Subject: MSS "final" / /

Patho

*Ewing sarcoma: the cell of origin is unknown, in the diaphysis of long bone
↳ small blue cell tumor (PNET), ↑ N:C ratio, t(11;22)(q24;q12) "fusion of EWSR with FLI", codman's triangle, the most sensitive test: FISH analysis

*Giant cell tumor of bone (osteoclastoma): benign, the cell of origin is unknown, in the epiphyses of long bone, osteoclast-like giant cells, high levels of RANKL, bubble appearance without infiltration to the extra cortical space.

*Aneurysmal bone cyst (ABC): benign, blood filled cyst, in the metaphysis of long bones, there's a debate whether it is a tumor or a reactive process.

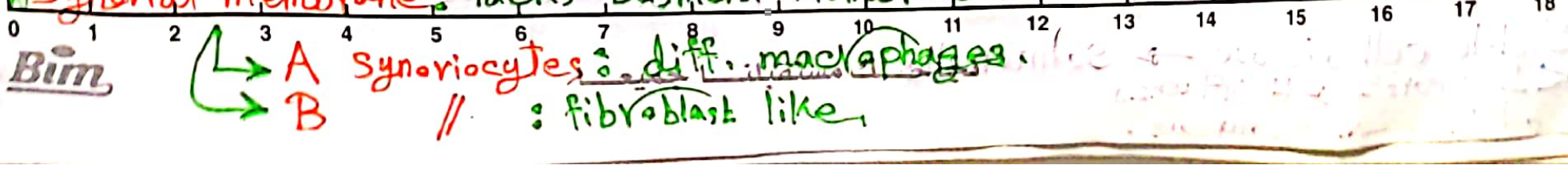
*Nonossifying fibroma (FCD, MFD): benign, maybe reactive not a true neoplasm, well circumscribed, bland fibroblastic proliferation, resolve spontaneously, in metaphysis.

*Fibrous dysplasia (FD): not a real tumor → developmental abnormality of bone genesis (mutations in GNAS 1 gene "cAMP mediated osteoblast differentiation"), leads to cherubism in children
→ Mazabraud syndrome (FD + soft tissue myxoma)
→ McCune-Albright syndrome (polyostotic FD + cafe au lait skin pigmentation + endocrine abnormalities) → abnormal trabecule, haphazard arrangment, chinese letter appearance, the biopsy help us to differentiate between it & PAGT disease

*Metastatic tumors to bone: Lytic, blastic or mixed
the primary source: carcinoma ← (adenocarcinoma in lungs)
↳ the primary source: prostate

*Joints → Non synovial (solid): synarthrosis, minimal movement.
↳ Synovial (cavitated): wide motion, covered by hyalin cartilage (70% water, type II collagen, no blood supply, no nerves, no lymphatics "shock absorber")

*Synovial membrane: lacks basment membrane.



Subject: _____

* Osteoarthritis (OA, DJD): degeneration of cartilage, secondary → preexisting disease, Primary idiopathic → aging process
  ↳ cartilage loss, osteophytes (bone spurs) → loose bodies in the middle of the space, joint space narrowing, crepitus, impingement on vertebrae
  → Trx: NSAIDs, intra-articular steroids
  → grade 5 is very severe: subchondral reactions, sclerosis & cyst.

* Rheumatoid arthritis: chronic inflammatory disease, autoimmune, systemic disease, nonsuppurative inflamatory synovitis, pannus formation → ankylosis (fusion of the joint space) & destruction of the cartilage
  → pathogenesis → TH1 → IFN-γ → activate macrophages & synovial cells.
  ↳ TH17 → IL-17 → recruits neutrophils & monocytes.
  → T cells → RANKL
  → macrophages → TNF & IL-1 → (synoviocytes → proteases "destroy hyaline cartilage")
  → polyarthritis, severe blue cells, leads to chronic granulomatous inflammation, waxing & waning chronic (having normal days & bad days), ulner deviation, boutonniere deformity of thumb, swan-neck deformity of fingers.
  → 2 tests → Anti-citrulliniated protein antibody (ACPA)
  ↳ Rheumatoid factor; negative rheumatoid factor doesn't rule out RA
  Trx: steroids, MTX, anti-TNF

* Juvenile idiopathic arthritis (JIA): <16 years for at least 6 weeks, oligoarthritis, systemic disease, large joints are more affected, rheumatoid nodules & rheum factor are usually absent (-)
  → screening test: anti nuclear antibody seropositivity.

