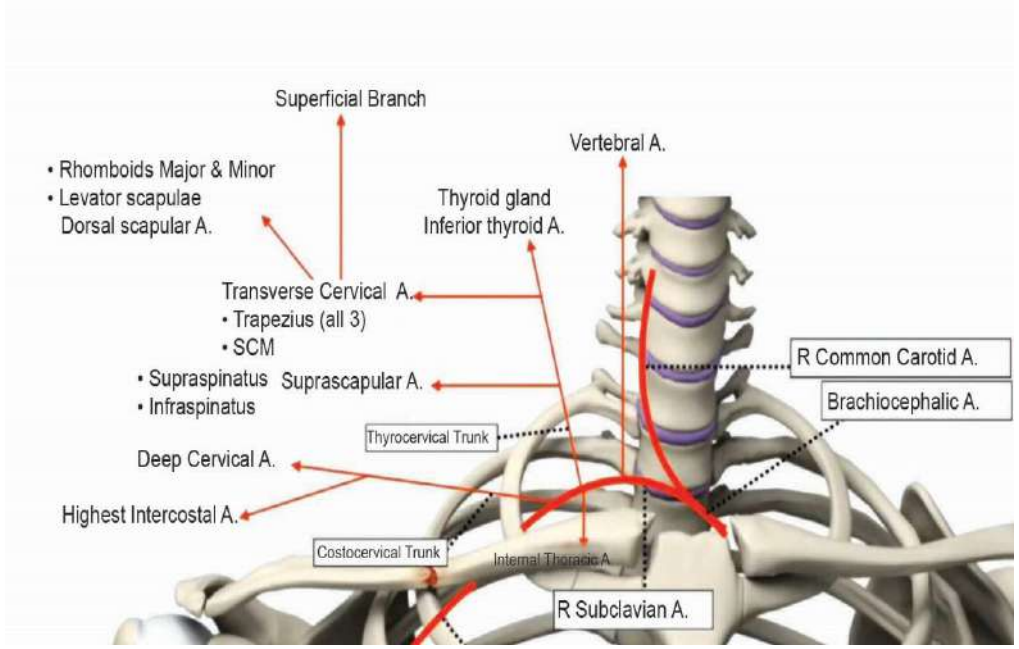
D. 12th rib

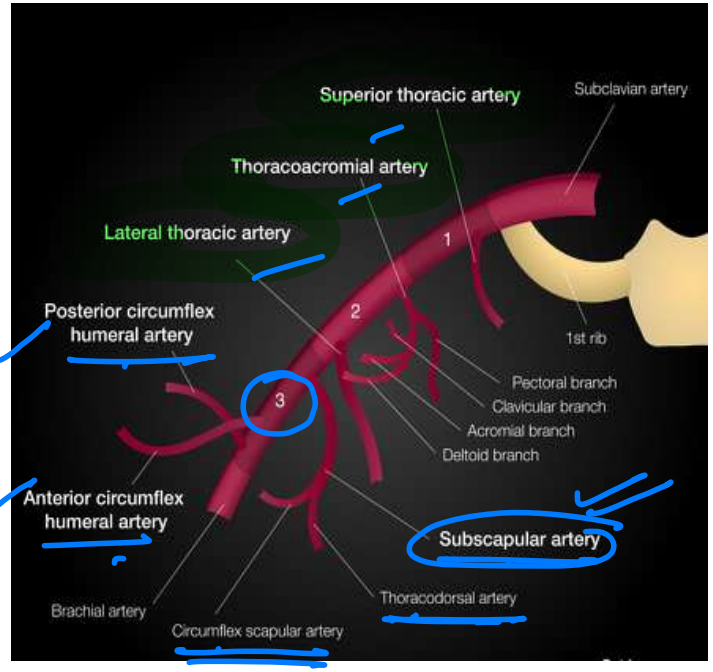
8 - 10

Midclavicular line: 6th rib-8th rib
Mid-axillary line: 8th rib-10th rib
Paravertebral line: 10th rib-12th rib

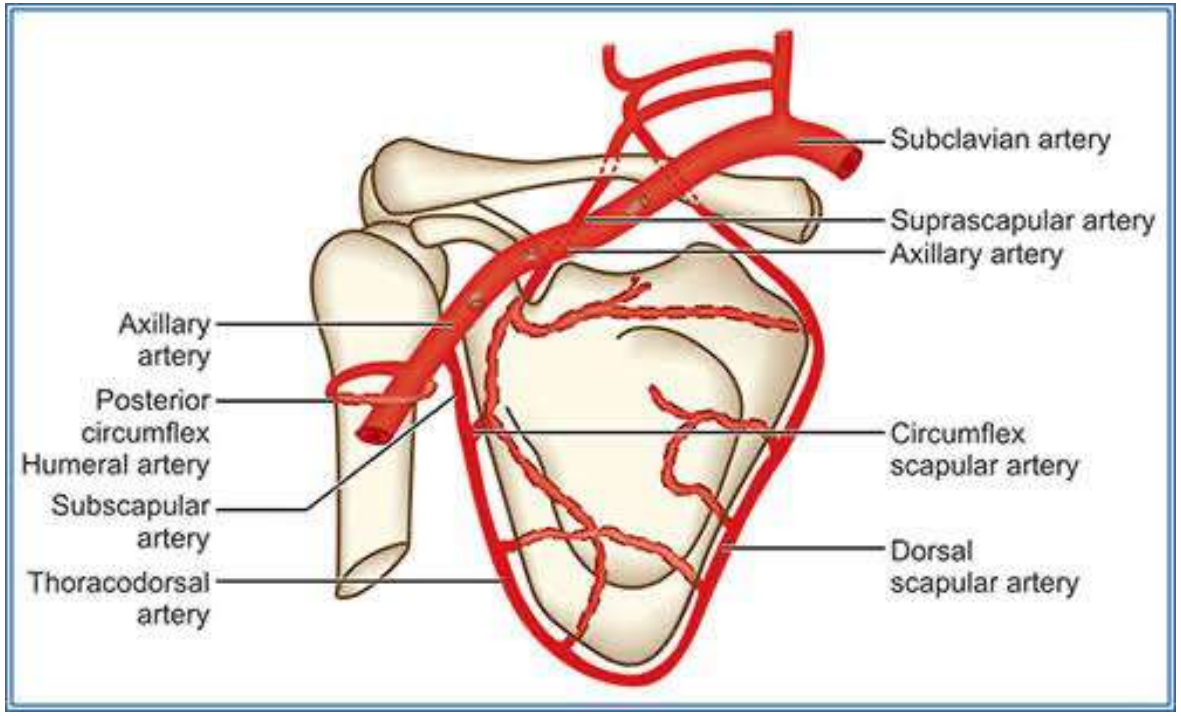
24. Which of the following arteries does not contribute to the scapular anastomosis?

