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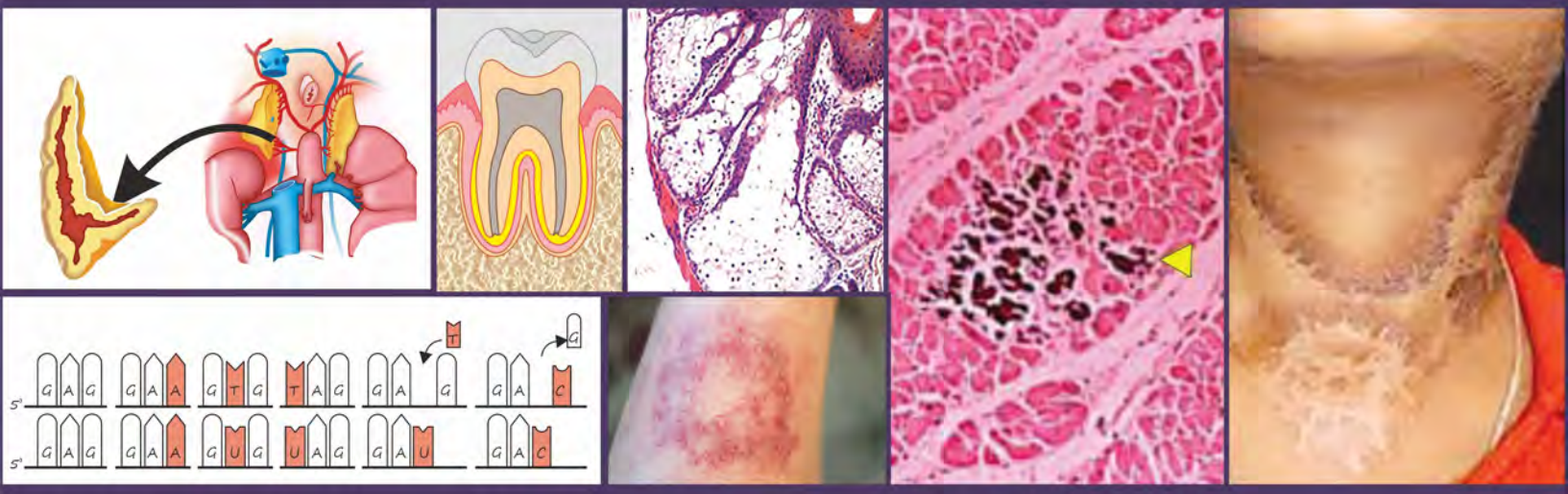
Volume **2**

Pre and Para Clinical Subjects

ONE Touch Picture Recap

For NEET/NEXT/FMGE/INI-CET



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Sudhir Kumar Singh

ONE Touch Picture Recap

For NEET/NEXT/FMGE/INI-CET

Volume 2

Pre and Para Clinical Subjects

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ONE Touch Picture Recap

For NEET/NEXT/FMGE/INI-CET

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Preface

Dear Readers,

With great pleasure and excitement, I introduce you with **One Touch Picture Recap Volume 2**, a unique and invaluable resource tailored specifically for NEET PG, AFMG, FMGE, and INI-CET aspirants. This book is the culmination of a vision to transform the way medical students approach their pre and paraclinical subjects by harnessing the power of visual learning.

In the world of medical education, where time is the essence, we often find ourselves grappling with the challenge of efficiently revising complex pre and paraclinical topics. **One Touch Picture Recap Volume 2** has been meticulously crafted to address this very challenge. By condensing the most critical information into a visual format, this book aims to enhance your retention and expedite your revision process.

The distinguishing features of this book are designed keeping your success in mind. The inclusion of important anatomical structures, histological slides, etc., in one place simplifies the often confusing landscape of pre and paraclinical subjects. Additionally, we have organized previous year topics in a systematic manner, providing you with a comprehensive and structured approach to exam preparation.

The book offers a range of special features:

- **Comprehensive Topic Coverage:** All significant previous year topics are systematically organized within the book, streamlining your study process and ensuring that essential knowledge is readily accessible.
- **High-Yield Tables:** Frequently asked Topics and clinical correlations are tabulated for easy learning and creating more visual impact for long-term memory.
- **Extensive Image Database:** It includes an impressive collection of 1000+ images, enriching your understanding and retention of crucial medical concepts.
- **Entrance Corner:** Must know facts covered extensively throughout the book from exam point of view.
- **Effective Pictorial Illustrations:** The book employs high-quality pictorial illustrations to simplify the intricate medical subjects, aiding in better comprehension and recall.
- **Latest 3 years IBQs:** Subject-wise Image-Based Questions of last 3 years are covered as a separate section to provide an idea about the trend of questions and also to know about the recently asked topics.

Within the pages of my book, I have poured my heart and soul into creating a beautiful and informative content that I hope will inspire and enlighten you on your path.

Whether you are embarking on your NEET PG journey, aiming for AFMG or setting your sights on INI-CET or FMGE, **One Touch Picture Recap** is your trusted companion. Our goal is to empower you with a tool that not only simplifies the complexities of pre and paraclinical subjects but also instills confidence in your ability to conquer your exams.

I would like to express my gratitude to all those who have contributed to the creation of this book, as well as to you, the aspiring medical professionals, for entrusting us with your educational journey.

I invite you to dive headfirst into this literary voyage, allowing the words to envelop your senses, invoking emotions and evoking images. I hope this book serves as a valuable asset in your pursuit of excellence.

Wishing you all success and a rewarding learning experience with **One Touch Picture Recap**.

Warm regards

Sudhir Kumar Singh

From the Publisher's Desk

Dear Students,

Let us begin with a power-packed and inspiring quote:

Arise, awake, and stop not until the goal is achieved.

—Swami Vivekananda

Healthcare is undoubtedly one of the most noble and sacred professions. We are truly fortunate to be a part of this field, which stands as a beacon of selfless service to humanity. Healthcare professionals work tirelessly, transcending boundaries of caste, creed, religion, community, nationality, and preferences. Their service is a testament to the divine nature of this profession.

We extend our deepest gratitude to all healthcare professionals for their unwavering commitment, particularly during the pandemic. When the world retreated behind closed doors, these brave individuals stood on the frontlines, leaving no stone unturned in saving the lives of people.

At CBS Publishers, we take great pride in supporting the healthcare community by offering resources that empower future professionals. Ten years ago, we laid the foundation in the PGMEE segment with titles such as the **Conceptual Review Series, SARP Series, AIIMS MedEasy, NIMHANS, PGI Chandigarh, My PGMEE Notes, ROAMS, PRIMES, FMGE Solutions** and many more.

What makes our PGMEE books stand out is the updated, simple, clear, and easy-to-understand language, making study sessions feel less like a challenge and more like an enjoyable learning experience. A team of our esteemed medical educators brings their expertise to create these comprehensive yet compact books, ensuring that all the critical topics are covered.

A special feature of our books is the use of illustrations that simplify complex concepts, making them easier to grasp. We also include previous years' questions, complete with detailed explanations, which are invaluable for exam preparation. Image-Based Questions (IBQs) further enhance the learning experience. The combination of concise theory and multiple-choice questions makes these books the ultimate tool to ease exam-related worries.

FMGE Solutions is one of our best-selling titles, meticulously designed to meet the specific needs of FMGE aspirants. This comprehensive guide is an all-in-one resource for FMGE preparation, offering in-depth coverage of essential topics, detailed explanations, and a wide array of questions that reflect the latest exam patterns. Its reputation as a bestseller speaks to its effectiveness and reliability as a trusted resource for future medical professionals.

One Touch Series is tailored specifically for aspirants of NEET PG, NExT, FMGE, and INI-CET. Conceptualized with a focus on last-minute revision, the **One Touch Series** covers a complete range of preclinical, paraclinical, and clinical subjects. These concise and expertly curated books are designed to help students efficiently review key concepts, ensuring they are well-prepared and confident as they approach their exams.

This year, we have introduced a new addition to the CBS Exam Book Series: **Ten into Ten** (Part A and B). According to the market research, at present no book is available for practice and this new addition to our exam book series will fill this gap for sure. Although there are multiple apps from where students can attempt test series online, not a single updated book is available in the market for offline practice, and this book now in your hand, will fill this vacuum. The motto of this book is Practice: Practice: Practice as

this book offers a decent amount of MCQs which will meet the evolving needs of students. **Ten into Ten** is a comprehensive question bank covering 10 medical subjects. It offers over 10,000 meticulously curated questions across 10 key subjects, crafted by 10 renowned medical scholars.

Following this, we will soon release the next part, **Nine into Nine**, further expanding our collection of practice materials for the PGME Examination, with the latest and most effective study approaches.

At CBS, we are committed to revolutionize the medical education and your support and encouragement can make our task easier. So, keep extending your support by sending your feedback to us. We will be highly pleased to serve you and make you victorious in your career. You can share your feedback at feedback@cbspd.com

Wishing you all the best in your endeavors.

Mr Bhupesh Aarora
(Sr. Vice President – Publishing & Marketing)
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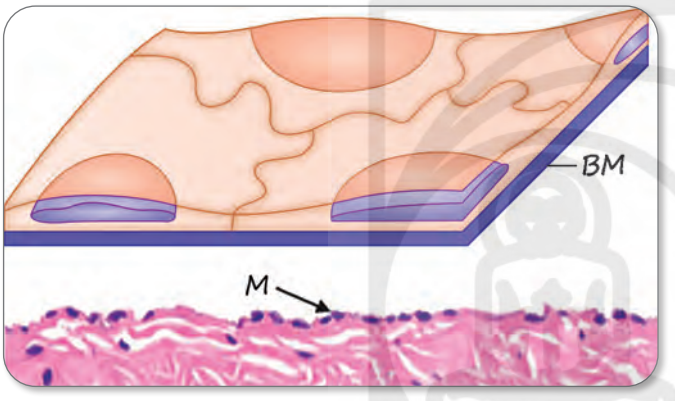
ANATOMY

TYPES OF EPITHELIUM AND THEIR LININGS

Simple Squamous Epithelium

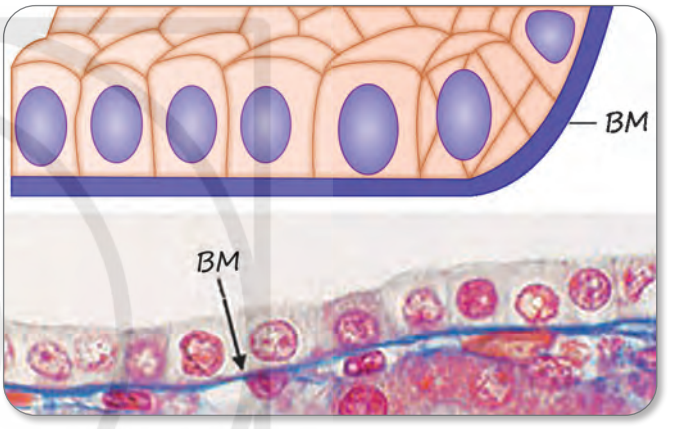
- Shape of superficial cell layer: Flattened
- **Location:**
  - Bowman's capsule (kidney)
  - Vascular system (endothelium)
  - Respiratory spaces in lungs
  - Body cavities (mesothelium)



Simple Cuboidal Epithelium

Location:

- Secretory cells of salivary gland acini
- Surface of ovary (germinal epithelium)
- Kidney tubules
- Thyroid follicles

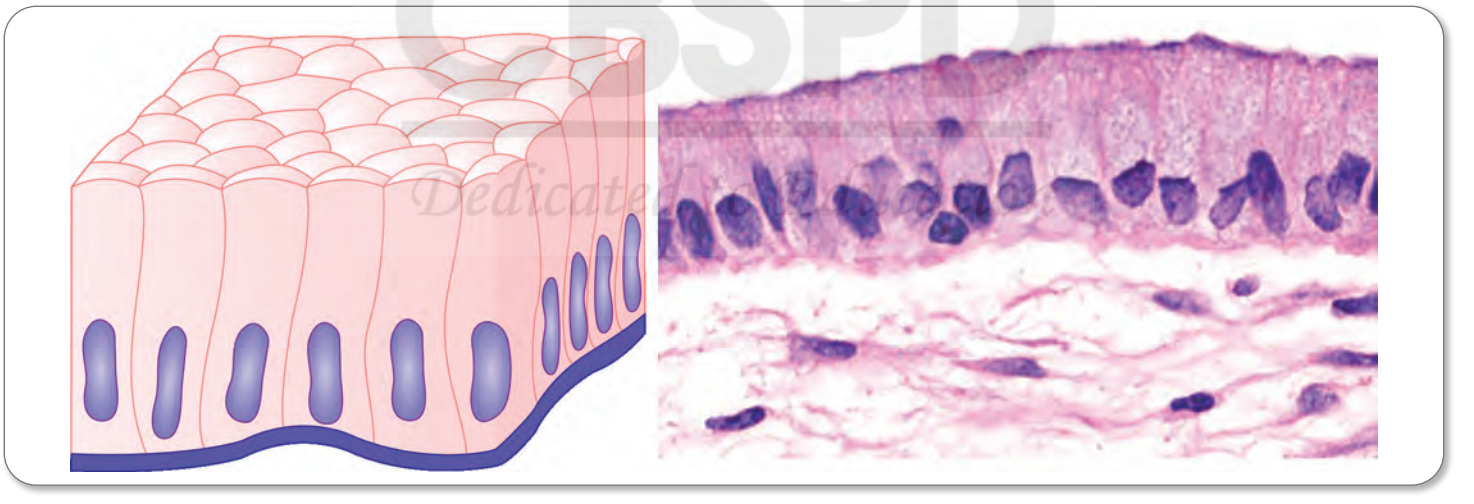


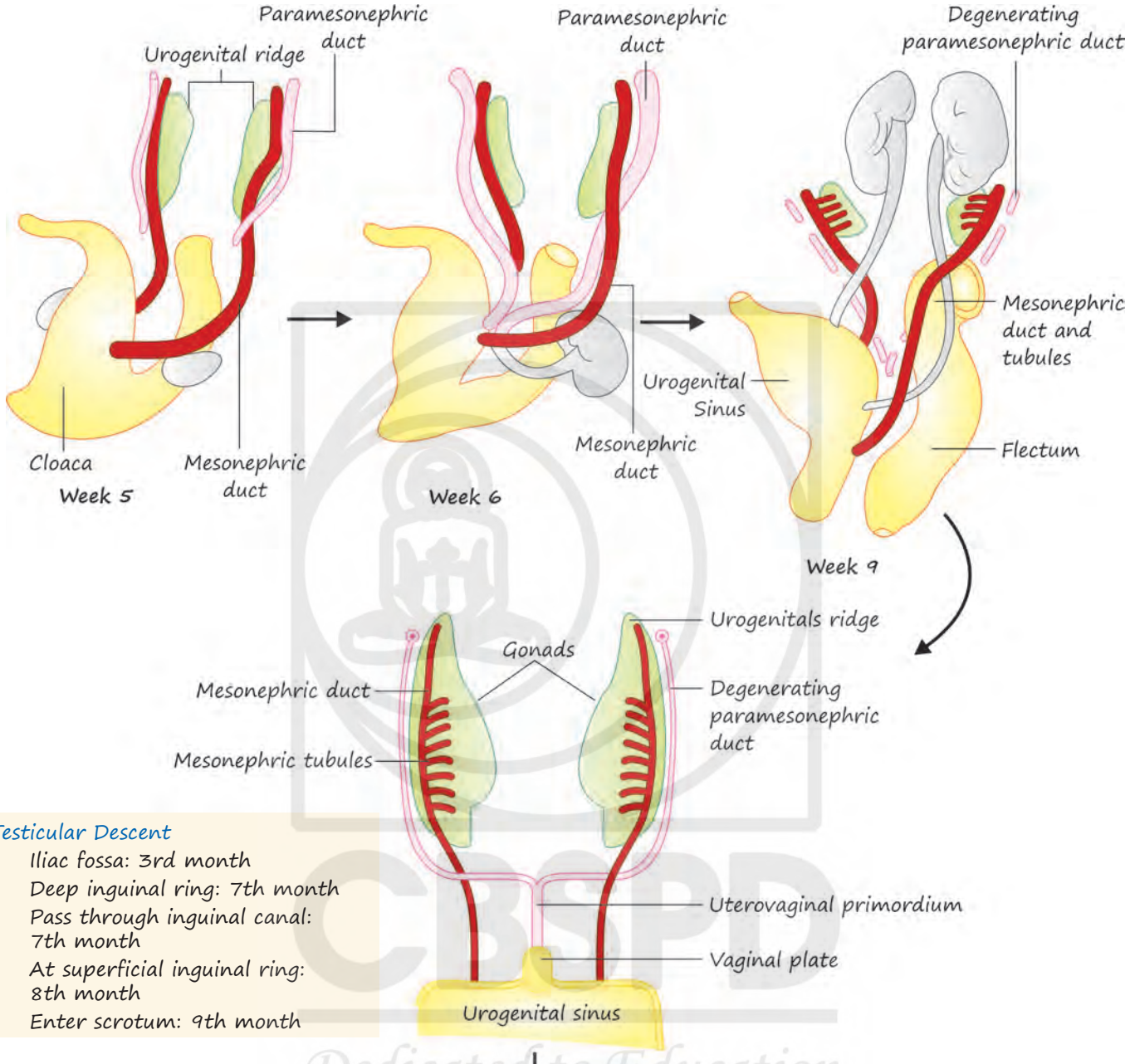
Abbreviations: BM, basement membrane; M, mesothelium