* Seronegative spondyloarthropathies: associated with HLA-B27, rheumatoid factor is absent, ↳ ligamintitis, ankylosis of sacroiliac joint. Trx: anti IL-17

* Suppurative arthritis: hematogenous spread, acut; systemic manifestation, ↑ESR, X-ray may show that everything is normal but the MRI may show some collections (more sensitive), Trx: aspiration of joint & antibiotics.

- Sickle cell disease → Salmonella
- <2 years → H. influenza
- adults → S. aureus.

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Subject: _____ / /

* Lyme arthritis: systemic disease, by spirochetes (most commonly: borrelia burgdorferi → neuro beryllliosis)
  ↳ erythema migrans rash & neuritis with cranial nerve palsy
  ↳ primary immune response (IgM), late immune response (IgG) "when spirochetes are disseminated"

* Crystal-induced arthritis: crystals deposition → inflammatory reaction → destroys cartilage

① Gout: deposition of MSU → activation of multiple inflammatory cells → IL-1B
- risk factors: hyperuricemia, thiazides / is occured mainly in big toe.
- morphologic changes → acute arthritis: (-ve) birefringent crystals
  ↳ chronic tophaceous arthritis: repetitive attacks & deposition.
  → Tophi
  → gouty nephropathy: nephrolithiasis & pyelonephritis.
- Trx: life style modifications (decrease amount of meat)
  NSAIDs & colchicine in acute gout
  Xanthine oxidase inhibitors (Allupurinol) in chronic gout

② Pseudogout: deposition of CPPD, increase with age, (+ve) birefringent
idiopathic / secondary (are assaciated with DM, HPTH, hemochromatosis → (iron deposition)
- Trx: Supportive, non-curative treatment, no preventive measures.

CPP appear shorter than MSU
↳ rhomboid-shaped & blue ↳ needle shaped & yellow

Benign joint tumors

1. Ganglion cyst: cystic bulge, mainly in the dorsum of wrist.
   - ↳ is not a true cyst → herniation of synovial membranes.
   - ↳ degeneration of joint space (pseudocyst)

- Trx: aspiration (surgical removal)
- under microscope: dense fibrovascular connective tissue with myxoid degeneration.
- True synovial cyst (baker cyst): big cyst filled with fluid or a herniation process, around the Knee joint, leads to deep vein thrombosis.

2. Tenosynovial giant cell tumor: T(1;2)(p13q;37) → affects type IV collagen α-3
   - ↳ Diffuse: brown pigment (hemosiderin macrophages)
     - ↳ evidence of previous bleeding
     - ↳ PVNS "finger like projection", most commonly in Knee
   - ↳ localized small hands tendons: in the distal aspect of joints of hand.

Soft tissue tumors (Sarcoma)

- no precursor or preneoplastic lesions, most common site: extremities (thigh), most common site of metastasis: lung / risk factor: NF1, gardner, Li-Fraumeni & Osler webber-rendu syndromes.
- 15-20% → simple Karyotype, ex: ewing & synovial sarcoma
- 80-85% → complex / : genomic instability & a lot of mutations → investigating these tumors for genetic abnormality is not useful, ex: LMS & pleomorphic sarcoma, Dx: grading & staging

Adipose tissue tumors

Lipoma	Liposarcoma
in subcutaneous tissue (subcutis), soft shiny yellow appearance, well-encapsulated & well-circumscribed, mature fat cells (adipocytes).	in extremities & retroperitoneum well-differentiated: "atypical lipomatus tumor", looks like lipoma ↳ difficult to diagnose MDM2 gene mutation, myxoid: t(12,16) pleomorphic: aggressive, bad prognosis

Fibrous tumors

1. Nodular fasciitis: reactive process, clonal, t(17,22) producing MYH9-USP6 fusion gene, may be self limiting, classical appearance: culture-like histology

The most important thing is not to mistakenly diagnose it as malignant.