a. Lateral thoracic artery
b. Transverse cervical artery
c. Subscapular artery
d. Suprascapular artery


Superficial Branch
Vertebral A.
• Rhomboids Major & Minor
• Levator scapulae
Dorsal scapular A.
Thyroid gland
Inferior thyroid A.
Transverse Cervical A.
• Trapezius (all 3)
• SCM
• Supraspinatus
• Infraspinatus
Suprascapular A.
R Common Carotid A.
Brachiocephalic A.
Thyrocervical Trunk
Deep Cervical A.
Highest Intercostal A.
Costocervical Trunk
Internal Thoracic A.
R Subclavian A.


Superior thoracic artery
Subclavian artery
Thoracoacromial artery
Lateral thoracic artery
1
2
3
1st rib
Posterior circumflex humeral artery
Pectoral branch
Clavicular branch
Acromial branch
Deltoid branch
Anterior circumflex humeral artery
Subscapular artery
Brachial artery
Circumflex scapular artery
Thoracodorsal artery

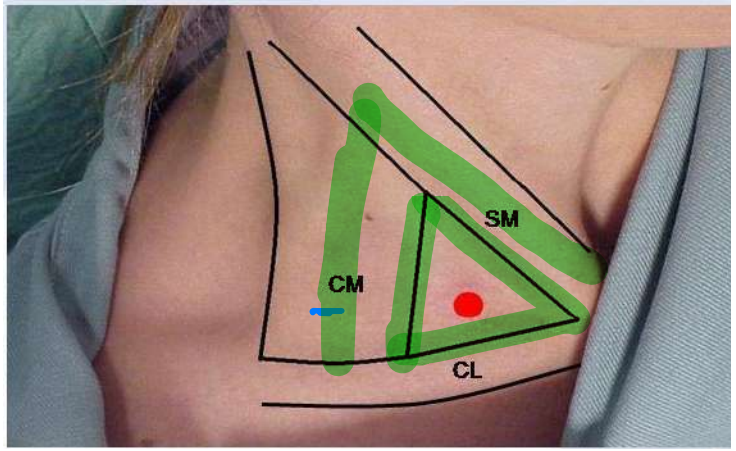
SALT SPA


Subclavian artery
Suprascapular artery
Axillary artery
Axillary artery
Posterior circumflex Humeral artery
Subscapular artery
Thoracodorsal artery
Circumflex scapular artery
Dorsal scapular artery

77. A 35-year-old patient is scheduled for central venous catheter placement. The anesthesiologist discusses the landmarks used to identify the internal jugular vein for cannulation. Which of the following surface landmarks is used for this purpose?

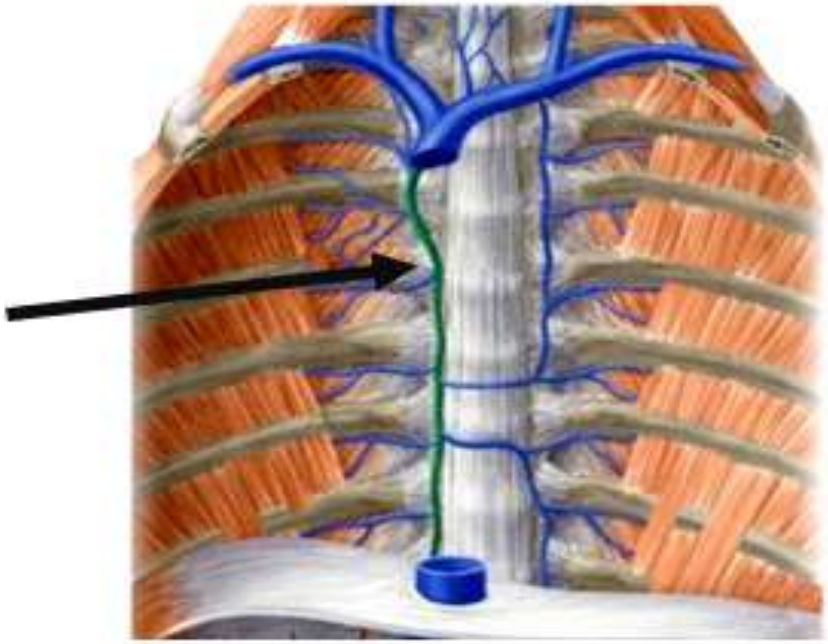
- Subclavian triangle
- Sedillot's triangle
- Scaleno Vertebral triangle
- Suboccipital triangle

Triangle of Sedillot



19. Identify the tributaries of the vessel marked in the image except:

- Right ascending lumbar
- Right subcostal vein
- Right 5th posterior intercostal vein
- Left 5th posterior intercostal vein