Simple Columnar Epithelium

Location:

- Lining of intestine, stomach, and excretory ducts in some glands
- Gallbladder

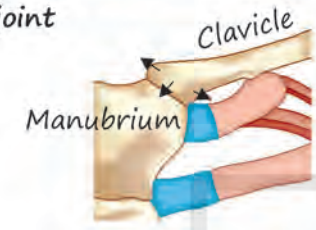
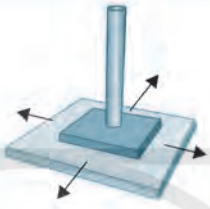
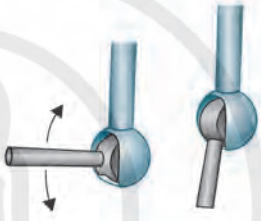
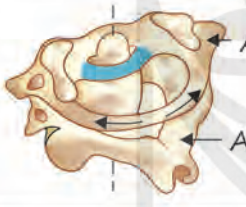
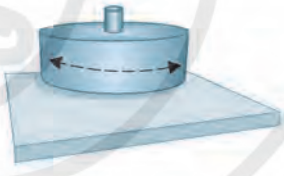
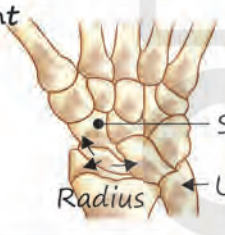
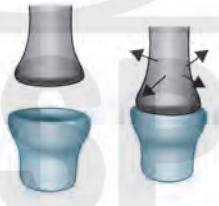
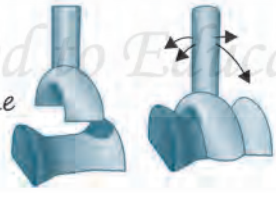
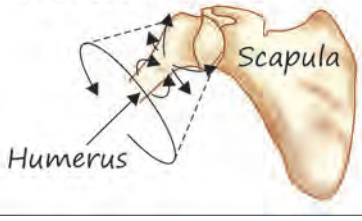
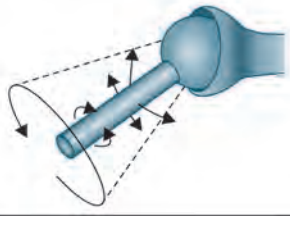




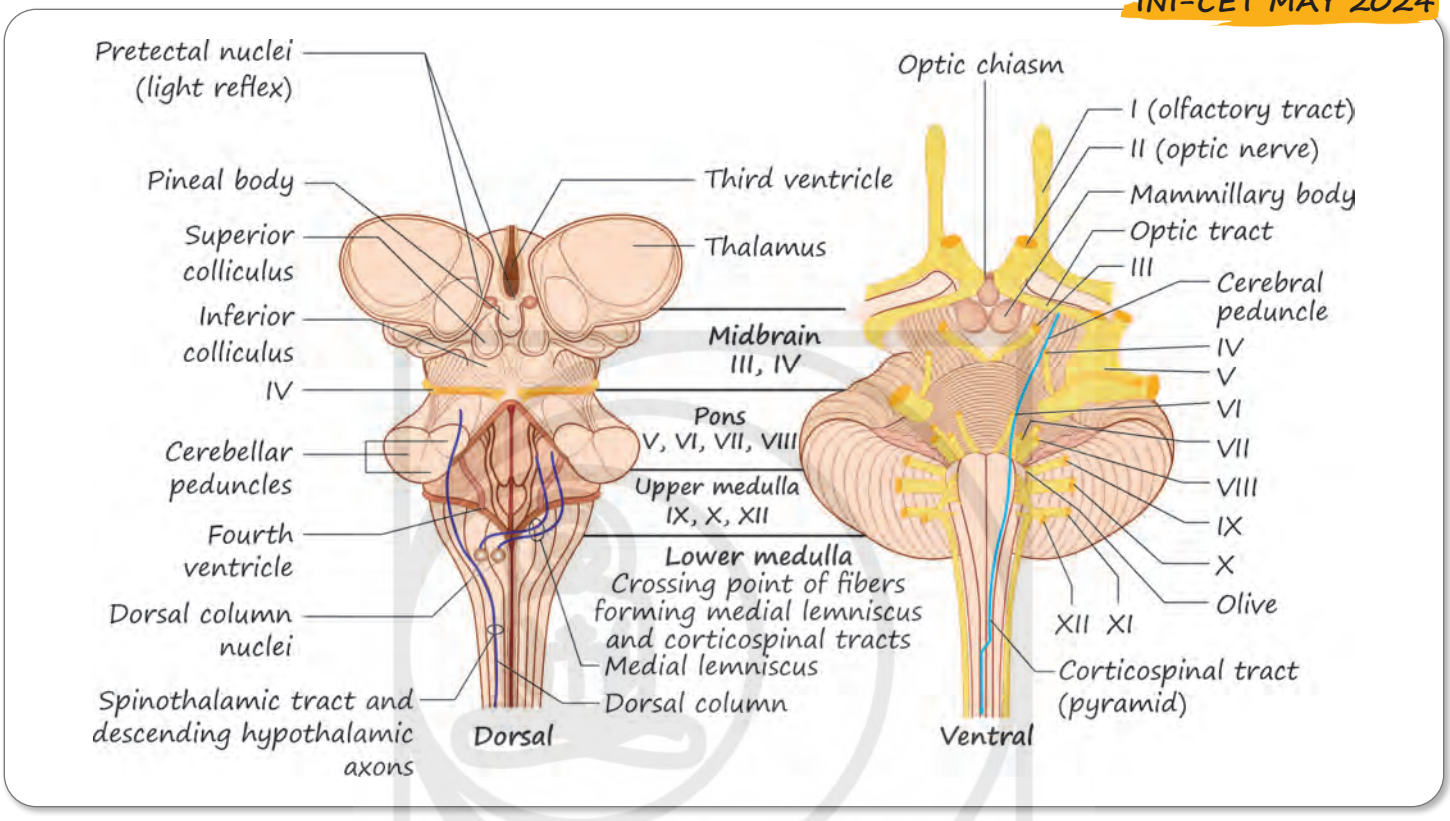
Testicular Descent

- Iliac fossa: 3rd month
- Deep inguinal ring: 7th month
- Pass through inguinal canal: 7th month
- At superficial inguinal ring: 8th month
- Enter scrotum: 9th month

Types of Synovial Joints

Types of synovial joints	Models of joint motion	Examples
Gliding joint 		• Acromioclavicular and sternoclavicular joints • Intercarpal and intertarsal joints • Vertebrocostal joints • Sacroiliac joints
Hinge joint 		• Elbow joints • Knee joints • Ankle joints • Interphalangeal joints
Pivot joint 		• Atlas/axis • Proximal radioulnar joints
Ellipsoid joint 		• Radiocarpal joints • Metacarpophalangeal joints 2–5 • Metatarsophalangeal joints
Saddle joint 		• First carpometacarpal joints
Ball-and-socket joint 		• Shoulder joints • Hip joints

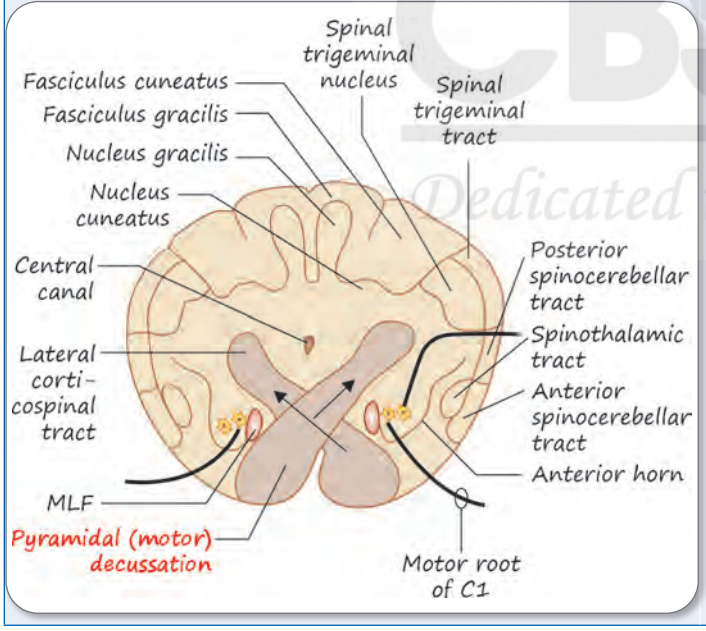
INI-CET MAY 2024

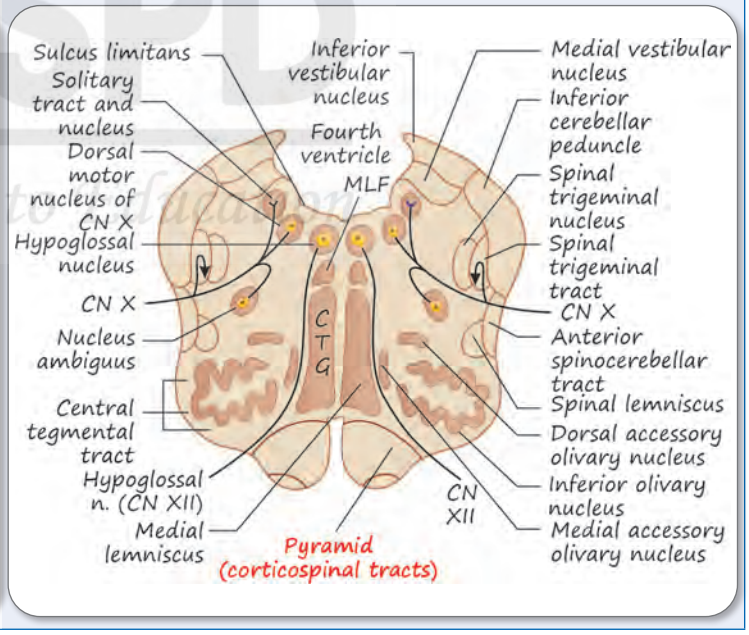


Descending Motor Pathways of the Medulla

INI-CET 2023

Pyramidal decussation	Pyramids
• It is located at the spinomedullary junction. • It consists of crossing corticospinal fibers.	• It constitutes the base of the medulla. • It contains uncrossed corticospinal fibers.



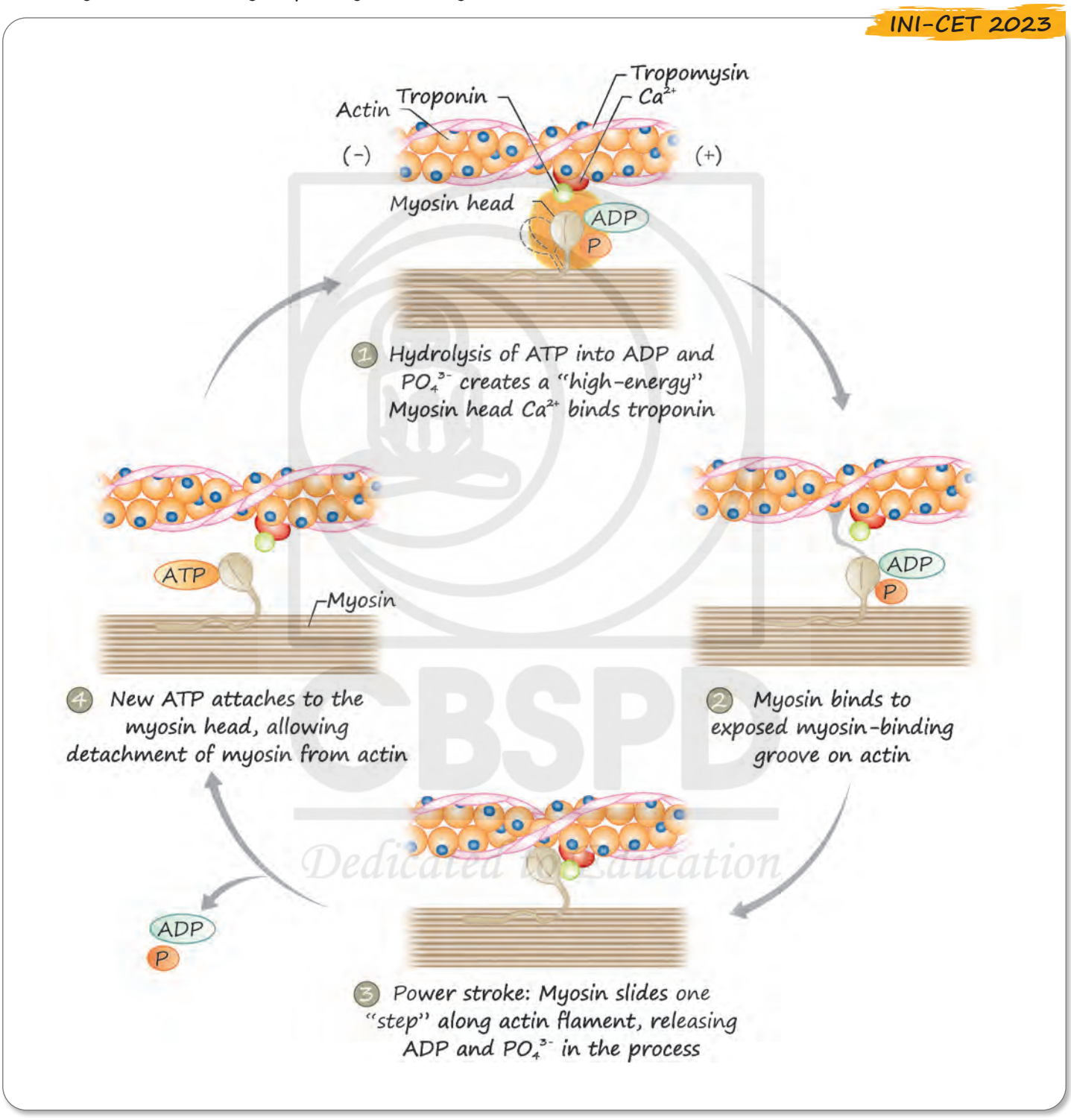


PHYSIOLOGY

MYOCARDIAL CONTRACTION

Ca^{2+} release from the sarcoplasmic reticulum (SR) increases intracellular Ca^{2+} to cause sarcomere contraction according to the following steps as given in Figure.