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Subject: ____ / /

② Fibromas: benign, cutaneous & subcutaneous, has fibroblast appearance & immunostim chemical features.
③ Fibrosarcoma: malignant, storiform (woven), superficial cutaneous, elongated nuclei.
④ Superficial fibromatoses: cutaneous & subcutaneous, infiltrative but they're benign (don't metastasize). (A) Palmar (dupuytren contraction) (B) Planter: in the sole of foot (C) Penile (peyronike disease).
⑤ Deep fibromatoses (desmoid tumor): in abdominal wall, mesentery & limbs, mutations in CTNNB1 (β-catenin) or APC → ↑ Wnt signaling, kill by local infiltration Not metastasis.

Skeletal muscle tumors

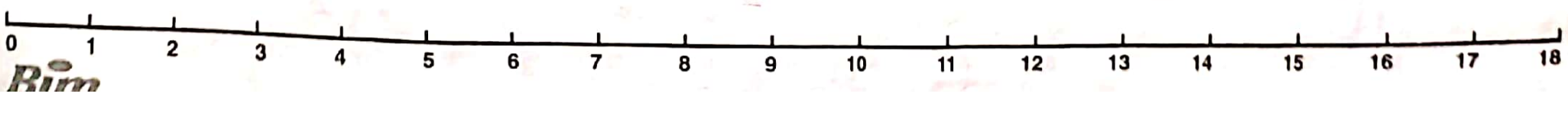
- Rabdomyoma: benign, occurs with TSC, in tongue & heart, aggresive
- Rabdomyosarcoma (RMS): malignant, fleshy & hemorrhagic tumors
  ↳ embryonal, alveolar, pleomorphic

Smooth muscle tumors

- Liemyoma (LYM): benign, mostly in uterus, fumarate hydratase on chromosome 1q42.3, well circumscribed, not infiltrative, no necrosis, no hemorrhage
- Leiomyosarcoma: malignant, infiltrative, hemorrhage & necrosis.

Tumors of uncertain organ

① Uncertain mesenchymal lineage.
② Synovial sarcoma: deep, t(X;18)(p11;q11) → Makes fusion genes SS18 monophasic (only spidle cells) or biphasic (spindle cells & glands), big mass close to joint.
③ Undifferentiated pleomorphic sarcoma (UPS): high grade, lack cell lineage deep soft tissue & extremities, necrosis, poor prognosis.



Subject: _____ / /

Physio

1) Simple muscle twitch: stimulus above threshold → contraction followed by relaxation. (fully relaxation)
↳ latent period (needs time due to action potential) / contraction & relaxation periods.
isn't enough to perform our everyday activities

2) Recruitment / motor unit summation: ↑ Voltage → ↑ number of motor units contracting at the same time until we reach the maximum stimulation

3) Frequency summation: stimulate the muscle before it fully relaxes → ↑ Ca^{++} can lead to tetanization.

4) Incomplete tetanization (unfused): is sustained but wavering contraction, it can only partially relax between stimuli.

5) Complete tetanization (fused): twitches can't be detected, it doesn't relax at all between stimuli, we reach maximum tension

6) Fatigue: we are stimulating the muscle & the response is dropping.

7) Treppe effect (stair case effect): when a muscle begins to contract after a long period of rest its strength of contraction will gradually increase.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

Subject: _____ / /

Micro

* Superficial Malessezia infections: endogenous (normal commensals of skin),
  Lipophilic yeast → carboxylic acid → depegmentation
  → pityriasis versicolor (tinea versicolor): asymptomatic, resolves spontaneously
  treatment is for cosmetic reasons, recurrence is common
  Dx: Wood's ultra-violet light → greenish color / spaghetti & meatballs appearance.
  → seborrheic dermatitis including dandruff

(1)
* Cutaneous mycoses (ring worm, tinea): caused by dermatophytes
  - Transmission → human to human → chronic response.
    ↳ zoophilic & geophilic → acute //.
  → red, itchy scaly rash, hair loss. - culture: SDA.