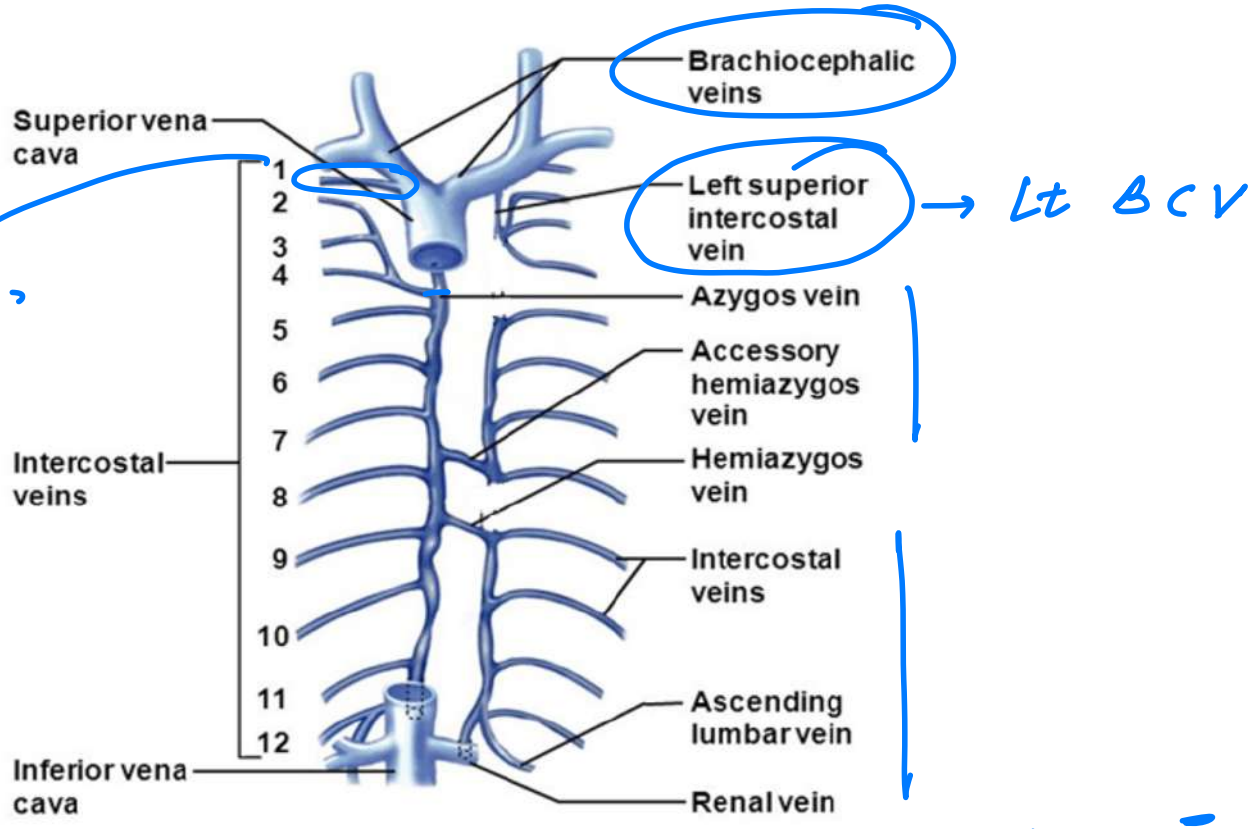


5 - 11

Acc hem

5 - 6 - 7 - 8

Hemi : 9 - 12



Rt BCV

→ Lt BCV

Azygos

Formed by: Right Lumbar azygos, right subcostal, right ascending lumbar
Tributaries:
Right superior intercostal vein: 2,3,4 PICV
Right 5-11th PICV
Hemiazygos, Accessory hemiazygos-T8
T4->SVC

Hemiaz

Formed by: left Lumbar azygos, left subcostal, left ascending lumbar
Tributaries:
Left 9-11th PICV

Acc hemiaz

Tributaries:
Left 5-8h PICV

37. The largest lymphatic duct of our body opens into the systemic circulation at which of the following locations?

A. Junction of superior vena cava and left brachiocephalic vein

B. Junction of left internal jugular and left subclavian vein

C. Directly into coronary sinus

D. Into the azygos vein

Feature	Details
Length	45 cm (18 inches)
Origin	Continuation of cisterna chyli near the lower border of T12 vertebra
Course	Ascends through the posterior mediastinum, crosses to the left at T5, arches at C7
Drainage Point	Junction of left internal jugular and left subclavian veins
Drainage Territory	Entire body below the diaphragm and left half of the body above the diaphragm

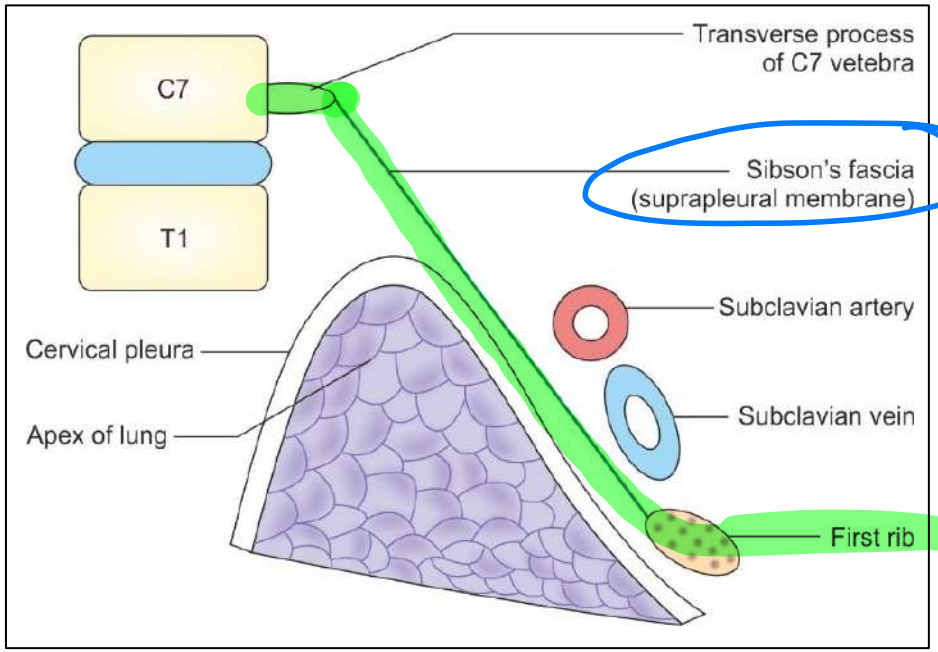
193. A 35-year-old construction worker presents with pain and swelling in the lower neck following a fall from a height. He reports difficulty breathing, and on examination, there is reduced air entry over the right lung apex. A CT scan reveals herniation of the cervical pleura into the lower neck, suggesting an injury to a fascial structure that protects the lung apex and separates the neck from the thoracic cavity. Which of the following statements regarding this fascial structure is incorrect?