INI-CET 2023



1. *Released Ca^{2+} binds to troponin C, causing a conformational change that moves tropomyosin (which normally blocks interaction between myosin and actin) away from the myosin-binding groove on actin filaments. Energy released from the hydrolysis of ATP → ADP + PO_4^{3-} is used to "cock" the myosin head into a high-energy state that can bind to newly exposed actin filaments.*

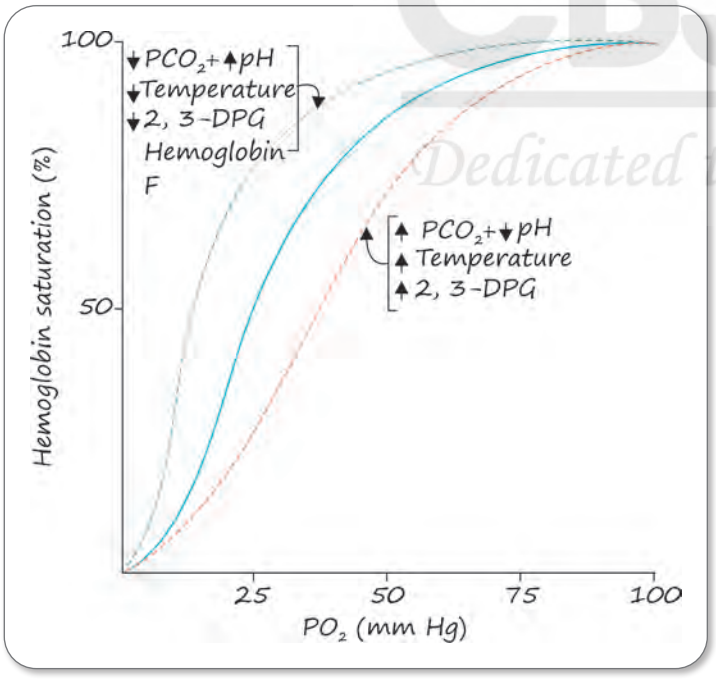
INI-CET 2024

2. *The high-energy state myosin binds to actin at the myosin-binding groove.*

Type I cells	Type II cells	Endothelial cells	Alveolar macrophages
• These are squamous epithelial cells that make-up 95% of the alveolar surfaces • Comprise 10% of cell population • They are specialized to serve as very thin (often only 25 nm in width) gas-permeable components of the blood-air barrier • **Functions:** ○ Allow for gas exchange with the adjacent capillaries ○ Nonproliferative	• They are also called type II pneumocytes, great alveolar cells, and alveolar septal cells • Cover 5% of alveolar surface area • Comprise 12% of the cell population • They are interspersed among the type I cells, to which they attach by desmosomes and occluding junctions • **Structure:** Roughly cuboidal with round nuclei • **Functions:** ○ Secrete surfactant ○ Proliferate after lung damage ○ Are source of precursors for new alveolar cells (types I and II)	• 40% of the cell population • Thin, wrapped into cylinders to form capillaries • **Function:** ○ Allow for gas exchange with the alveolus	• Known also as **dust cells**, these large monocyte-derived representatives of the mononuclear phagocyte system are found both on the surface of alveolar septa and in the interstitium • **Structure:** Amorphous • They also phagocytose blood cells that enter the alveoli as a result of heart failure **Note:** • Alveolar macrophages, which phagocytize RBCs that leak into alveoli in CHF, are also called "heart failure cells" • **Function:** ○ Engulf debris ("dust cells")

HEMOGLOBIN-OXYGEN DISSOCIATION CURVE

INI-CET NOV 2024, INI-CET 2023



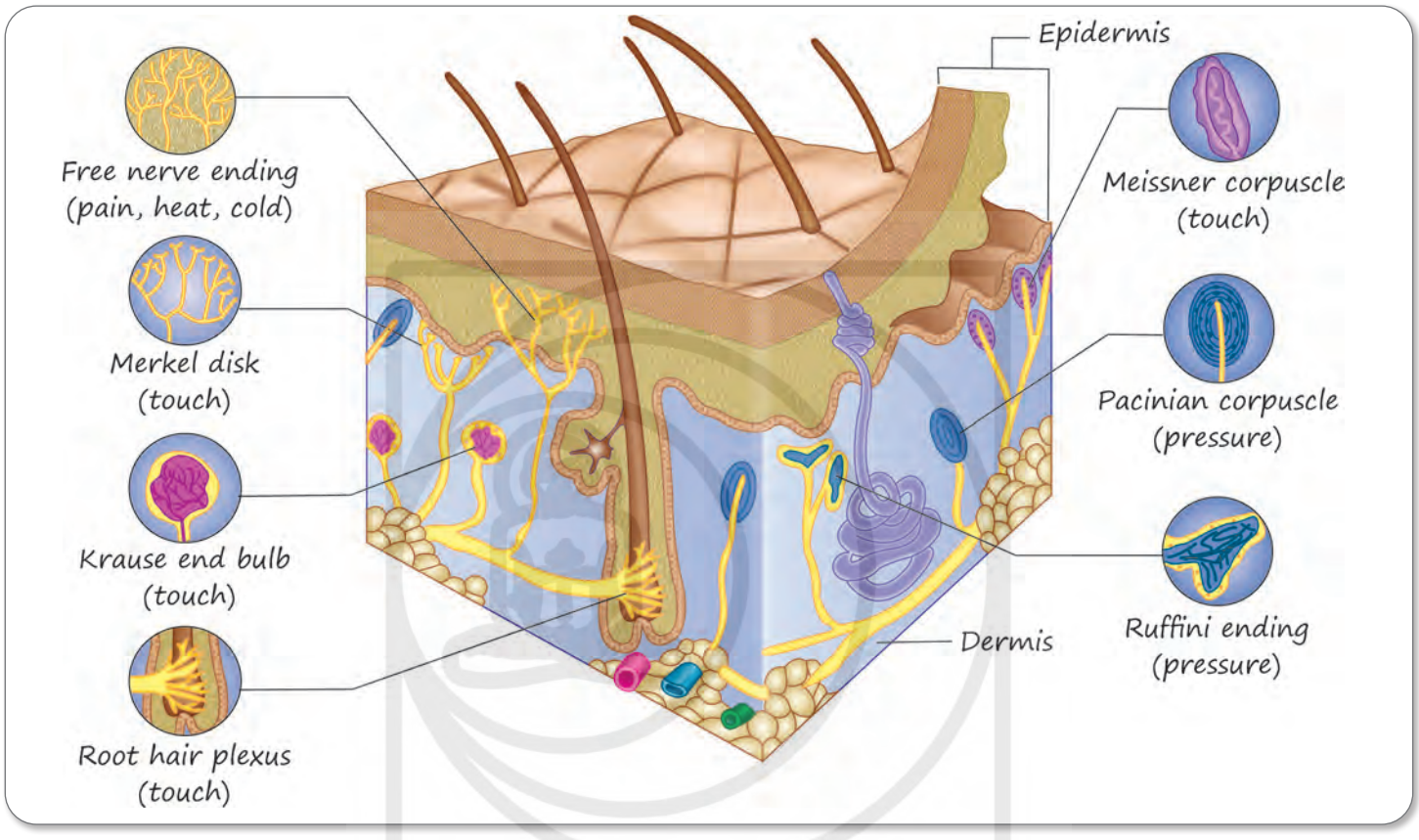
Factors that cause a right and left shift of the oxygen-hemoglobin dissociation curve.

Left Shift	Right shift
(↓ O_2 unloading to tissue) Left = Lower	(↑ O_2 unloading to tissues) ACE BATs right handed
↓H^+ (↑ pH, base) ↓ Pco_2 ↓ 2, 3—BPG ↓Temperature ↑CO ↑MetHb ↑Hbf	↑ H^+ (↓ pH, Acid) ↑ Pco_2 Exercise ↑ 2, 3–BPG High Altitude ↑ Temperature

2, 3-DPG:

- It is an intermediate product in glycolysis.
- It binds with β-chins of deoxyhemoglobin causing more O_2 to be released at tissues.

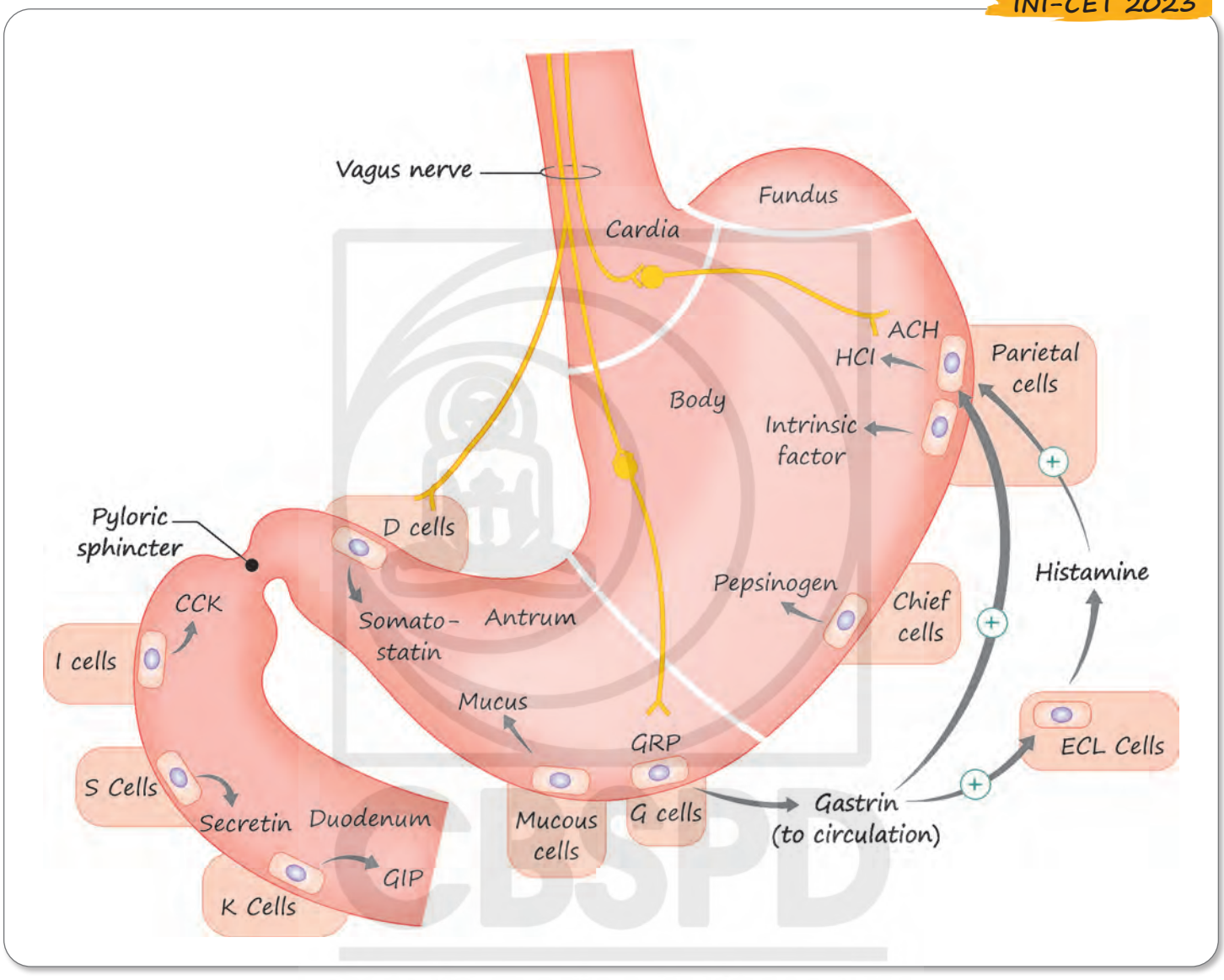
PROPERTIES OF DIFFERENT TACTILE RECEPTORS



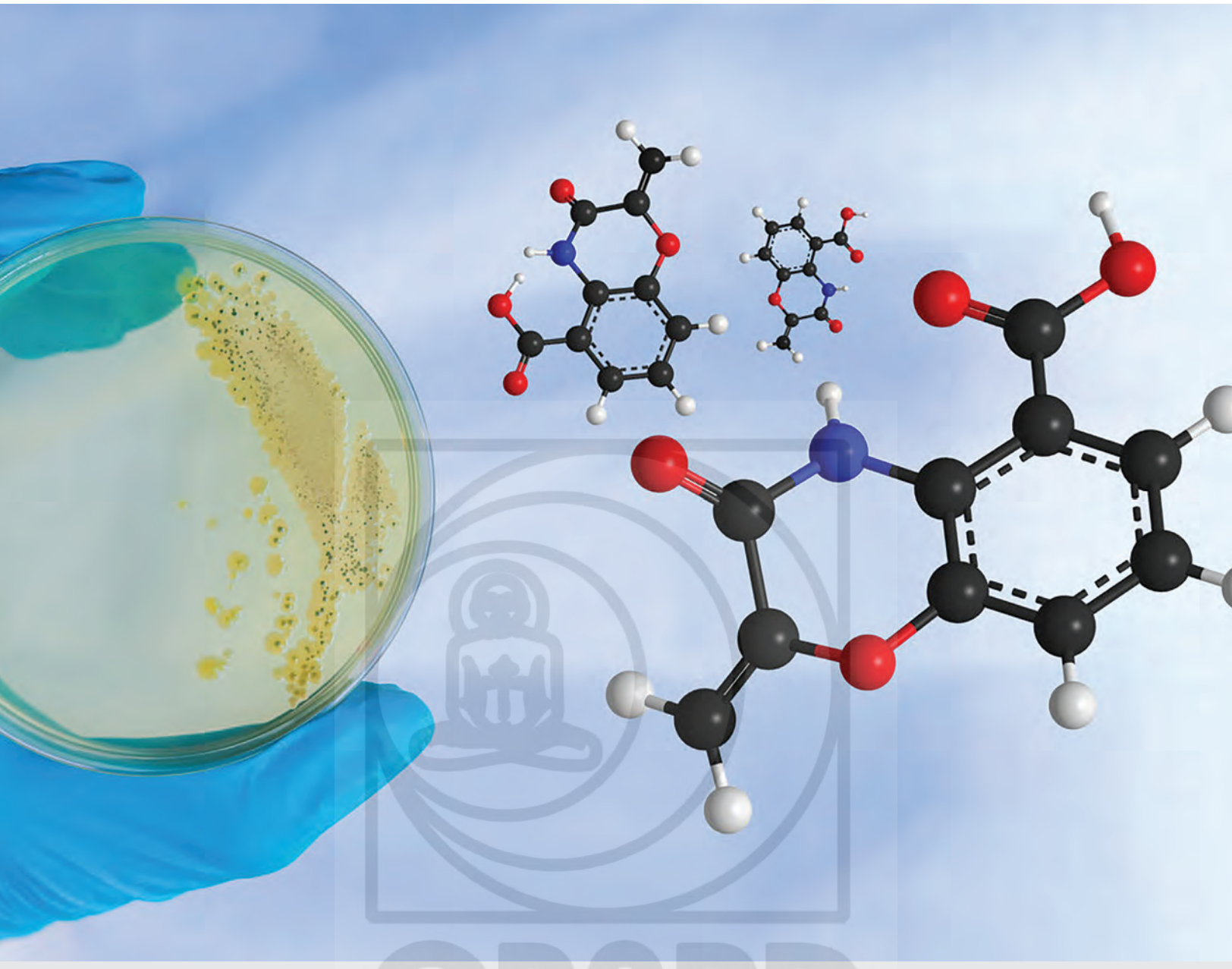
Touch receptors	Characteristics
Meissner's corpuscles	• They sense tap and flutter. • Present in dermal papillae. • Mainly detect the initial contact of the hand with objects • Respond to changes in texture • Respond to low frequency slow vibrations • Rapidly adapting receptors.
Merkel's cells	• Sense to touch and sustained pressure • Present in epidermis. • Sensitive to edges, corners, and points • Distinguish textures - play a key role in the ability to read Braille for blind people (**Two-Point discrimination**) • They are slow adapting receptors.
Pacinian corpuscles	• They are the most sensitive mechanoreceptors in the somatosensory system. • Detect deep pressure and high frequency (3-500 Hz) fast vibration. • They are rapidly adapting receptors.
Ruffini corpuscles	• Sense stretch and fluttering vibration. • Seen around joint capsules • They respond to sustained pressure • They are very sensitive to skin stretch • Rapidly adapting receptors

GASTRIC SECRETIONS

INI-CET 2023



Abbreviations: ACh: acetylcholine; CCK: cholecystokinin; ECL cells: enterochromaffin-like cells; GIP: gastric inhibitory peptide; GRP: gastrin-releasing peptide; HCl: hydrochloric acid

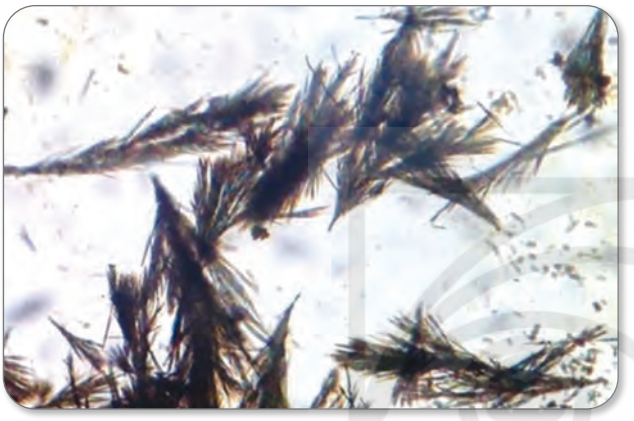


BIOCHEMISTRY

SHAPES OF OSAZONE CRYSTALS

Osazones are crystals and all reducing sugars form osazones.

Needle-Shaped Crystals

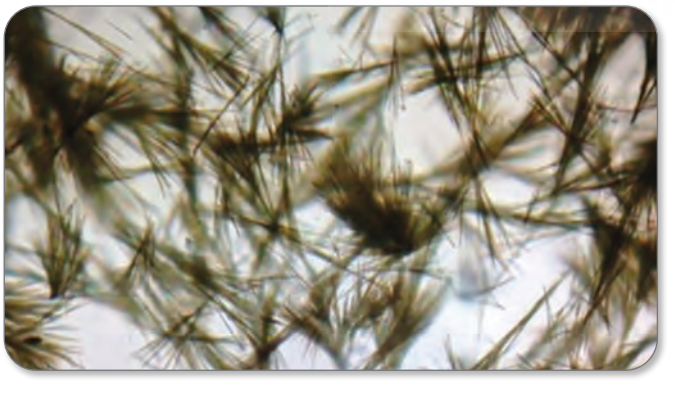


Seen in glucose.