- Onychomycosis (fungal infections of the nail) → painfull (by candida)
  → painless (by dermatophytes)

(2)
* Candidiasis: by candida albicans → oval gram (+) budding yeast, opportunistic
  endogenous, ferments glucose & maltose with acid & gas production,
  chlamydospore & germ tube formation, creamy appearance

* Subcutaneous mycoses: (1) Madura foot: caused by madurell mycetomatis
  (2) Sporotricosis: caused by sporothrix schenkii → nodule

* Endemic mycosis: caused by dimorphic fungus, asymptomatic
  (systemic //) (soil inhibitant) → pulmonary diseases
  → Transmission: through inhalation
  → Dx: antigen skin test → isn't significant (cross positivity)
  - Serological tests are of limited value ..... not significant
  - Detection of histoplasm antigen in blood & urine is significant.

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Subject: / /

Embryo

* 1st pharyngeal arch → maxillary process (maxilla, zygomatic bone & lower part of temporal //)
  - → ventral part (ramus of mandible)
  - mandibular process → meckel's cartilage → middle part (anterior ligament of malleus & sphenamandibular ligament)
    - → dorsal part (malleus & incus)
  - → is supplied by mandibular n. → (tensor tympani, tensor veli palatini, muscles of mastication, mylohyoid & anterior belly of digastric)

* 1sh pharyngeal cleft → (external auditory meatus & outer layer of tympanic membrane)

* 1sh // pouch → (middle ear, eustachian tube & inner layer of tympanic //)

* 2nd (hyoid) pharyngeal arch
  - → ventral part (upper parts of the body of hyoid bone & lesser horn of hyoid bone)
  - → reicherk's cartilage → middle // (stylohyoid ligament)
    - → dorsal // (stapes & styloid process)
  - → is supplied by facial n. → (muscle of facial expression, stapedius, stylohyoid & post. belly of digastric)

* 2nd pharengeal cleft : downward growth, cover the other clefts with a space in between (cervical sinus)

* 2nd // pouch → (palatine tonsils)

Subject: _____ / /

- Oblique facial cleft : failure of fusion between maxillary & fronto-nasal processes.
- Macrostomia (or micro) : // // // // maxillary & mandibular //
- Cleft (hare) lip : // // // // maxillary process & intermaxillary segment.
- Median cleft lip : // // // of medial nasal prominences.
- Cleft lower lip : // // // // mandibular processes.
- // of the primary palate : // // // between maxillary process & intermaxillary segment (ant. to incisive foramen)
- // // // secondary // : // // // // // processes. (post. to incisive foramen).

Subject: _____ / /

Anatomy

* The eye :-
* Sclera : white due to irregularity of the type I collagen fibers.
* Cornea : transparent due to uniform arrangement of collagen fibrils / avascular /
  Nerve supply : long ciliary n. / the most important refractive medium of the eye.
  → 5 layers → ① external stratified squamous epithelium non keratinized (corneal epithelium covering) 5-6 cell layer.
  ② anterior limiting membrane (Bowman's membrane)
  ③ Substantia propria (stroma) : dense connective tissue
  ④ posterior limiting membrane (Descemet's membrane)
  ⑤ inner monolayer of epithelial cells (endothelium) : maintains a fluid balance
- Uvea : choroid, ciliary body & iris → pigmented, controls pupil diameter by Sphincter & dilator pupillae
  brown, vascularized, pigmented. (absorbs light)
  Connected to lens by Suspensory ligaments (zonular fibers)
  Secrete aqueous humor (by ciliary processes)
  Nerve supply : oculomotor n. (parasympathetic) / Action : accomodation of the eye, for near vision (ciliary muscle contract & suspensory ligaments are relaxed) the opposite for far vision
- Canal of schlemm : reabsorbs aqueous humor.
- Presbyopia : ↓ ability to accommodate (lens become denser & less elastic)
- Cataract : lens become opaque (due to denaturation of crystallins).