A. Attached to the inner border of the 2nd rib 1st

B. Covers the apical part of the lung

C. Part of the scalenus minimus muscle

D. Vessels pass above the fascia

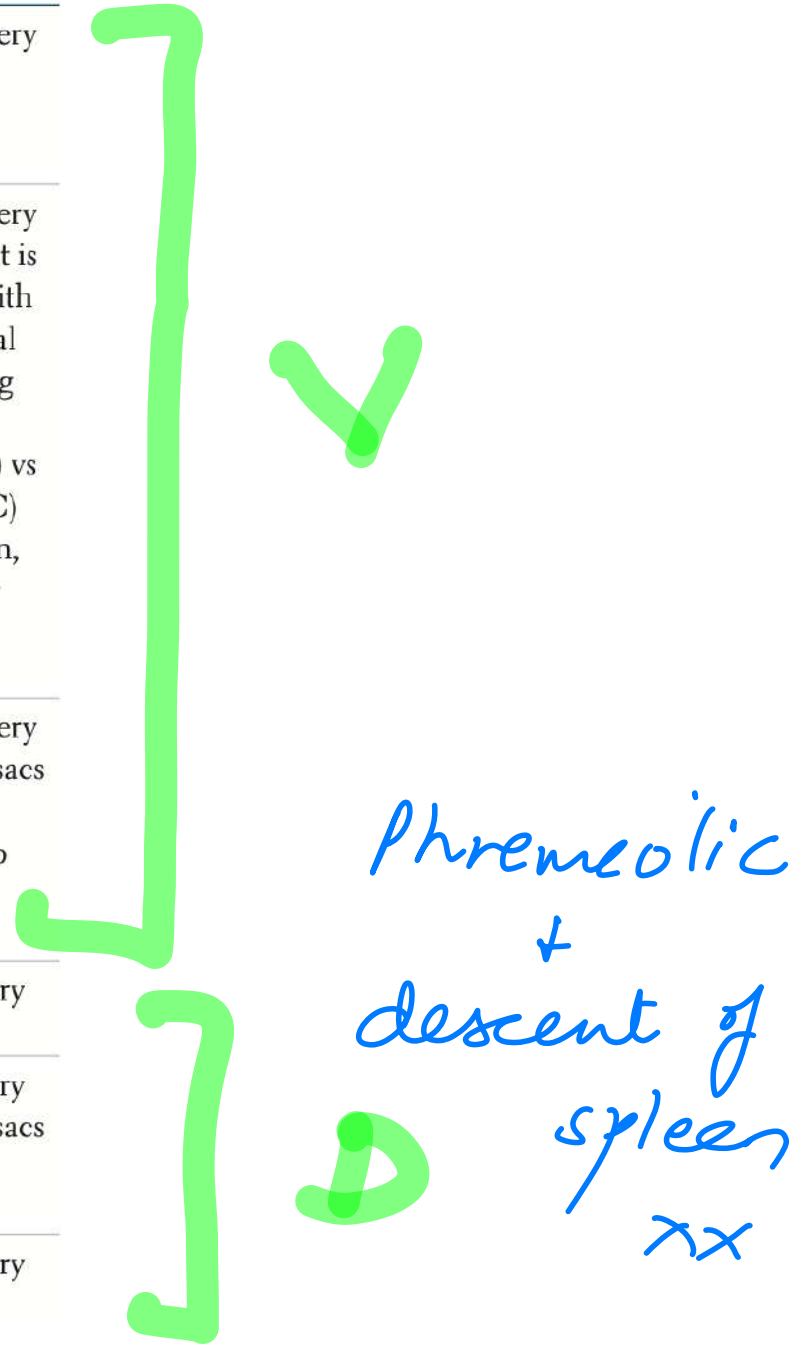

C7
T1
Transverse process of C7 vetebra
Sibson's fascia (suprapleural membrane)
Subclavian artery
Subclavian vein
Cervical pleura
Apex of lung
First rib

39. Which of the following statements about the lienorenal (splenorenal) ligament are correct?

A. It connects the spleen to the kidney.
B. It contains the splenic artery and vein.
C. It contains the short gastric arteries.
D. It encloses the tail of the pancreas.

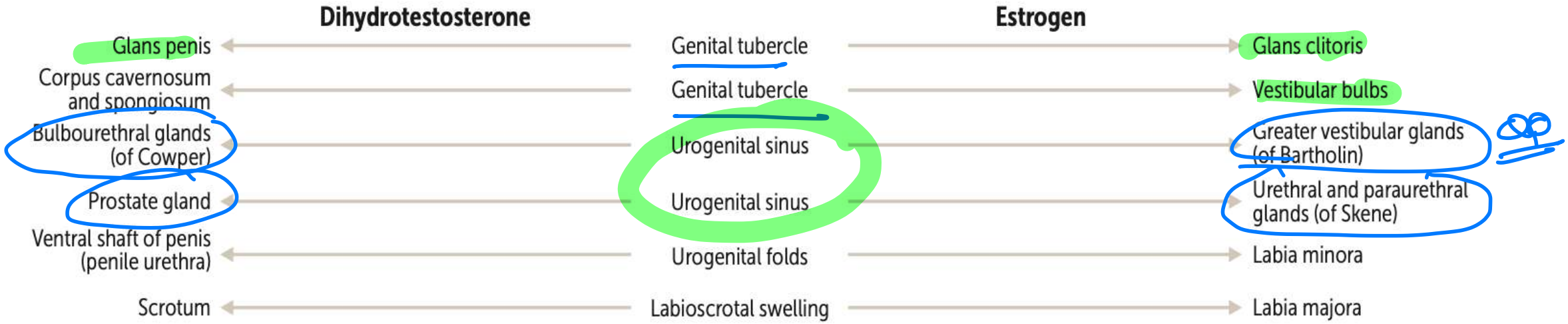
A. A and B only
B. A, B, and D only
C. A, C, and D only
D. All of the above