Needle-Shaped Crystals

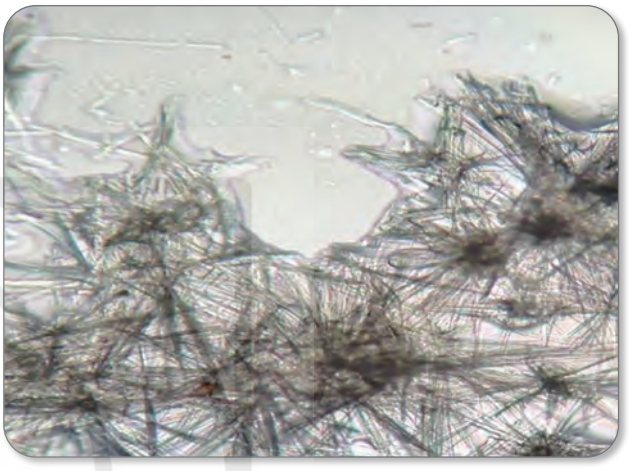
Seen in fructose.

Needle-Shaped Crystals



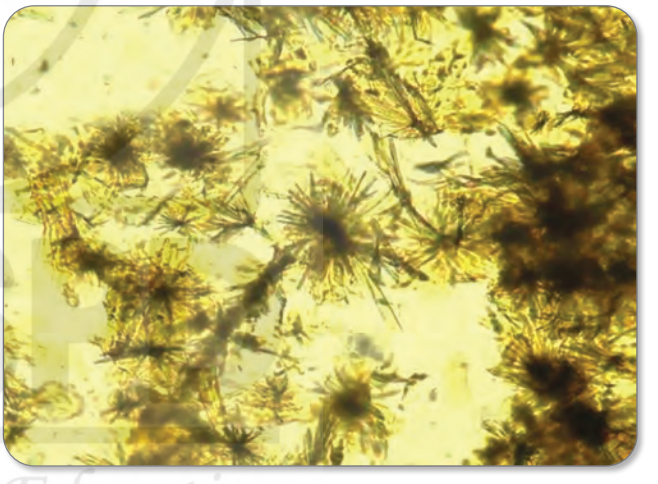
Seen in mannose.

Balls With Thorny Edge Shaped Crystals



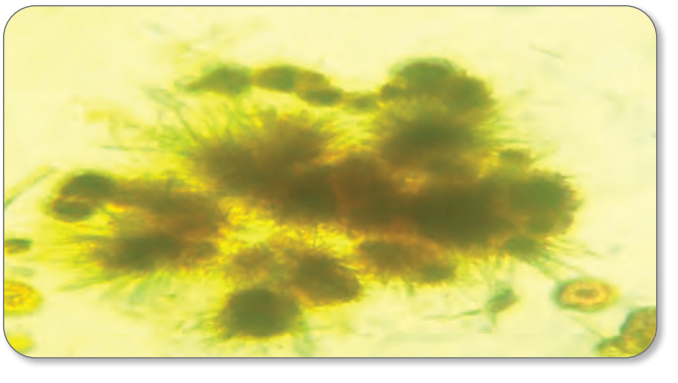
Seen in galactose

Sunflower-Shaped Crystals



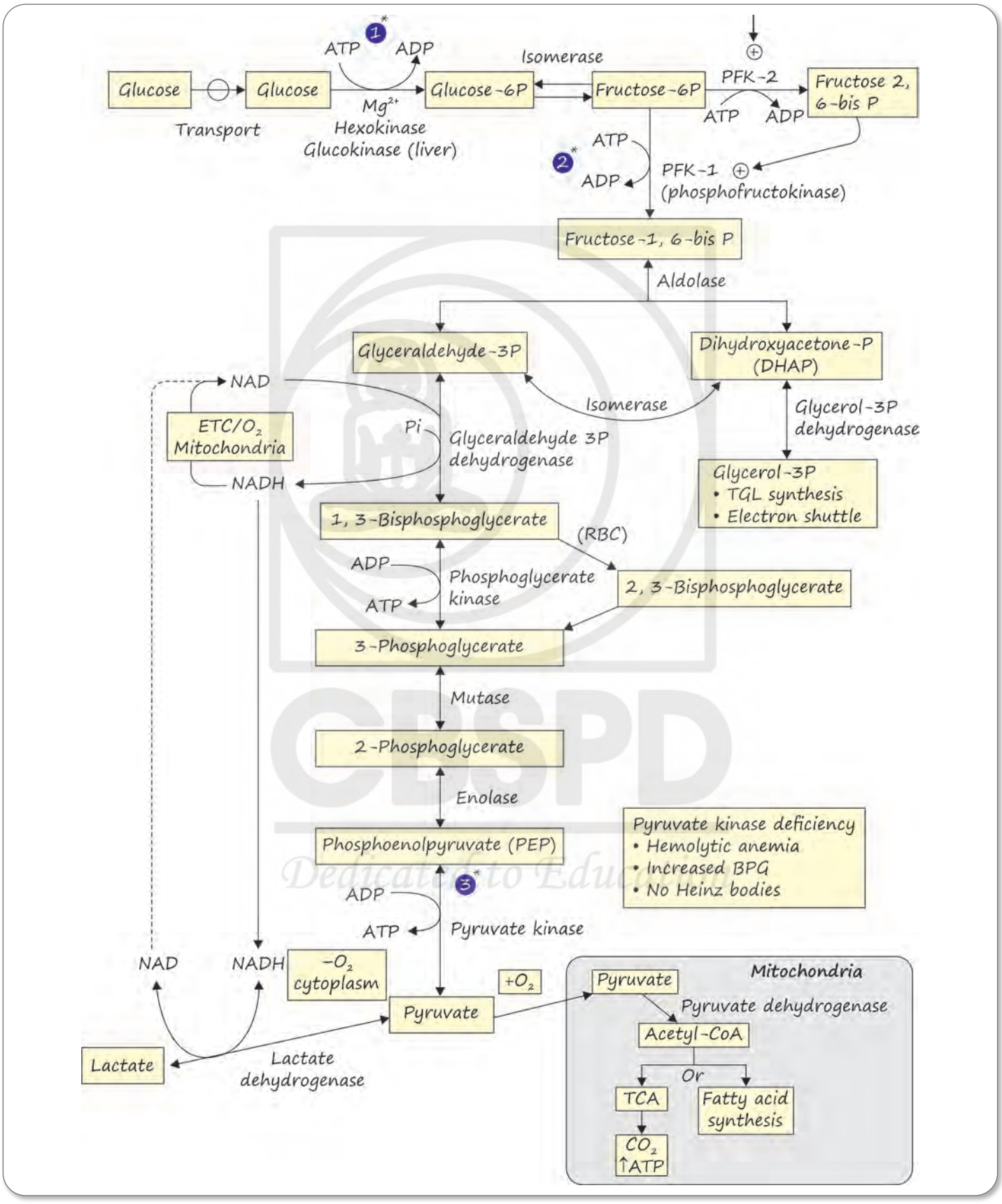
Seen in maltose

Powder Puff/Hedgehog Appearance/Cotton Ball-Shaped Crystals



Seen in lactose.

GLYCOLYSIS

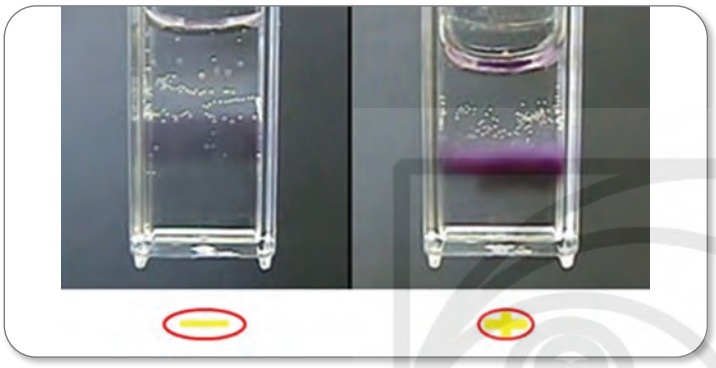


*Controlled enzymes catalyzing irreversible steps

Abbreviations: NAD, Nicotinamide adenine dinucleotide; ATP, adenosine triphosphate; TCA, tricarboxylic acid; NADH, nicotinamide adenine dincleotide hydrogen

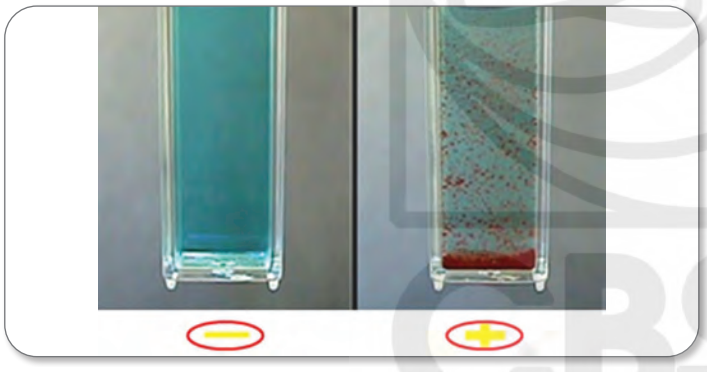
Molisch Test

- Molisch test is a general test for carbohydrates.
- But there is one condition: The number of carbons should be 5 or more, only then Molisch test is positive.

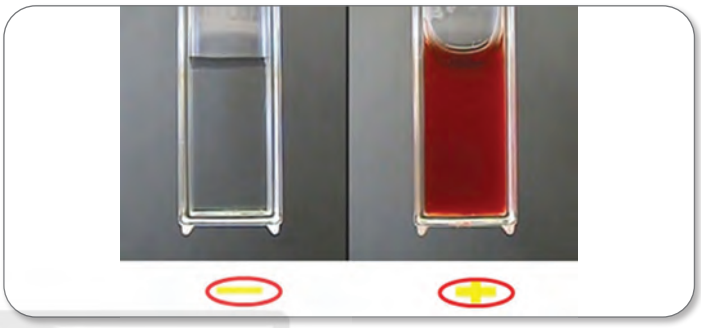


Barfoed's Test

- Barfoed's test is used to distinguish between monosaccharides and disaccharides.
- Monosaccharides give a positive Barfoed's Test.

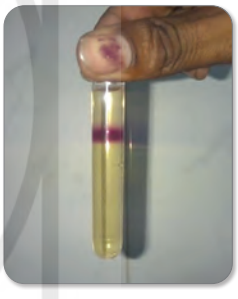


Seliwanoff's Test



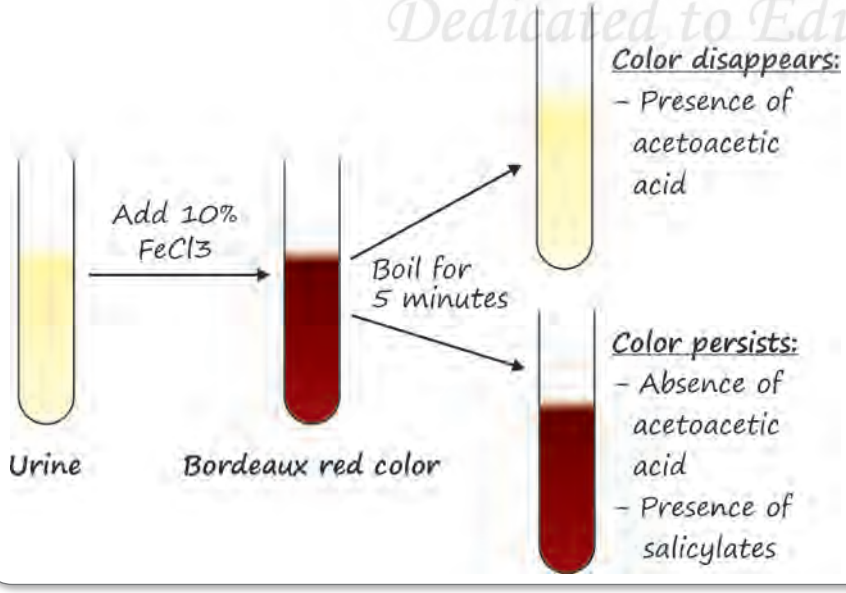
- Seliwanoff's test is used to distinguish between aldehyde and keto sugar.
- Keto sugars give a positive Seliwanoff's test.

Rothera's Test



- Rothera's test is done for the detection of ketone bodies.
- Ketone bodies react with sodium nitroprusside (in the presence of NH_3) to form a purple-colored ring.
- Rothera's nitroprusside –Pink/Purple permanganate ring test and Gerhardt's –Ferric chloride-red wine color tests are used for detection of ketone bodies in urine.

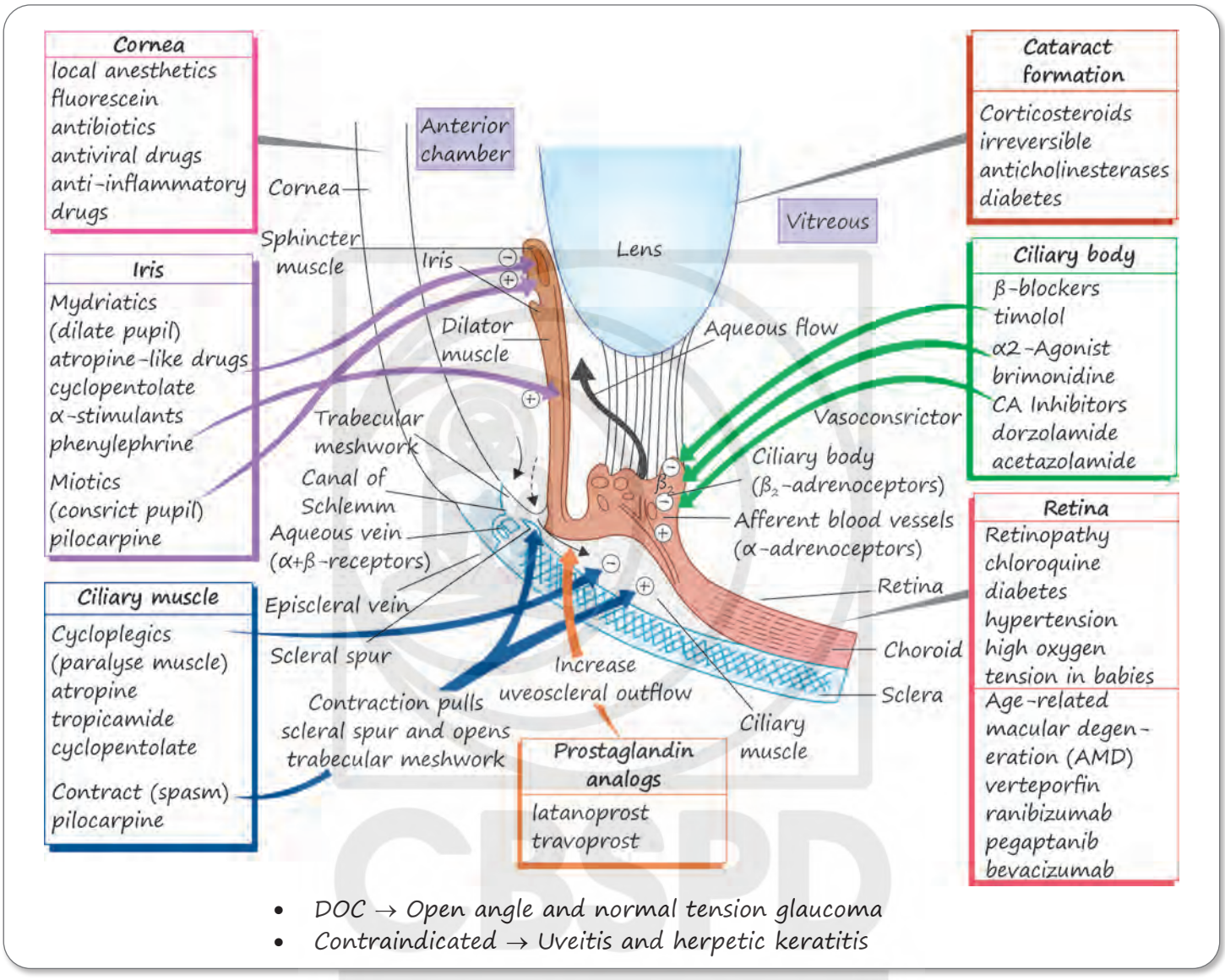
Gerhardt's Test



- Gerhardt's test is also done for ketone bodies.
- Ferric chloride added → Wine color.
- Positive test indicates acetoacetate and not acetone.