* Retina → Macula lutea : avascular, contain fovea centralis (point of sharpest vision : ↑ conc. of cones), inferolateral to optic disc (vascular, blind spot)
  - Central artery of retina → Anatomical end artery (don't anastomse).
  → 10 layers → ① pigment epithelium : prevent the scattering of light & enhance clarity of vision.
  → Neural retina (9 layers) → ① photoreceptor layer (rod & cone) (for black/white vision "deficiency of V.A → night blindness") (for color vision)
  ② outer limiting layer ③ outer nuclear layer ④ outer plexiform layer
  ⑤ inner nuclear layer : nuclei of bipolar cells, amacrine cells, horizontal cells & muller cells (form the outer & inner limiting layer) ⑥ inner plexiform layer
  ⑦ ganglionic layer ⑧ nerve fiber layer ⑨ inner limmiting layer

* The first (5) layers receive O_2 & nutrients from choroide capillaries.
* The last (5) layers are supplied by branches of central artery of retina.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

Main cells
Photoreceptors ← bipolar cells → ganglionic cells
Horizontal cells ← Cross-talking cells → Amacrine cells

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Subject: _____ / /

Muscles of Mastication (Nerve supply: mandibular n.)

Muscle	Origin	Insertion	Action
Temporalis	temporal fossa	coronoid process	closing jaws, elevation & retraction of the mandible
Masseter	zygomatic arch, maxillary process of zygomatic bone	lateral surface of the mandible	closing jaws, elevation of mandible
Medial pterygoid	medial surface of the lateral pterygoid plate	medial surface of the mandible near the angle	closing jaw elevation of mandible
Lateral pterygoid	upper head: roof of the infratemporal fossa (greater wing of sphenoid) lower head: lateral surface of lateral pterygoid plate	neck of mandible (pterygoid fovea)	protraction of the mandible

*Contents of temporal fossa: superficial, middle & deep temporal artery / deep temporal nerve auriculotemporal & zygomaticotemporal nerves, temporal branch of facial nerve.

Infratemporal fossa
- gap deep to zygomatic arch → Temporal fossa
- inferior orbital fissure → Orbit
- pterygo-maxillary fissure → Pterygo-palatine fossa
- foramen ovale & spinosum → middle cranial fossa

*Contents of infratemporal fossa: medial & lateral pterygoid muscles, maxillary vein, middle meningeal vein, pterygoid venous plexus, sphenomandibular ligament (between sphenoid & lingula), maxillary artery (buccal, inferior alveolar, deep temporal, middle meningeal arteries & pterygoid branches), mandibular n. (inferior alveolar, buccal, lingual & auriculotemporal nerves), chorda tympani & otic ganglion.

*maxillary artery
- 1st part (madibular): middle meningeal & inferior alveolar arteries.
- 2nd part (pterygoid): pterygoid branches, deep temporal, buccal & masseteric arteries.
- 3rd part (pterygopalatine): infraorbital artery

*Mandibular n.
- meningeal branch
- nerve to medial pterygoid (tensor tympani, tensor veli palatina)
- post. division → ALL (Auriculotemporal, Lingual & Inferior alveolar n.)
- Ant. // → masseteric, buccal, deep temporal, nerve to lateral pterygoid.
  - the only sensory branch.

pterygoid venous plexus

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

Bim Temporalis X L. pterygoid X M. pterygoid

Subject: _____ / /

* Otic ganglion: parasympathetic, below the foramen ovale
  - ↳ sensory: mandibular n.
  - ↳ parasympathetic → pre-ganglionic: lesser petrosal n. (from tympanic n. from glossopharyngeal n.)
  - ↳ parasympathetic → post- // : auriculotemporal n.

* Facial n. → above the stylomastoid foramen → chorda tympani → peterotympanic fissure → infratemporal fossa

* Submandibular ganglion → sensory: lingual n.
  - ↳ parasympathetic: chorda tympani

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* Deviations of vertebral column to the right or left:-

1) Torticollis (wry neck): if gravity line is shifted to left → left eye, nostril, cheek & mouth are smaller than the right parts.
2) Scolioses: if it was to right side → trunk is shifted to the right & the right shoulder is higher than the left.

- If the gravity line is shifted anteriorly → positive sagittal balance.
- // // // // // // posteriorly → negative // //.