LIGAMENT	CONNECTS	STRUCTURES CONTAINED	NOTES
Falciform ligament	Liver to anterior abdominal wall	Ligamentum teres hepatis (derivative of fetal umbilical vein), patent paraumbilical veins	Derivative of ventral mesentery
Hepatoduodenal ligament	Liver to duodenum	Portal triad: proper hepatic artery, portal vein, common bile duct	Derivative of ventral mesentery Pringle maneuver—ligament is compressed manually or with a vascular clamp in omental foramen to control bleeding from hepatic inflow source (portal vein, hepatic artery) vs outflow (hepatic veins, IVC) Borders the omental foramen, which connects the greater and lesser sacs Part of lesser omentum
Hepatogastric ligament	Liver to lesser curvature of stomach	Gastric vessels	Derivative of ventral mesentery Separates greater and lesser sacs on the right May be cut during surgery to access lesser sac Part of lesser omentum
Gastrocolic ligament	Greater curvature and transverse colon	Gastroepiploic arteries	Derivative of dorsal mesentery Part of greater omentum
Gastrosplenic ligament	Greater curvature and spleen	Short gastrics, left gastroepiploic vessels	Derivative of dorsal mesentery Separates greater and lesser sacs on the left Part of greater omentum
Splenorenal ligament	Spleen to left pararenal space	Splenic artery and vein, tail of pancreas	Derivative of dorsal mesentery



34. Which of the following structures in women is homologous to gubernaculum testis in men?

A. Round ligament
B. Broad ligament
C. Uterosacral ligament
D. Cardinal ligament



Descent of testes and ovaries

	DESCRIPTION	MALE REMNANT	FEMALE REMNANT
Gubernaculum	Band of fibrous tissue	Anchors testes within scrotum	Ovarian ligament + round ligament of uterus
Processus vaginalis	Evagination of peritoneum	Forms tunica vaginalis Persistent patent processus vaginalis → hydrocele	Obliterated

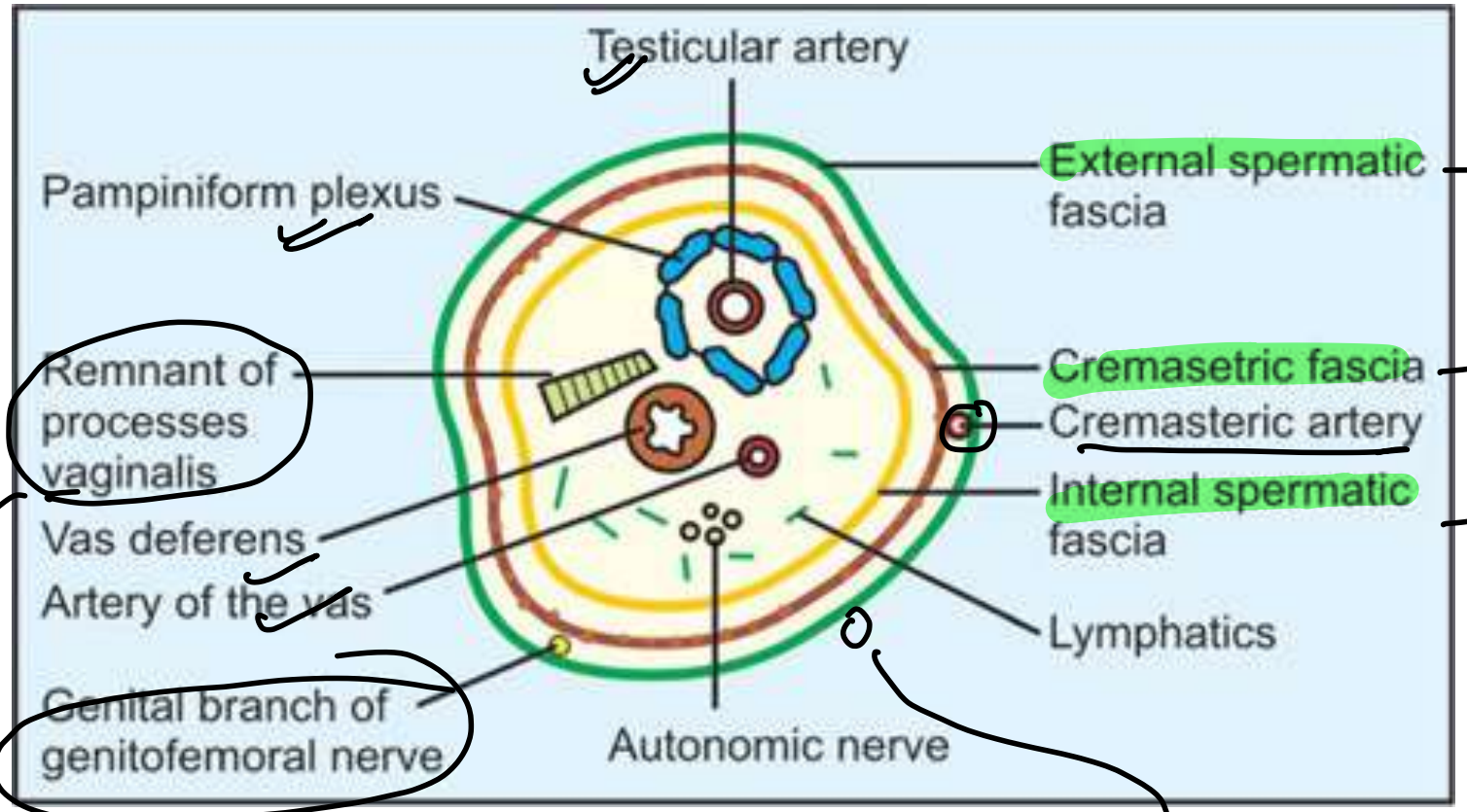
44. Which of the following muscles is not involved in the formation of the perineal body?