PHARMACOLOGY

OCULAR PHARMACOLOGY



- DOC → Open angle and normal tension glaucoma
- Contraindicated → Uveitis and herpetic keratitis

Beta Blockers

- Second-line drug (timolol, levobunolol, metipranolol, carteolol) for treatment of Open angle and normal tension glaucoma (decrease IOP by **decreasing aqueous production**).
- Betaxolol (selective β_1 blocker): maximum retinal neuroprotective effect.
- Side effect of Timolol → **nasolacrimal duct obstruction** and **ocular cicatricial pemphigoid**
- Contraindication of nonselective β-blocker → **Asthma** and **COPD** (it can block β_2 receptors and cause bronchospasm)

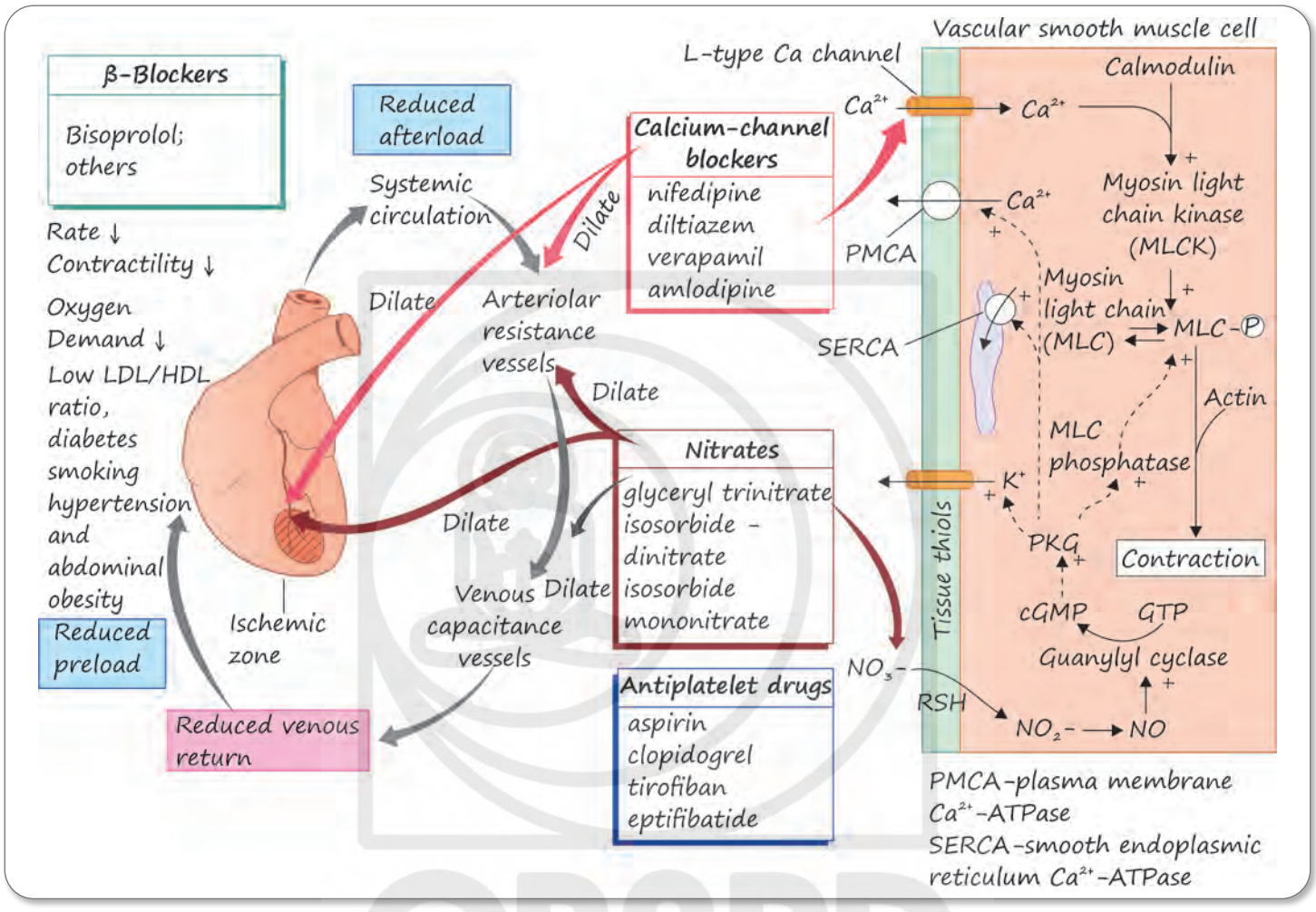
Sympathomimetics

- α_2 agonists (brimonidine) → **Third-line drug** treatment of Open angle and normal tension glaucoma
- Side effect of brimonidine → **Drowsiness**/fatigue (sedation dry mouth, hypotension and **apnea** in **young children**)

Carbonic Anhydrase Inhibitors

- **Acetazolamide (oral)** → Both closed and open angle glaucoma
- Topical brinzolamide and dorzolamide → **Third-line drug** treatment of Open angle and normal tension glaucoma. These drugs act by **decreasing aqueous** production

DRUGS USED IN ANGINA



Types of Angina

- **Stable (effort) angina:** Due to fixed narrowing of coronary arteries.
- **Unstable angina/NSTEMI:** Due to acute **formation of thrombus** on atherosclerotic plaque.
- **Variant (Prinzmetal) angina:** Due to **coronary artery vasospasm.**

Nitrates (e.g., Nitroglycerin, Isosorbide Dinitrate, Isosorbide Mononitrate)

- **Uses:** Stable angina, unstable angina, and variant angina.
- **Side Effects:** Tachycardia, orthostatic hypotension, headache
- Remember, **nitroglycerin dilates VEINS** >> arteries.

β -Blockers (e.g., Metoprolol, Atenolol, Propranolol)

- **Uses:** Stable angina, **not variant (Prinzmetal) angina** (because β -blockade can disrupt the balance of α and β effects and worsen vasospasms).
- **Side effects:** Bradycardia, AV block. Contraindicated in asthma and COPD patients (only beta-blockers selective for β2-receptors, such as atenolol and metoprolol, can be used).

Calcium Channel Blockers (e.g., Verapamil, Diltiazem, Nifedipine)

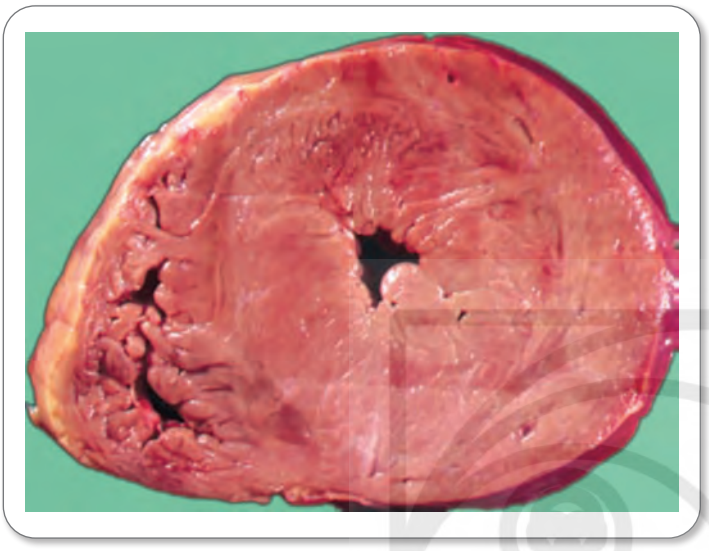
- Decrease O_2 demand.
- Verapamil, diltiazem: Decreases HR and contractility (like β -blockers).
- Nifedipine: Decreases afterload via vasodilation.
- **Uses:** Stable angina and variant (Prinzmetal) angina (calcium channel blockers are the drugs of choice).
- **Side Effects:** Nifedipine may cause reflex tachycardia (increased O_2 demand); verapamil and diltiazem can cause constipation, bradycardia, and AV block. Verapamil has negative inotropic effects and can cause signs of heart failure.

Ranolazine

- **Mechanism:** Inhibits the late phase of inward sodium current thereby reducing diastolic wall tension and oxygen consumption. Does not affect heart rate or blood pressure.
- **Clinical Use:** Angina refractory to other medical therapies (Decreases risk of atrial fibrillation, decreases HbA_1C).
- **Adverse Effects:** Constipation, dizziness, headache, nausea.

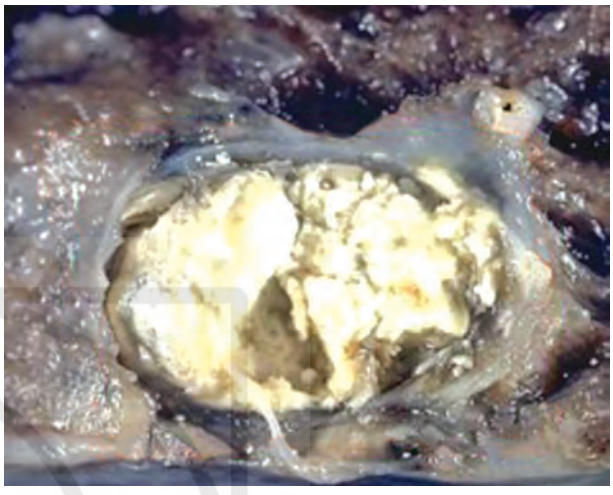
PATHOLOGY

Hypertrophy



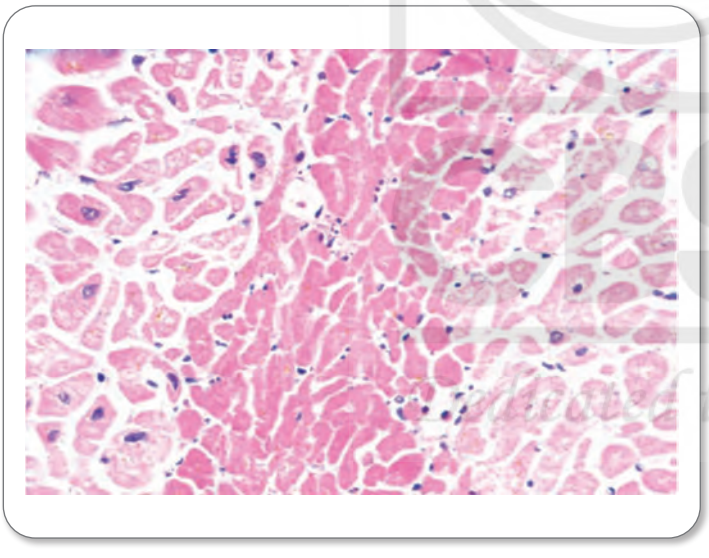
- The illustration shows marked hypertrophy of the left ventricle. Hypertrophy of this extent, often seen in hypertensive heart disease, is caused by increased workload from increased ventricular pressure. This organ enlargement is the result of an increase in size of the individual muscle cells.

Caseous Necrosis



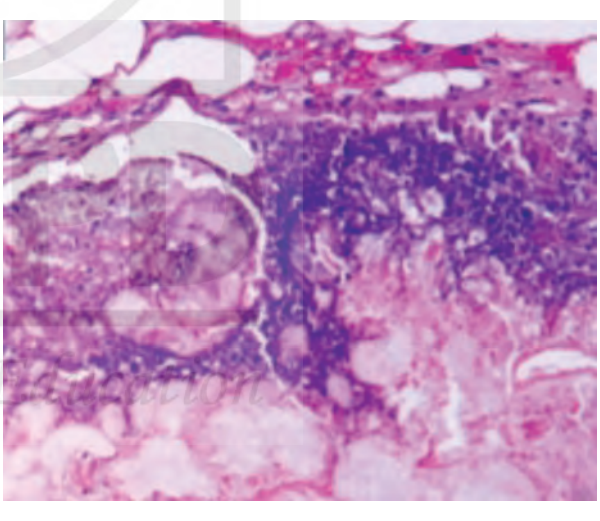
- It is soft, friable necrosis with 'cottage cheese' like appearance. Its liquefactive necrosis with debris thickens the soup to make it cheese like.
- Characteristic of granulomatous inflammation of TB or fungal infection (fungal cell wall and mycobacterium thickens the soup).

Coagulative Necrosis



The figure illustrates general preservation of myocardial architecture with some fragmentation, more intense cytoplasmic staining corresponding to increased cellular eosinophilia, and loss of nuclei, all of which are characteristics of coagulative necrosis.

Fat Necrosis



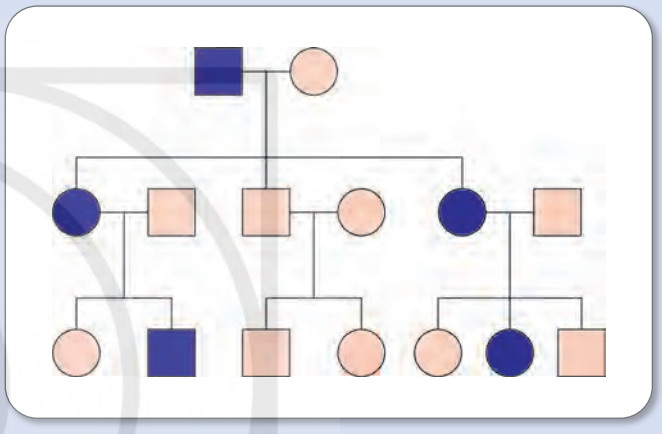
Outlines of dead fat cells without peripheral nuclei; saponification of fat (combined with Ca^{2+}) appears dark blue on H&E stain.

Examples:

- Most common mitochondrial inheritance is **MELAS syndrome** (mitochondrial encephalopathy, lactic acidosis, and Stroke like syndrome).
- Leber hereditary optic neuropathy
- NARP (neurogenic weakness, ataxia and retinitis pigmentosa).
- Leigh's syndrome
- CPEO (Chronic progressive external ophthalmoplegia)
- Kearns-Sayre syndrome

X-linked Dominant

- Rare pattern of inheritance
- Affected male will transmit it to **100% of their daughters** and none of their sons.
- Affected (diseased) female will transmit the disease to 50% of their sons and daughters.
- **Examples:**
  "Red Rose For All Children"
  Red: X-linked hypophosphatemic Rickets
  Rose: Rett syndrome
  For: Fragile X syndrome (XR > XD)
  All: Alport syndrome
  Children: Charcot–Marie–Tooth disease



Autosomal dominant inheritance

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- Most common pattern of Mendelian inheritance.
- They manifest disease in the heterozygous state, so at least one parent of index case is usually affected.
- Most commonly due to defects in structural genes.
- Many generations, both males and females are affected.

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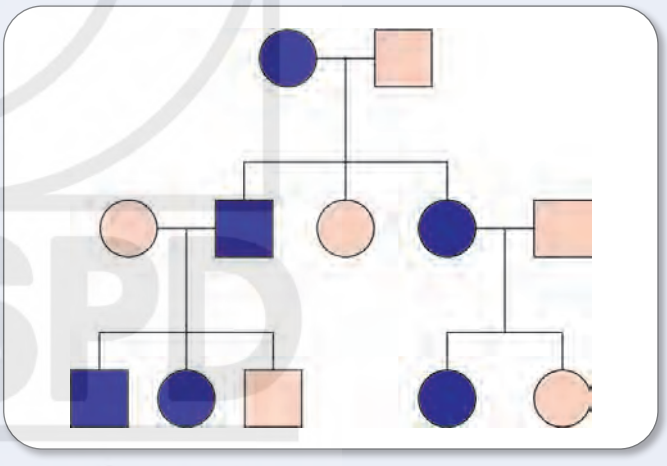
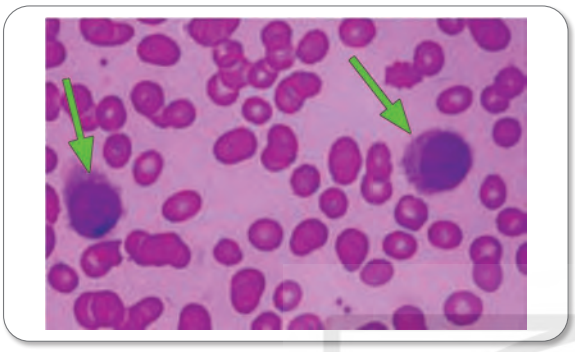
- **Examples:**
  - Achondroplasia
  - Autosomal dominant polycystic kidney disease
  - Familial adenomatous polyposis
  - Familial hypercholesterolemia
  - Hereditary hemorrhagic telangiectasia
  - Hereditary spherocytosis
  - Huntington disease
  - Li-Fraumeni syndrome
  - Marfan syndrome
  - Multiple endocrine neoplasia
  - Neurofibromatosis type 1 (von Recklinghausen disease)
  - Neurofibromatosis type 2
  - Tuberous sclerosis
  - Von Hippel-Lindau disease



Contd...