- Positive sagital balance → kyphosis, cardiovascular & pulmonary diseases
  1. Ankylosing spondylitis
  2. Schuermans kyphosis: developmental type of kyphosis
     - ↳ decrease blood supply in the anterior half of the body of vertebra → wedging of vertebra
  3. Osteoporosis

- Negative sagital balance → lordosis, facet joint arthropathy, fracture of pars interarticularis, spondylolisthesis

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Subject: / /

Muscles of the back

Extensic group

Muscle		Nerve supply	Action
First layer	Trapezius	Ventral rami of Spinal nerves	No functional relation to the vertebral column.
	latissimus dorsi		
Second layer	Levator scapulae		
	Rhomboidus (minor & major)		
Third layer	Serratus posterior superior	2nd to 5th intercostal n.	elevation of ribs (2-5)
	// // inferior	9th to 11th // n. & the subcostal n. (12th)	depression of ribs

Attachment of the thoracolumber fascia

In the thoracic region	medially	to the spines of thoracic vertebrae
	laterally	to the ribs, near their angles
In the lumber region	post. layer	to the spinous processes & supraspinous ligament
	middle //	to the tips of transverse processes & intertransversus ligaments
	anti. //	to the bases of // // (covering quadratus lumborum)

Splenius muscle

Nerve spply	dorsal rami of the cervical nerves (Same as intrinsic group)
Action	extend the neck (antagonist of sternocleidomastoid muscle)

Intrinsic group

Muscle			Nerve supply	Action
Superficial layer	Erector Spinae (from medial to lateral)	spinalis	lateral branches of posterior rami of spinal nerves	extends the spine, lateral flexion (ipsilateral)
		longissimus		
		iliocostalis		
Intermediate layer	Transverso-Spinalis (from superficial to deep)	Semispinalis capitis	greater occipital n.	extension, ipsilateral rotation (contralateral)
		// cervicis thoracis	medial branches of posterior rami of spinal nerves	
		Multifidus	medial branches of posterior rami of spinal nerves	extension, ipsilateral rotation of the spine
		Rotatores		Extention & contralateral rotation of thoracic spine
Deep layer	Interspinales		posterior rami of spinal nerves	extends cervical & lumber spine
	Intertransversarii		posterior rami of spinal nerves	lateral flexion & stabilize the spine
doesn't reach the skull	Levatores costarum		Post. rami of spinal nerves (T1-T12)	elevate the ribs & rotate the thoracic vertebrae

Subject: _____ / /

	Epidural hematoma	Subdural hematome
The cause	Tumour over pterion → injury to anterior branch of middle meningeal artery	Violent shaking → injure to bridging veins (superior cerebral veins), Venous sinus
Shape	biconvex shaped	luner (crescent) shaped
Time	Always acute	acute → hyperdense bleeding (White like bone)
		chronic → hypodense bleeding (like CSF)
Treatment	Craniotomy	

* The most common traumatic intracranial bleeding is subarachnoid hemmorrege (SAH).
* Base of skull fracture → raccoon eye, battle sign (hematoma behined ear), (pneumocephalus (subdural air in CT scan). → meningitis, CSF rhinorea or ottorhea.

* Brain Contusion "intra-parynchymal localized bleeding"
  ↳ if >3 cm → intra-cerebral hematoma.

Muscles of the neck		Nerve supply	Action
Sternocleidomastoid		spinal part of accessory & C2 & C3	extend head & flex neck
Scalene	Anterior (brachial plexus between them)	Ant. rami of cervical nerves	elevates 1st rib & laterally flexes the cervical spine
	medius	// // // // //	elevates 2nd rib & laterally flexes the cervical spine
	posterior		
Infrahyoid	Sternohyoid	Ansa cervicalis (C1, C2, C3)	depresses hyoid bone
	omohyoid	// //	depresses larynx
	Sternothyroid	C1	elevates larynx & depresses hyoid bone
	Thyrohyoid		
Suprahyoid	stylohyoid	facial nerve	elevates hyoid bone
	digastric	ant. belly : nerve to mylohyoid post. // : facial nerve	// // // & depresses mandible
	mylohyoid	nerve to mylohyoid (inf. alveolar "mandibular n.")	// // & elevates floor of mouth & hyoid bone
	Geniohyoid	C1 نجاحك متقبل جميعا	elevates hyoid bone & depresses mandible

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Subject: _____ / /

* descending hypoglossi + descending cervicalis (C2+C3) → ansa cervicalis.
(superior root) (inferior root)

* Cutaneous branches of cervical plexus: lesser occipital (C2), great auricular (C2&C3), transverse cervical (C2&C3) & supraclavicular (C3&C4) nerves.