A. Bulbospongiosus muscle
B. Superficial transverse perineal muscles
C. Deep transverse perineal muscles
D. Internal anal sphincter muscle

external anal Sphincter

45. Which of the following structures of the inguinal canal lies outside the internal spermatic fascia?

A. Pampiniform plexus of veins
B. Testicular artery
C. Testicular nerve plexus
D. Ilioinguinal nerve



Ext oblique

Int oblique

Fascia transversalis

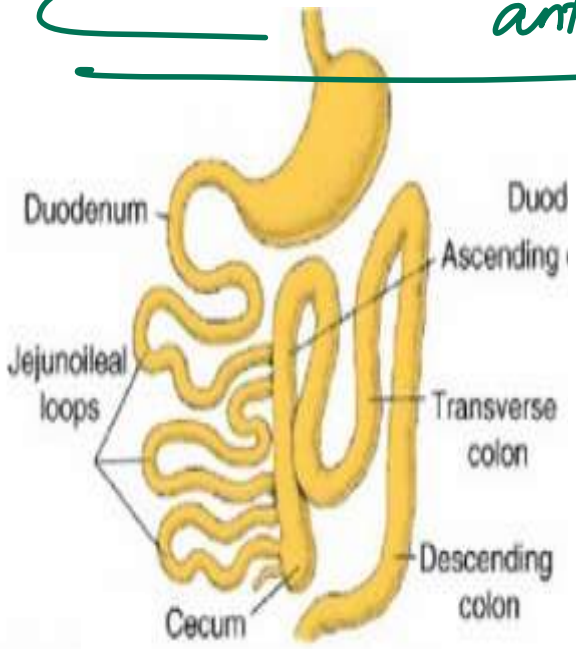
PP

Ilioinguinal N — ✓ ing canal

× sperm cord

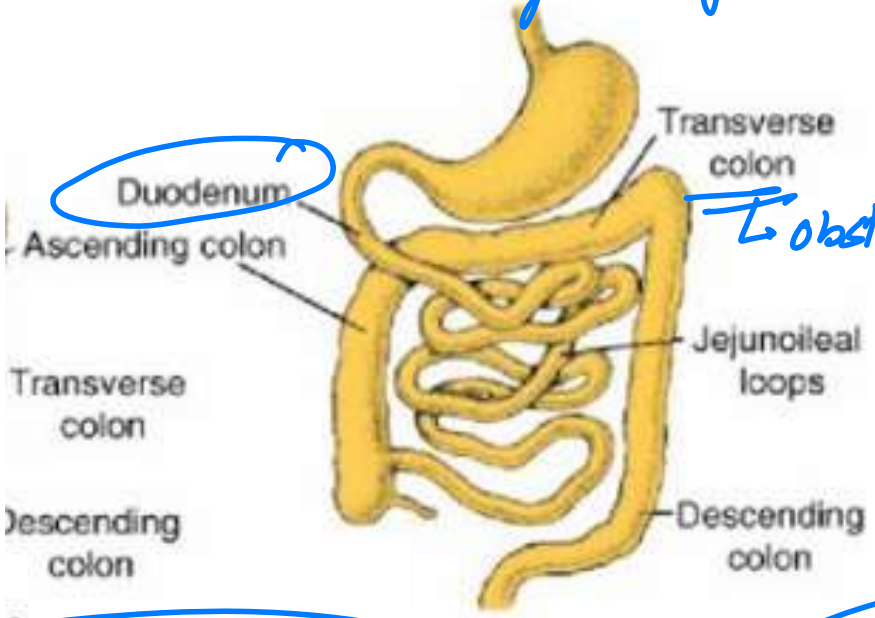
ROTATION ABNORMALITIES

Non rotn – 90° anticlock



Reverse rotn

Large before small



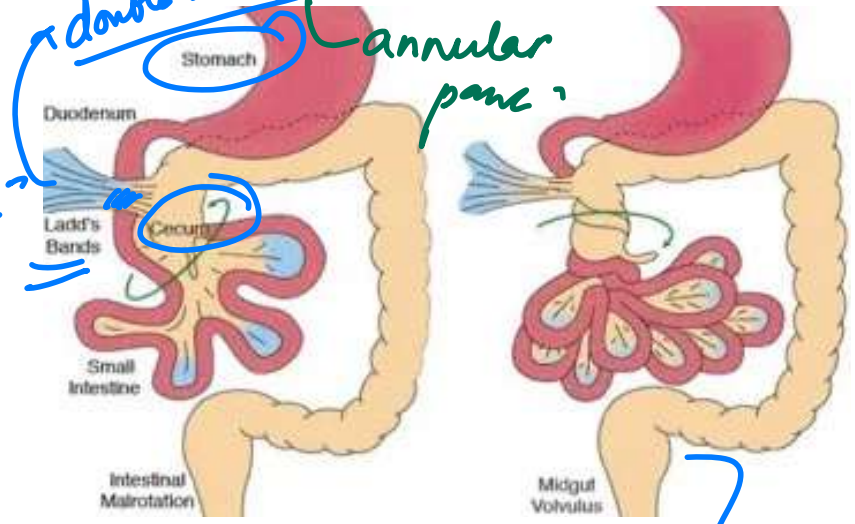
Mixed

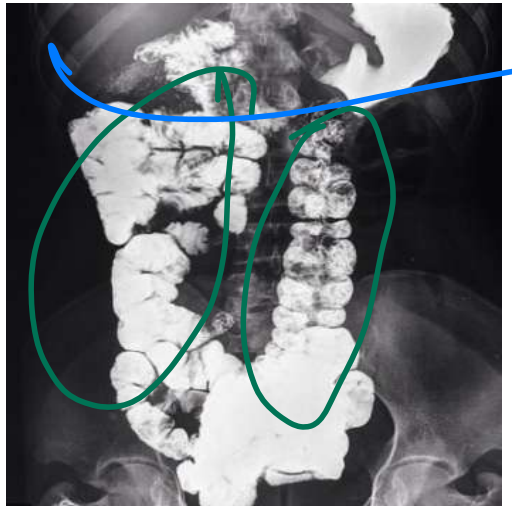
subpyloric cecum

double bubble

annular panc

Obstruc



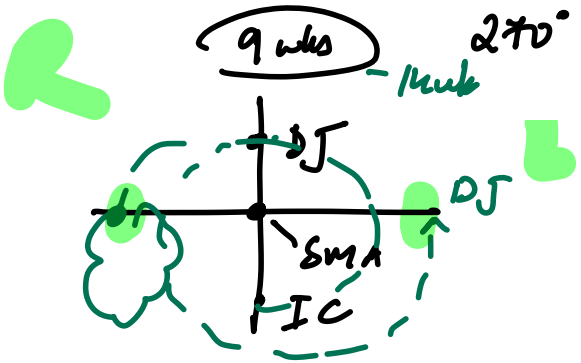


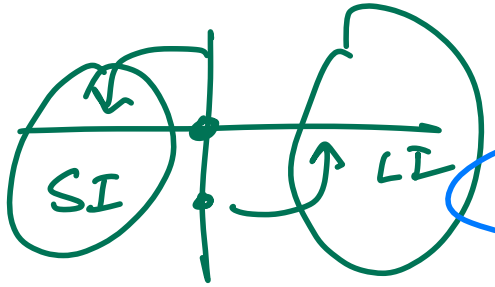
Midgut volvulus

9 wks

Mid

270° anticlock