Hairy Cell Leukemia (HCL)



CBC with smear showing pathognomonic "hairy cells" (mononuclear cells with many cytoplasmic projections)

Acute Myelogenous Leukemia (AML)

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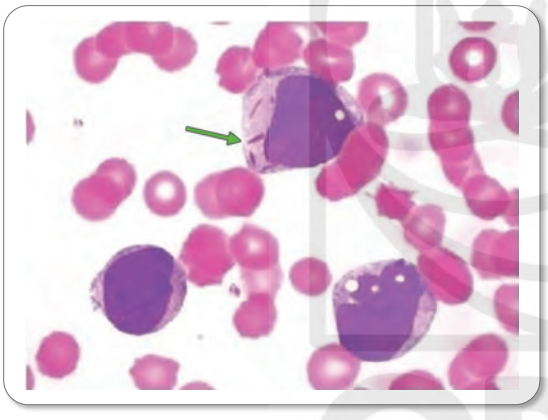

Auer rods are pink or red-stained needle-shaped structures seen in the cytoplasm of myeloid cells, containing agglomeration of azurophilic granules containing enzymes such as acid phosphatase, MPO and esterase, and may represent abnormal derivatives of cytoplasmic granules.

Chronic Myelogenous Leukemia (CML)

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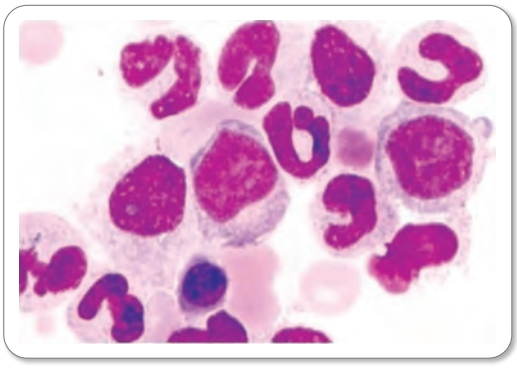

The given figure shows blast cells, promyelocytes, myelocytes, and band forms.

Hodgkin Lymphoma (HL)

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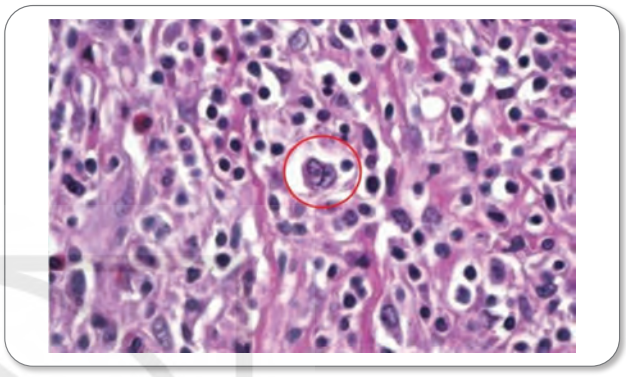

Excisional lymph node biopsy showing the classic Reed-Sternberg cells (giant abnormal B cells with bilobar nuclei and huge, eosinophilic nucleoli, which create an owl's-eye appearance.

Burkitt Lymphoma

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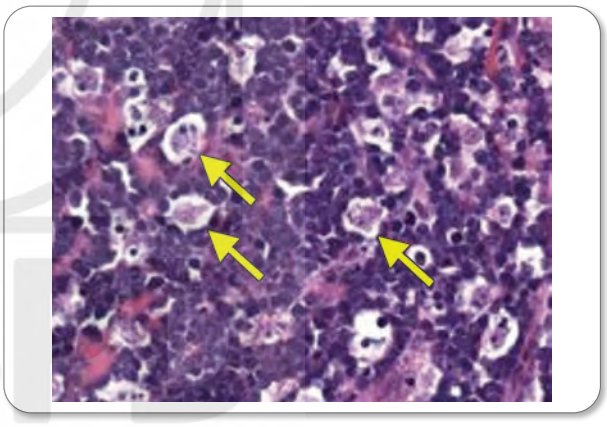
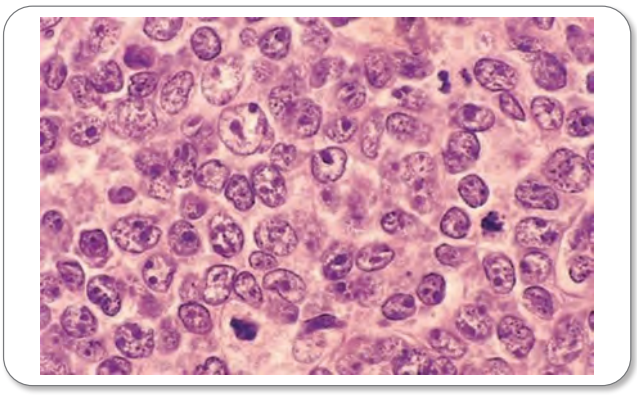


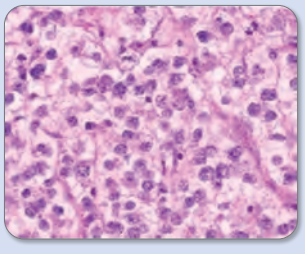
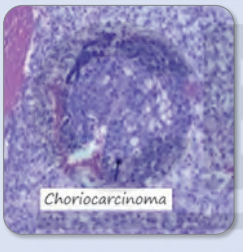
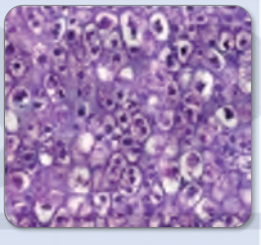
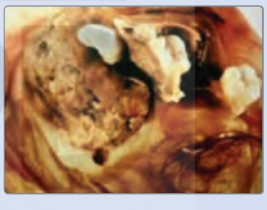
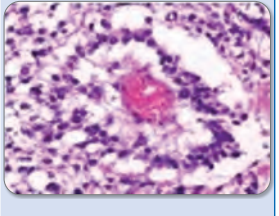
High grade, "starry sky" appearance on lesion biopsy; sheets of lymphocytes with interspersed "tingible body" macrophages.

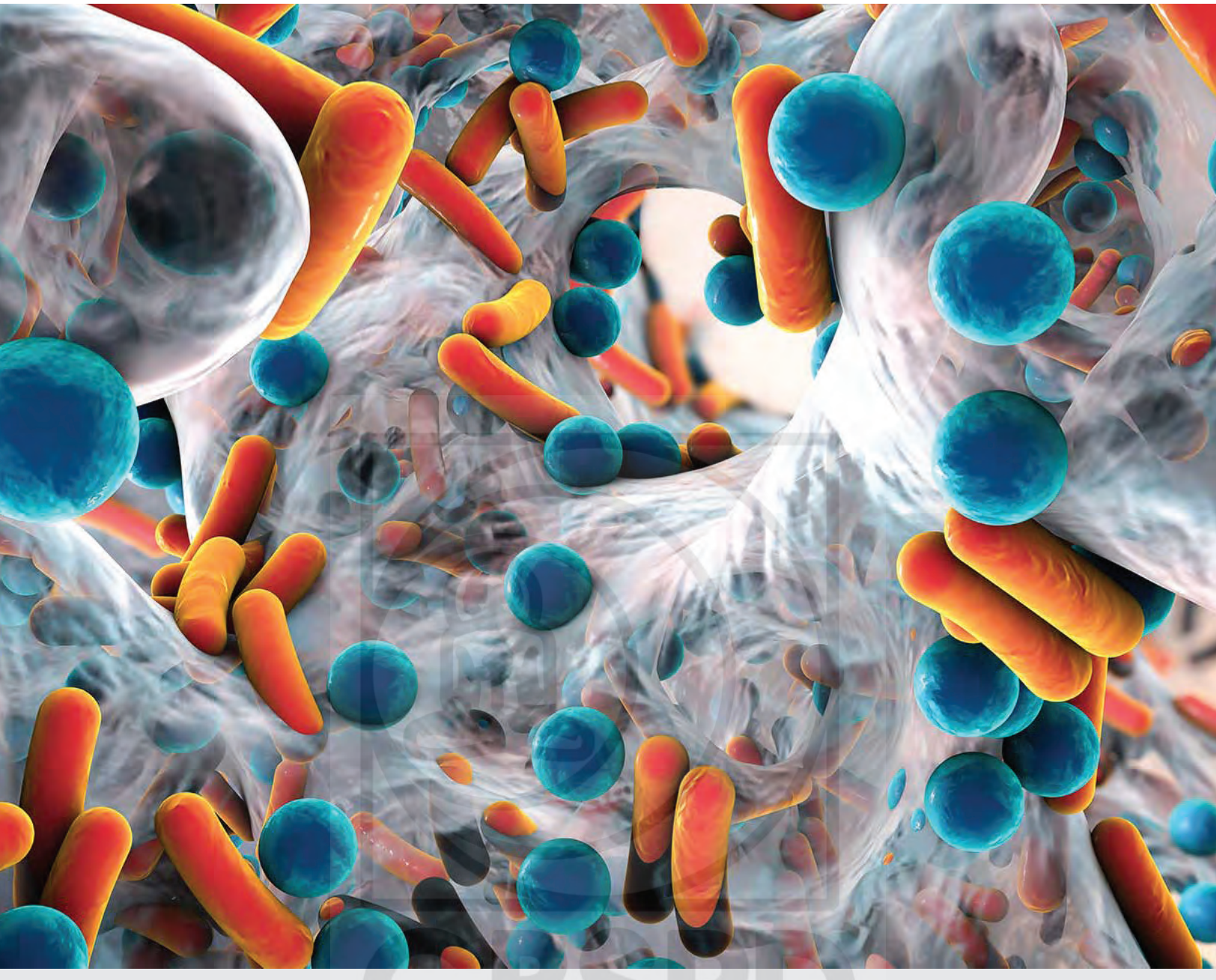
Diffuse Large B-cell Lymphoma



Tumor cells have large nuclei, open chromatin and prominent nucleoli.

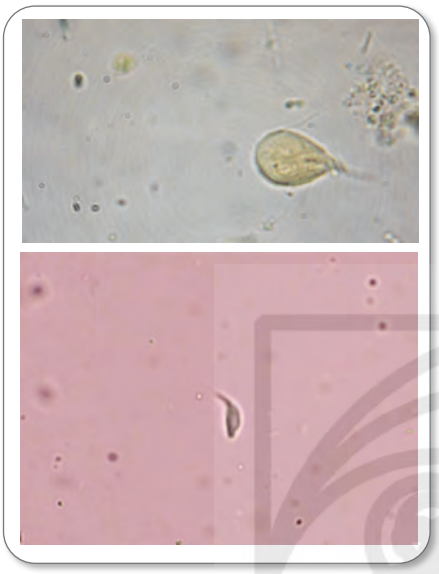
Ovarian Tumors

Dysgerminoma	Choriocarcinoma	Embryonal carcinoma	Cystic teratoma	Endodermal sinus (yolk sac) tumor
• Malignant tumor with cells that resemble oocytes (large cells, clear cytoplasm, central nuclei) – fried egg appearance	Malignant tumor composed of cytotrophoblasts and syncytiotrophoblasts	• Malignant tumor composed of large primitive cells	• Tumor made up of fetal tissue derived from >2 embronic layers (e.g., skin, hair cartilage, thyroid, etc.)	Malignant tumor that mimics yolk sac
Malignant	Malignant (trophoblasts are very invasive)	Malignant (aggressive)	• Mostly benign but if immature tissue (neural or somatic malignancy) present, indicates malignant potential	Malignant
• Most common malignant germ cell tumor • Seminoma is male counterpart (histologically indistingduishable)			• Most common germ cell tumor	• Most common germ cell tumor in kids
 Fried egg appearance on biopsy	 Tumor is small, hemorrhagic and spreads hematogenously early		 Hair and teeth seen in cystic teratoma INI-CET 2022	 Schiller-Duval bodies (glomerulus like structure) classically seen on biopsy. INI-CET 2022
• Good prognosis; responds to radiotherapy	• Poor response to chemotherapy			
• Serum LDL may be elevated	• High Beta-HCG characteristic (made by syncytiotrophoblasts) may lead to thecal cysts in ovary		• Hyperthyroidism in case of Struma ovarii (teratoma mainly composed of thyroid tissue)	

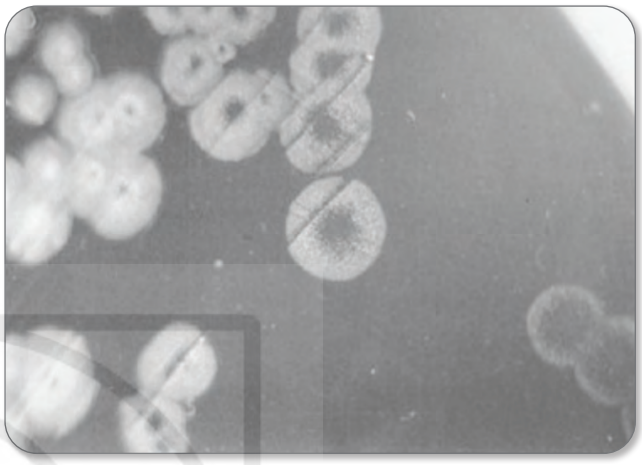


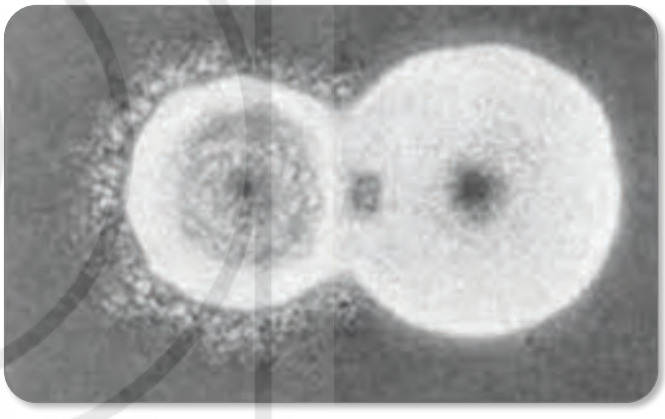
MICROBIOLOGY

Falling Leaf Motility: Giardia



Twitching Motility: Eikenella Corrodens





Jerky Motility: Trichomonas

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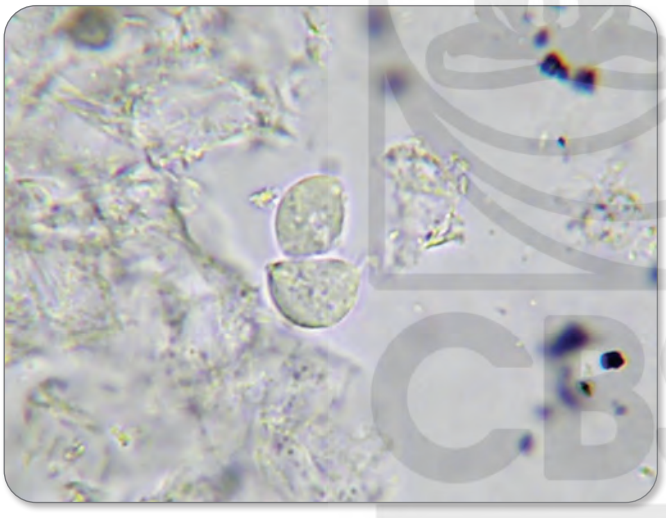
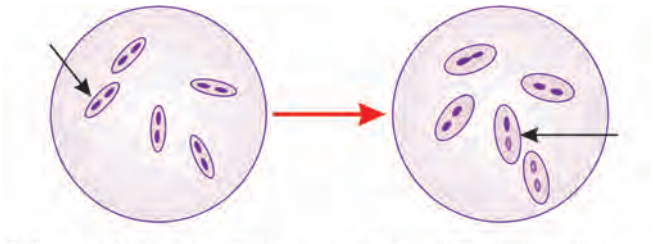


Points to Remember

- Lashing motility: Saprophytic spirochetes.
- Differential motility (motility at different temperatures): Yersinia enterocolitica and Listeria monocytogenes.
- Stately motility: Clostridia.

REACTIONS/TESTS FOR IDENTIFICATION OF MICROBES

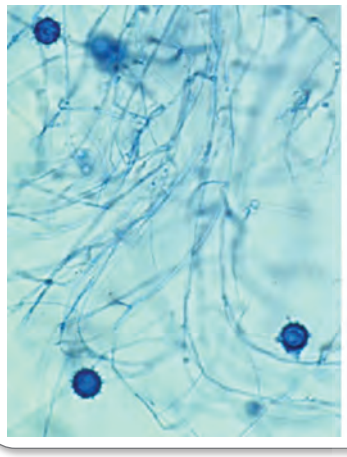
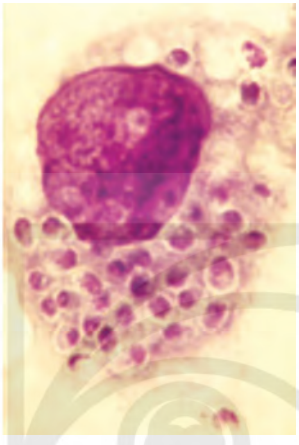
Quellung/Capsular Swelling Reaction



- Pneumococcus is mixed on a slide with a drop of the specific antiserum and a loop full of methyl blue solution, in the presence of homologous antiserum, capsular becomes apparently swollen.