Posterior triangle of the neck

* Boundaries: anterior border of trapezius, posterior border of sternocleidomastoid, middle third of clavicle
* Roof: investing layer
* Floor: scalene, levator scapulae, splenius capitis
* Contents: inferior belly of omohyoid, accesory n., brachial & cervical plexus
subclavian A. (3rd part), suprascapular A., transverse cervical A., occipital A.
// V., // V., // // V.,
external & anterior jagular veins

① Occipital triangle ② supraclavicular (subclavian) triangle

Anterior triangle of the neck

* Boundaries:- superiorly: mandible, anteriorly: midline, posteriorly: sternocleidomastoid

Triangle	Boundaries	content
① Carotid	superior: posterior belly of digastric lateral: sternocleidomastoid inferior: superior belly of omohyoid	internal jugular vein, // , external & common carotid arteries, 10th, 11th & 12th cranial nerves, ansa cervicalis
② Submandibular (digastric)	speriorly: mandible anteriorly: ant. belly of digastric posteriorly: post. // // //	submandibular gland & lymph nodes. Facial vein & artery
③ Submental	Inferiorly: hyoid bone Floor: mylohyoid muscle medially: midline laterally: ant. belly of digastric	submental lymph nodes
④ Muscular	superiorly: hyoid bone medially: midline supero-laterally: superior belly of omohyoid infero-laterally: sternocleidomastoid	pharynx, larynx, thyroid & parathyroid glands, trachea, esophagus,

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Subject: _____ / /

* Middle ear (tympanic cavity):
- Roof: tegmen tympani
- Floor: internal jagular vein
- Anterior wall: internal carotid artery, tensor tympani muscle (N: mandibular divisein of trigeminal), auditory (eustachian) tube: "posterior inner third is bony"
- Posterior wall: aditus → mastoid antrum "is related to sigmoid venous sinus"
  pyramid → stapedius muscle (N: facial nerve)
  vertical part of facial nerve.
- Medial wall: horizontal part of facial nerve
  Oval window (closed by base of stapes "fenestra vestibuli")
  round // (// // secondary tympanic membrane "fenestra cochleae")
- Lateral wall: membranous wall

* Joints of the sternum:-
1) Manubriosternal joint: secondary cartilaginous joint
2) Xiphisternal // : // // //

* Costovertebral joints:-
1) Costotransverse //: plane synovial joint, between tubercle of ribs & transverse process
2) Costocorporeal //: // // //, // head of rib & vertebral body
- 1st & last 3 ribs articulate with corresponding vertebral body only.

* Joints of the costal cartilage:-
1) Sternocostal joint: plane synovial joint
2) Chostochondral //: cartilaginous // between ribs & costal cartilage (No movement)

* Intercostal muscles:-
1- External: its fibers are directed downward & forward
2- Internal: // // // // // & backward
3- Innermost: incomplete muscle layer
4- Subcostal: from internal surface of rib to internal surface of rib 2-3 levels below the organ.

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Subject: _____ / /

*Transversus thoracis muscle: for respiration & strengthen the intercostal spaces.

-Pump handle movement: elevation of rib → increase in antero-posterior diameter of thoracic cavity
-Bucket // // : // // // → // // lateral // // // //

*Arterial supply of thoracic wall:-

-Ant. wall: 9 on each side /2 in each space/ internal thoracic A. → upper 6
musculophrenic A. → 7,8,9
-Post. // : 11 // // // /1 // // // / superior intercostal A. → 1st 2nd
descending thoracic aorta → 3-11

→ Ant. walls ant. intercostal V. drain into internal thoracic V.

*Venous drainage of thoracic wall:

→ Right: 2nd - 11th drain into azygos V.
→ Post. wall: 1st intercostal V. drain into brachiocephalic V.
→ Left: 2nd, 3rd → left brachiocephalic V.
4th - 8th → superior hemiazygos V.
9th - 11th → inferior // V.

-Pectus excavatum (sunken or funnel chest): concave "caved in" appearance in the ant. chest wall.

-Rectus carinatum (pigeon chest): protrusion of sternum & ribs

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