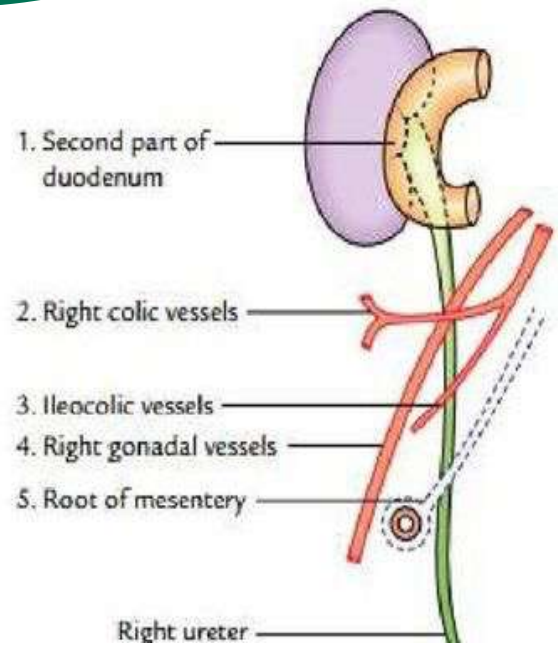
Malrots

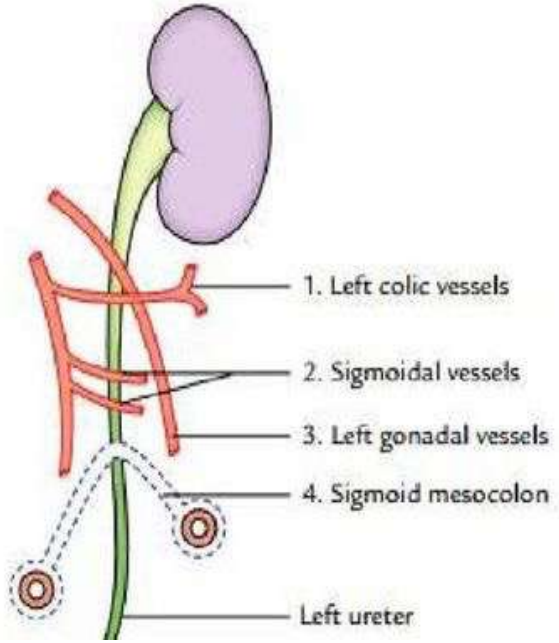
31. Which of the following is not an anterior relation of the left ureter while exposing it?

A. Root of the mesentery (Rt)
B. Sigmoid mesocolon
C. Left Gonadal vessels
D. Left colic vessels

Abdominal part - Anterior Relations

- Right side
  - 2nd part of duodenum
  - Right colic vessels
  - Iliocolic vessels
  - Right testicular / ovarian vessels
  - Root of mesentery
- Left side
  - Left colic vessels
  - Sigmoidal vessels
  - Left testicular / ovarian vessels
  - Sigmoid mesocolon





46. The structure that is present in the deep perineal pouch is?

A. Bulb of the vestibule
B. Corpus spongiosum
C. Bartholin glands
D. Bulbourethral glands

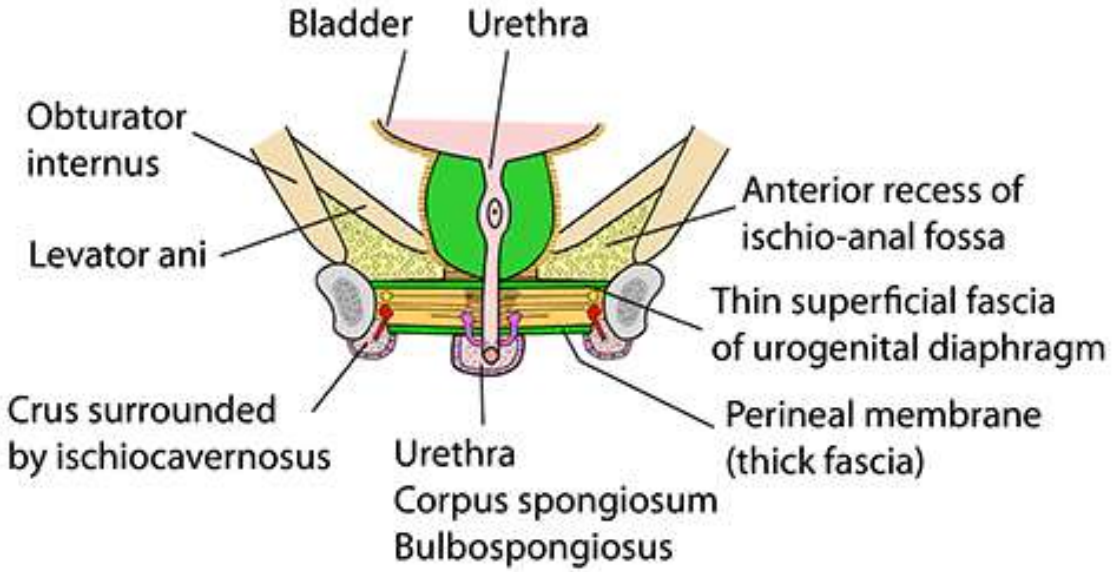
MALE PERINEUM - DEEP PERINEAL POUCH

Deep perineal pouch (between perineal membrane below & superior fascia of urogenital diaphragm above). Contains:

- Membranous urethra
- Deep transverse perinei
- Sphincter urethrae (external sphincter)
- Bulbourethral glands (Cowper's). They drain into urethra below the perineal membrane
- Internal pudendal vessels
- Dorsal nerve of penis

S + D

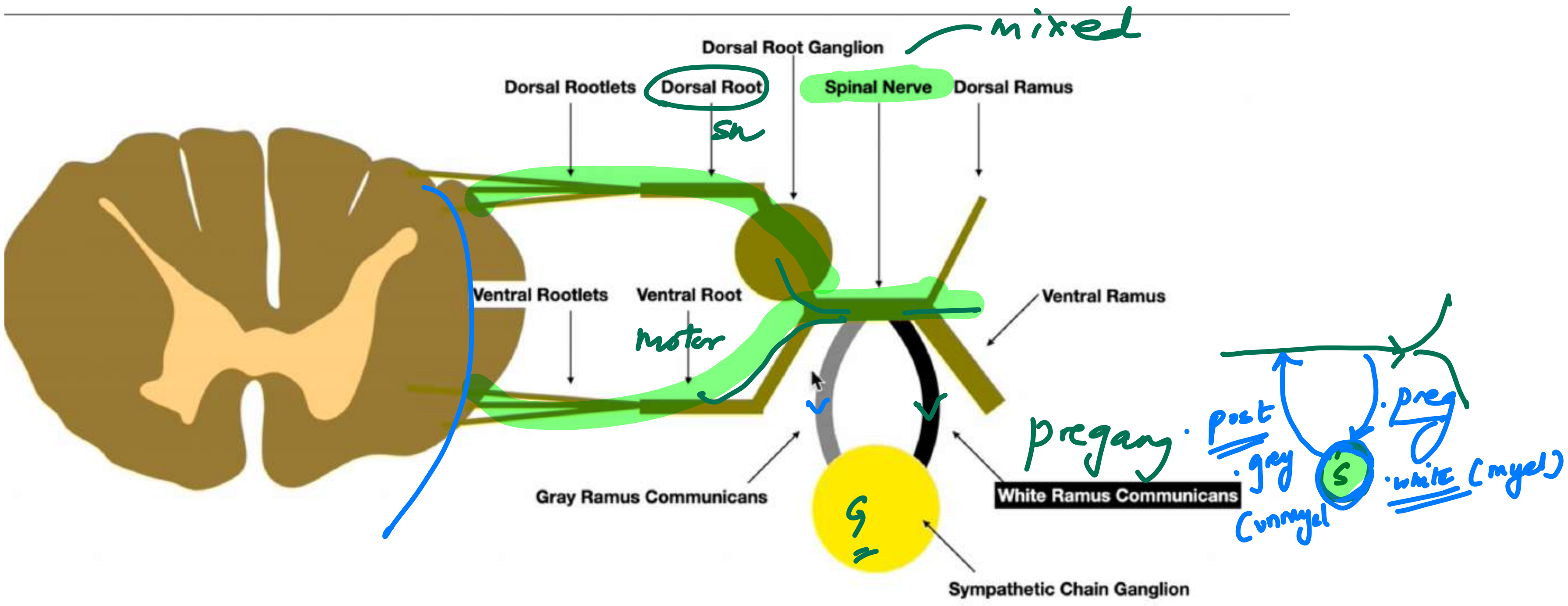
- Note that the external sphincter has striated muscle extensions around lower prostatic urethra, above the urogenital diaphragm that are called the **intrinsic urethral mechanism**



Coronal section through urogenital diaphragm at level of the prostate

118. All of the following are true about grey rami communicantes except?

A. Unmyelinated
B. Connected to spinal nerve
C. Preganglionic
D. Present medial to white rami communicantes


Dorsal Root Ganglion
Dorsal Rootlets
Dorsal Root
Spinal Nerve
Dorsal Ramus
mixed
sn
Ventral Rootlets
Ventral Root
motor
Ventral Ramus
Gray Ramus Communicans
White Ramus Communicans
Sympathetic Chain Ganglion
pregang
post
gray
(unmyel)
preg
white (myel)

25. Which of the following bones violates 'The secondary ossification center that appears first, fuses last' law ?

A. Radius

B. Fibula

C. Ulna

D. Sternum

Primary ossification centres appear before birth and are single

except carpals

except 2 1 clavicle

27.Which of the following types of joints is incorrectly matched ?

A. Acromioclavicular joint – Plane synovial joint

B. Wrist joint – Condyloid joint

C. Sternoclavicular joint – Plane joint saddle

D. Intercarpal– Plane synovial joint

Joint Type	Example	Permitted Movements
Plane (gliding)	Intercarpal, intertarsal joints	Gliding movements (limited sliding)
Hinge	Elbow, interphalangeal joints	Flexion, extension
Pivot	Atlantoaxial joint, Sup-Inferior radioulnar	Rotation (e.g., pronation/supination)
Saddle	1st carpometacarpal joint (thumb)	Flexion, extension, abduction, adduction, circumduction
Ball and socket	Shoulder, hip	Flexion, extension, abduction, adduction, rotation, circumduction

Feature	Condylar Joint	Ellipsoid Joint
Articular Surface	Convex **rounded condyle** fits into a shallow concavity	Elliptical convex surface fits into elliptical concavity
Shape	More cylindrical/rounded	Elliptical (oval)
Degree of rotation	May permit **limited axial rotation**	**No axial rotation**
Examples	Knee (femoral condyles on tibia), temporomandibular joint (TMJ), metacarpophalangeal joints (sometimes classified here)	Wrist (radiocarpal joint), metacarpophalangeal joints (MCP)

35. Which of the following is not a unilayered epithelium?

A. Simple squamous epithelium
B. Pseudostratified columnar epithelium
C. Simple columnar epithelium
D. Seminiferous epithelium