HISTOPATHOLOGICAL FINDINGS OF SYSTEMIC FUNGI

Histoplasma

Tiny oval yeast cells (2–4 µm size) with narrow-based budding within the macrophage with an underlying granulomatous response. Histoplasma capsulatum has no capsule so it is misnamed. In stained smears, the yeast cytoplasm shrinks away from the cell wall leaving a clear space resembling a capsule.

Blastomyces

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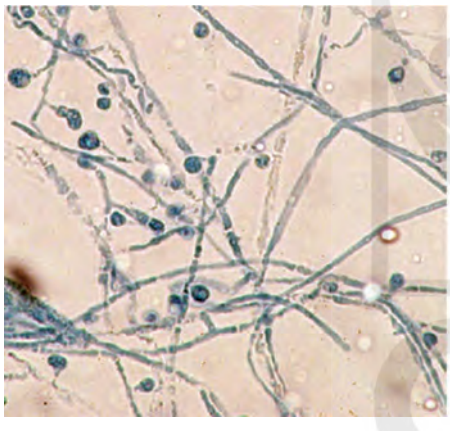
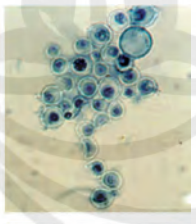


Thick cell wall, round yeast cells of 8–15 µm size with single broad-based budding (Figure of 8 appearance). Note the thick cell wall and the broad base between the mother cell and the blastoconidium (bud). One budding pair has been enlarged in the inset for detail.

Coccidioides

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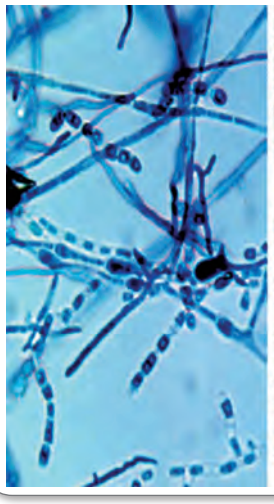
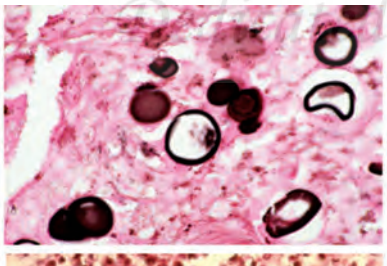
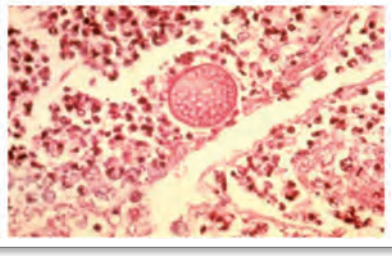

Mature spherules of coccidioides are seen in the given image. Spherules which are large sac-like structures (20–80), have thick, double refractile wall, and are filled with endospores.

Characters of Plasmodium in Blood Smears

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Characters	P. falciparum	P. vivax	P. malariae	P. ovale
Size of RBC	Normal	Large	Large	Normal
Shape	Round but crenated	Round/Oval	Round	Round/Pear-shaped fimbriated
Stippling	Maurer's clefts; basophilic stippling	Schuffner's dots	Ziemann's stippling	Schuffner's dots and James' dots
Schizonts	8–24 merozoites in grape-like clusters	12–24 merozoites in grape-like pattern	8–12 merozoites in rosette form	8–12 merozoites irregularly arranged
Gametocytes	Sausage/ Crescent/ Banana-shaped	Round-shaped	Round-shaped	Round-shaped
Diagnostic keys	Ring form, accole form, gametocytes	Large RBCs, ring form, trophozoites, schizonts, gametocytes	Small RBCs, ring form, band form, schizonts	Large pear-shaped fimbriated RBCs, schizonts

MICROFILARIAE ON BLOOD FILM

Wuchereria Bancrofti

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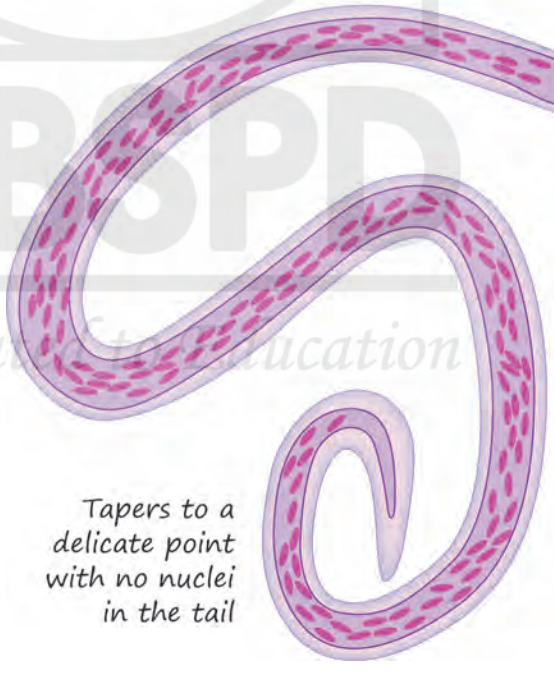
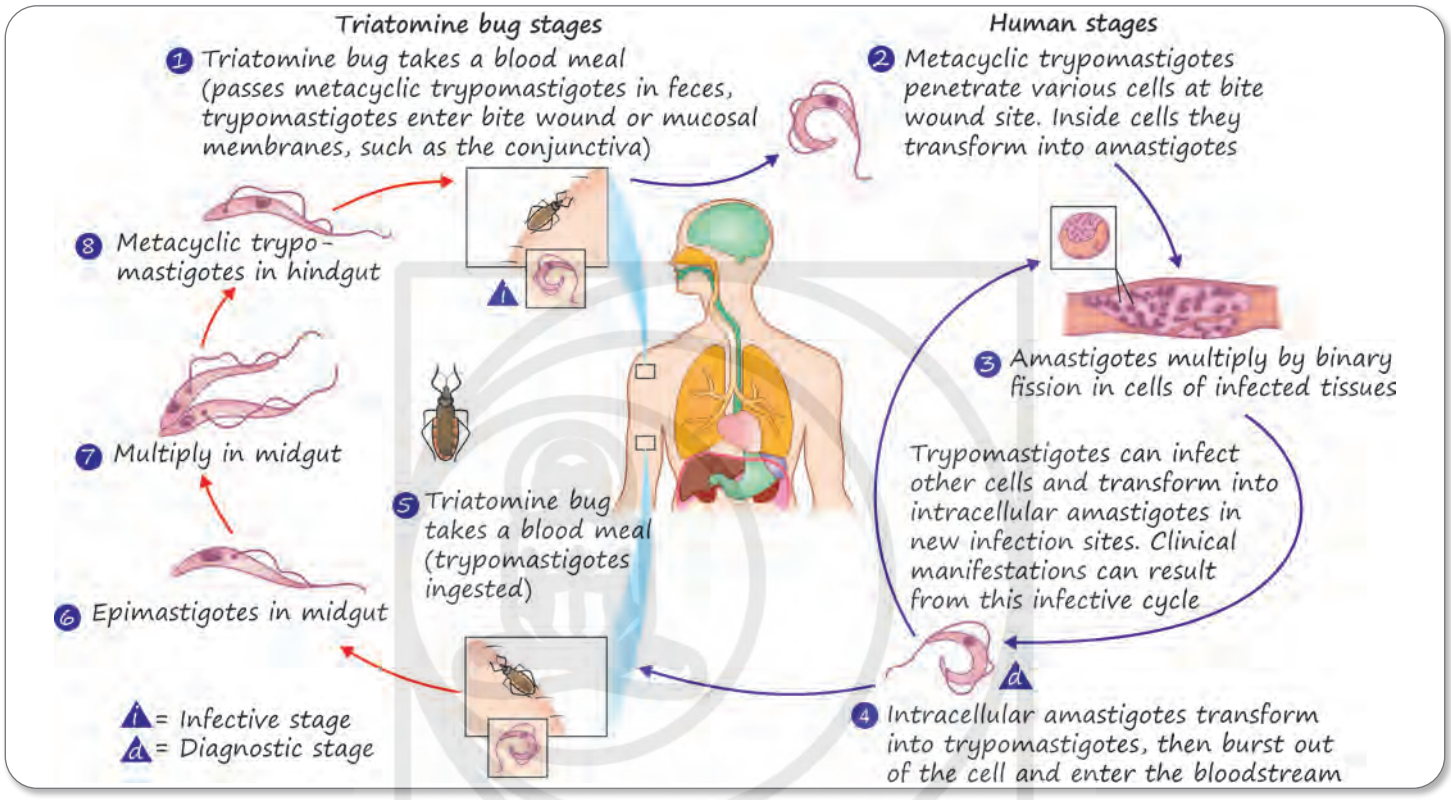


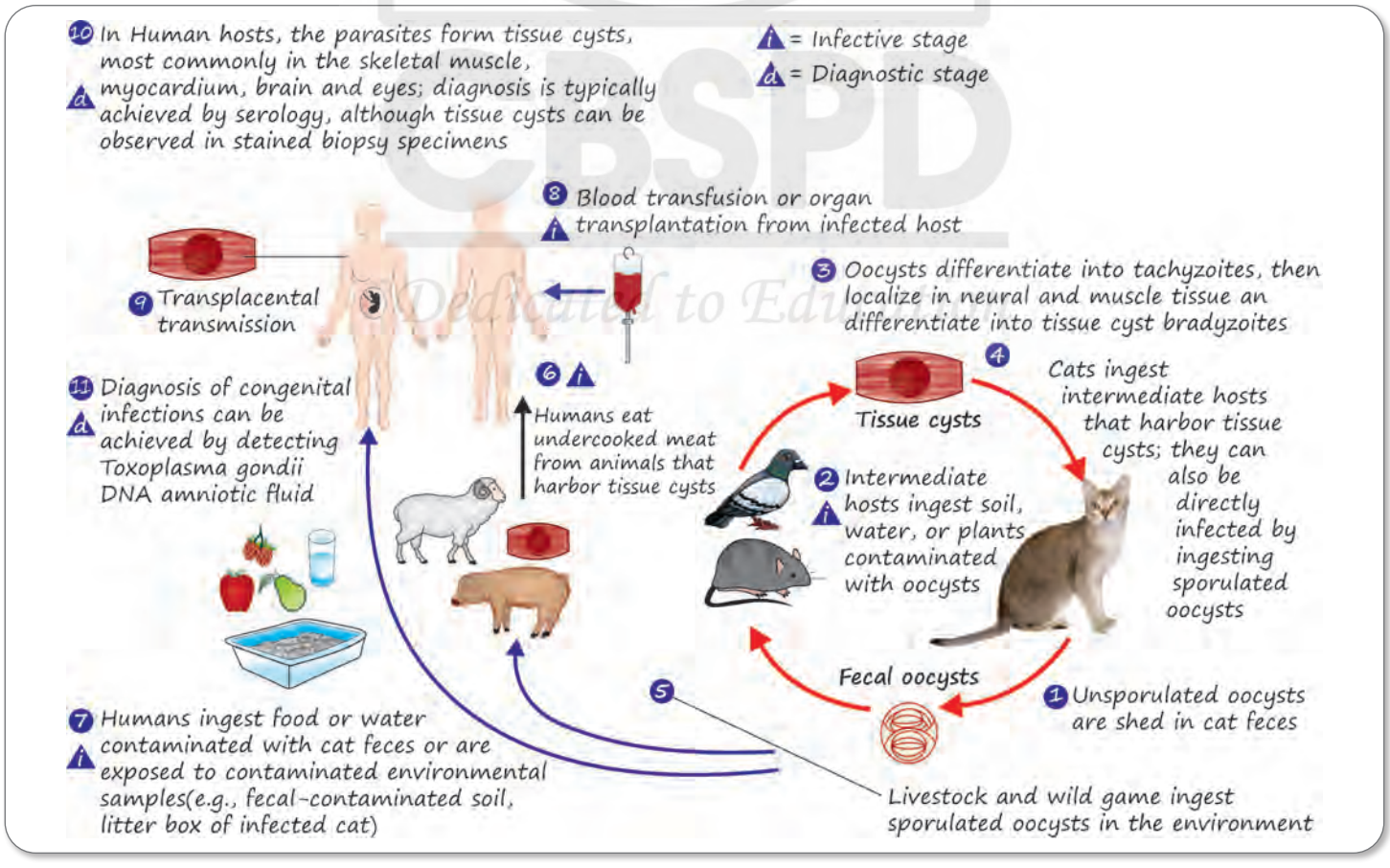
- The sheath stains a pinkish color with Giemsa and appears as a "halo" around the body on the film. The head has a space and the tail tapers to a point with no nuclei there.

LIFE CYCLES

Trypanosoma Cruzi (Chagas Disease)



Toxoplasma



FORENSIC MEDICINE

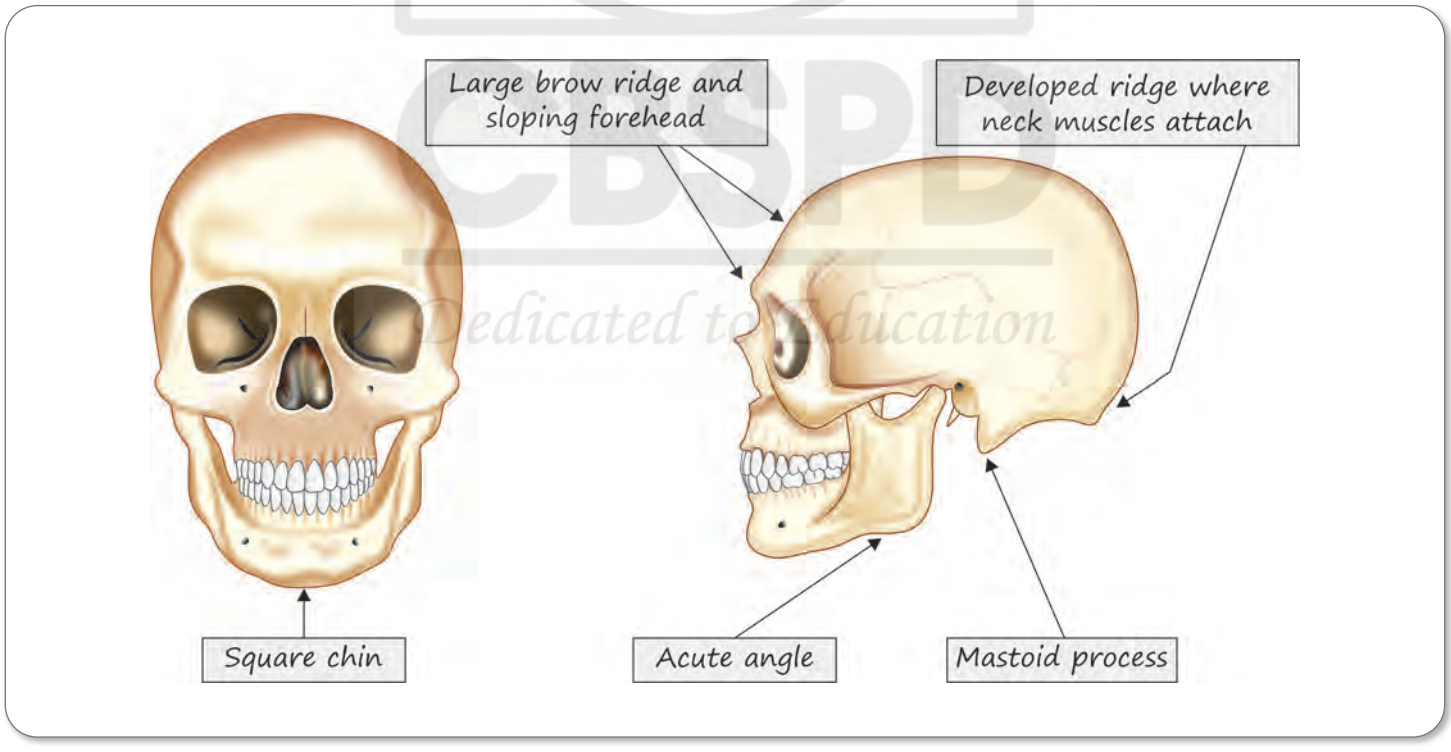
Stiffening

Heat stiffening	Cold stiffening

• If the body is subjected to heat exposure at > 65°C, rigidity is produced.
• **Synonyms:** Defense attitude, pugilistic attitude, fencing attitude and Boxer attitude.
• **Mechanism:**
  ○ Muscle protein coagulation due to heat
  ○ Muscles are contracted
• **Conditions:**
  ○ Burns
  ○ High voltage electric shock
• **Attitude:**
  ○ The legs are flexed at the hips and knees, the arms are flexed at the elbows and held out in front of the body and the fingers are hooked like claws.
• **Fate:**
  ○ The stiffening remains until decomposition.
  ○ The **normal rigor mortis does not occur** in heat stiffening.
	• If the body is exposed to freezing temperature, the tissues become frozen and stiff, stimulating rigor.
	• **Mechanism:**
	  ○ Freezing of body fluids
	  ○ Hardening of the subcutaneous fatty tissue.
	• **Fate:**
	  ○ On exposing the body to warm atmosphere, cold stiffness disappears, followed by normal rigor mortis occurring rapidly and passes off quickly.

SEX DETERMINATION FROM BONES

Male Skull Versus Female Skull



Male skull

Primary blast injuries	Blast wave
Secondary blast injuries	Flying projectiles
Tertiary blast injuries	Victim displacement
Quaternary blast injuries	Structural collapse/fire
Quinary blast injuries	Hyper-inflammatory state due to chemical/radiation

Primary Blast Injuries

Air blast:

- **Organ involvement: Ear > Lung > GIT.**
- Ear involvement: Tympanic membrane perforation and middle ear damage.
- Blast lung
- Underwater blast:
- When the explosion occurs under water, the pressure changes are termed underwater blast.
- Occurs mostly in GIT
- Solid blast:
- Refers to a wave of energy that spreads to rigid structure
- Mostly skeletal injuries. Fractures of vertebra and legs are common.

Quick Revision

Order of organ involvement in primary blast injuries:

- **In Air:** Tympanic membrane, lung and GIT
- **Under water (head above water level):** GIT, Lung and Ear
- **Under water (head under water level):** Ear, GIT and Lung.

Secondary Blast Injuries

- Injuries produced by **flying shrapnel and projectiles.**
- A triad of abrasions, bruises and puncture lacerations is diagnostic – **Marshall's triad.**

Entrance Corner:

- Most **common blast injury**: Secondary blast injury
- Most common **fatal** blast injury: Secondary blast injury
- Most **common organ** involved **in primary blast** injury: Ear
- **Second most common** organ involved in **primary blast** injury: Lung
- Most common organ involved in **underwater blast with head above water**: GIT
- Most common organ involved in **underwater blast with head under water**: Ear
- Most **common organ** involved in **secondary blast** wave: Skin
- Most common **fatal injury in primary blast** injury – Blast lung
- Most common injury in **solid blast** – Skeletal injuries

Contd...

Tertiary Blast Injuries

- Due to **victim displacement**
- Skeletal injuries resulting from traumatic impact against rigid structures

Quaternary Blast Injuries

- All other injuries that are not included in the first three categories.
- These include flash burns, crush injuries, traumatic injuries and respiratory injuries.

Note:

- **Explosion burns:** When the bomb explodes, the temperature of the explosive gases can exceed 2000°C, and the heat radiated momentarily can cause flash burns. So, it is **a quaternary** type blast injury.
- **Building collapse** can cause crush injuries which is a **quaternary blast injury.**

Incendiary bombs:

- Contain phosphorus and magnesium
- Primarily produce burns.

Molotov cocktail:

- **Simple incendiary weapon.** It is also known as a **petrol bomb.**
- The bomb consists of a bottle filled with petrol (gasoline).
- Wick is lighted and thrown at the target.

LATEST IMAGE-BASED QUESTIONS

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- INI-CET 2022
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- FMGE 2023
- FMGE 2022

NEET PG 2024

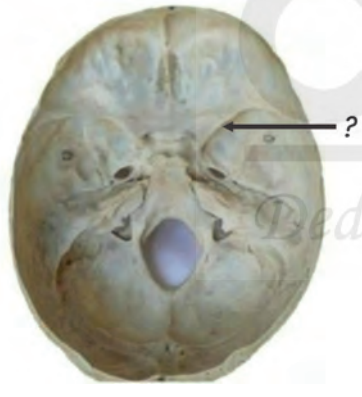
1. What is the outer covering of the condition shown in the image?

a. Chorion
b. Amnion
c. Endoderm
d. Ectoderm

Ans. b. Amnion

Explanation: The diagnosis based on the given image is omphalocele and is covered by the amnion.

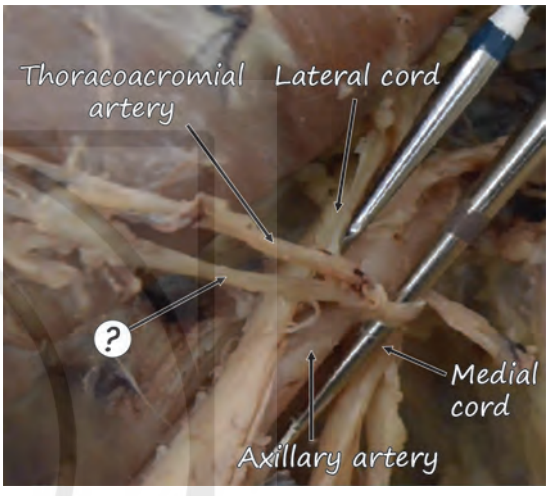
2. If a tumor compresses the structures passing through the opening marked in the given image, which of the following sensations would be affected?



a. Sensation of the nasopharynx
b. Mucosa of the nasal cavity
c. Sensation in the anterior scalp and dorsum of the nose
d. Sensation of the chin

Ans. c. Sensation in the anterior scalp and dorsum of the nose

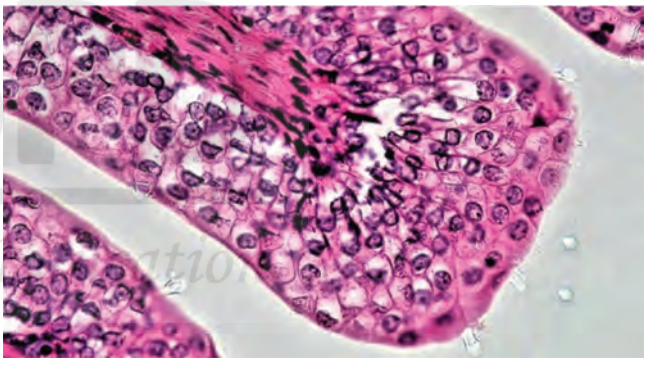
3. Identify the marked structure.



a. Thoracodorsal nerve
b. Medial pectoral nerve
c. Subscapular nerve
d. Long thoracic nerve

Ans. b. Medial pectoral nerve

4. Where will you find the epithelium shown in the image?

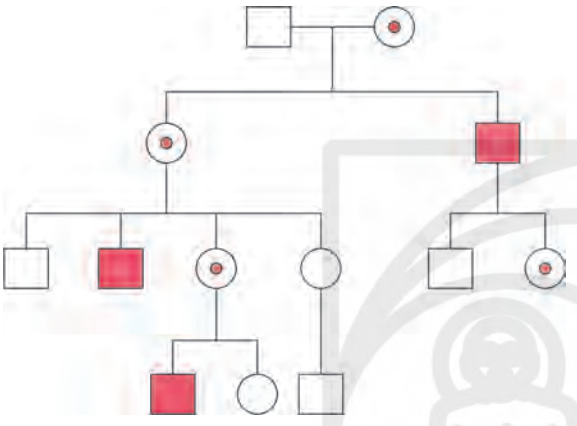


a. Gallbladder
b. Trachea
c. Ureter
d. Duodenum

Ans. c. Ureter

NEET PG 2024

1. Which condition is inherited according to the given pedigree?



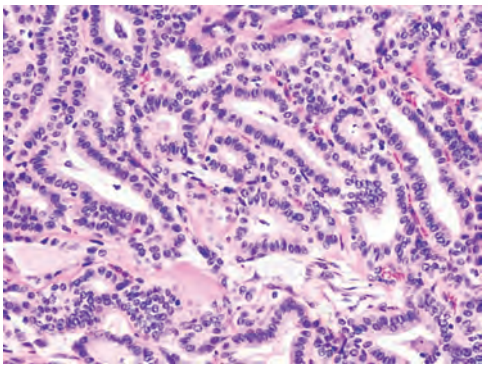
a. Wilson disease
b. Wiskott-Aldrich syndrome
c. Prader-Willi syndrome
d. Achondroplasia

Ans. b. Wiskott-Aldrich syndrome

Explanation:

- The given pedigree chart points toward an X-linked recessive mode of inheritance and among the options provided Wiskott-Aldrich syndrome is inherited via this mode.
- A Triad of micro-thrombocytopenia, eczema, and recurrent infections points toward Wiskott-Aldrich syndrome.

2. Which of the following is the most common mutation associated with the microscopy image of the thyroid shown?



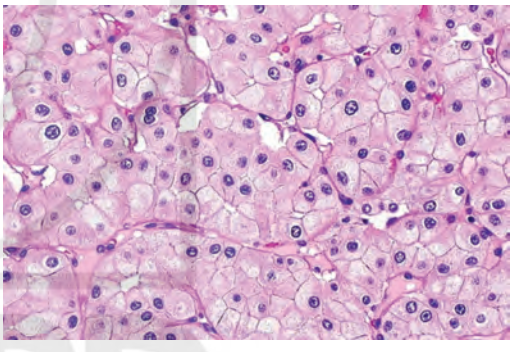
a. BRAF V600E
b. RET
c. MET
d. KRAS

Ans. a. BRAF V600E

Explanation:

- The most common mutation associated with the microscopy image which shows the orphan annie eye nuclei which is characteristic of papillary carcinoma of the thyroid is the BRAF V600E mutation.
- Papillary thyroid carcinoma is the most common thyroid cancer. It is also the most predominant thyroid cancer in children and iodine-sufficient areas. Radiation exposure is an important risk factor.

3. A patient presents with flank pain and hematuria. The histology slide of the patient is provided. Based on the clinical presentation and histological findings, which of the following conditions is most likely?



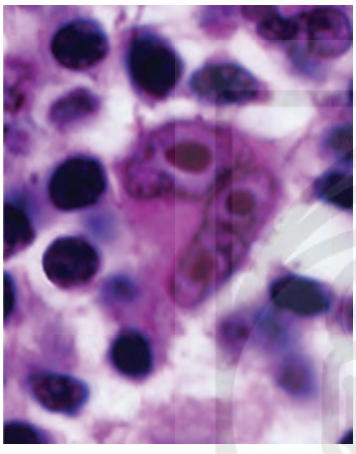
a. Chromophobe renal cell carcinoma
b. Clear cell carcinoma
c. Metastasis
d. Papillary cell carcinoma

Ans. a. Chromophobe renal cell carcinoma

Explanation:

- The given histological image is of chromophobe renal cell carcinoma. It can be identified by the presence of pale eosinophilic cells arranged in the form of solid sheets with some cells having a perinuclear halo.
- Chromophobe carcinoma is thought to arise from the intercalated cells of the collecting ducts. It is composed of cells with prominent cell membranes and pale eosinophilic cytoplasm, usually with a halo around the nucleus. It shows large cells having a plant-cell-like appearance. They are arranged in solid sheets with a concentration of the largest cells around blood vessels.

39. A 45-year-old woman came with complaints of fever, night sweats, generalized itching and unintentional weight loss of 10% in the last 3 months. On examination, she has enlarged cervical and axillary lymph nodes. The lymph node examination and biopsy showed the following picture. What would the likely diagnosis and treatment option be?



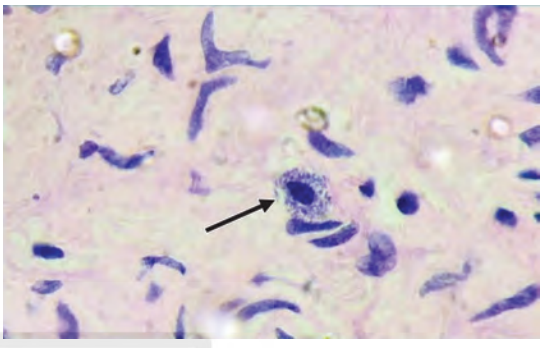
a. Non-Hodgkin Lymphoma – Rituximab monotherapy
b. Non-Hodgkin Lymphoma – Poor prognosis due to advanced stage – treated with radiotherapy
c. Hodgkin Lymphoma – ABVD regimen
d. Sarcoidosis – Started on Prednisolone 40 mg/day

Ans. c. Hodgkin Lymphoma – ABVD regimen

Explanation:

- The clinical vignette with the lymph node biopsy showing a classical Reed-Sternberg cell is suggestive of a diagnosis of Hodgkin's lymphoma and an ABVD regimen (Doxorubicin (Adriamycin), Bleomycin, Vinblastine, and Dacarbazine) is used for the treatment.
- The Reed-Sternberg cell is a giant cell. It has a classic owl-eyed appearance due to the presence of a symmetric or mirror-image bilobed nucleus with prominent nucleoli surrounded by a clear space.

40. Identify the cell marked in the image here.



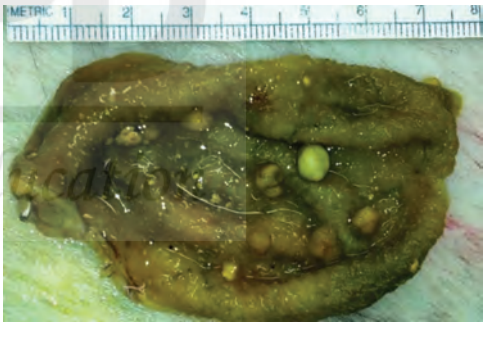
a. Mast cell
b. Macrophage
c. Plasma cell
d. Fibroblast

Ans. a. Mast cell

Explanation:

- The cell marked in the image is a mast cell stained with toluidine blue. Mast cell granules contain acid proteoglycan that binds basic blue such as toluidine blue.
- Mast cells may be difficult to differentiate from lymphocytes in routine, hematoxylin, and eosin-stained sections, and special metachromatic stains (toluidine blue or Giemsa) are used to visualize their granules.

41. A patient suffering from cholelithiasis underwent cholecystectomy. The image of the specimen is shown below. Which of the following is the correct diagnosis?

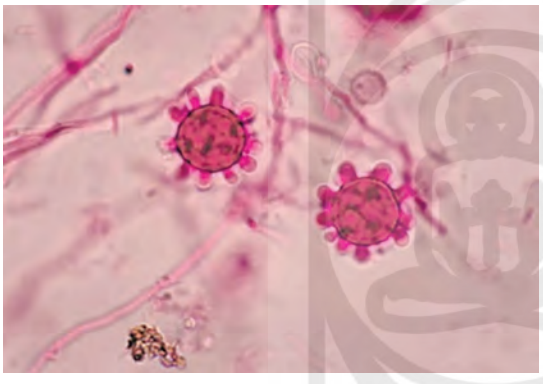


a. Cholesterolosis
b. Gallbladder polyp
c. Carcinoma gallbladder
d. Strawberry gallbladder

Ans. b. Gallbladder polyp

NEET PG 2024

1. A young man who has just returned from the USA develops fever, cough, and breathlessness. A chest radiograph shows bilateral hilar lymphadenopathy and mediastinal lymphadenopathy. Culture on Sabouraud Dextrose Agar (SDA) reveals white to light brown puffy colonies. Lactophenol blue staining shows the findings as depicted in the image. What is the most likely causative organism?



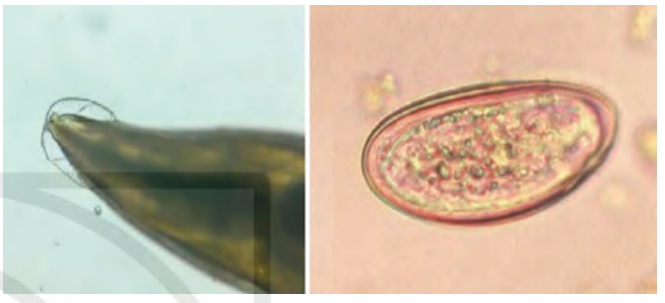
a. Cryptococcosis
b. Histoplasmosis
c. Blastomycosis
d. Mucormycosis

Ans. b. Histoplasmosis

Explanation:

- The image shows the tuberculate macroconidia, with finger-like projections which, along with the history, is a characteristic feature of Histoplasma.
- Histoplasmosis (Darling's disease) is a granulomatous disease caused by a dimorphic fungus, Histoplasma capsulatum. It is endemic in the USA, in the states bordering the Ohio River valley and the lower Mississippi River. In India, it is reported from the region of West Bengal, along the Ganga River. The fungus inhabits humid and acidic soil that contains a large amount of bird or bat droppings.

2. A child is brought with complaints of abdominal pain, diarrhea and perianal itching for the last 3 days. The mother said she noticed a white thread-like structure in the child's night clothes. She collected the worm and brought it to the clinician. A perianal swab was collected. Microscopy of the swab and the worm are shown in the images. What is the likely causative organism?



a. Enterobius vermicularis
b. Ascaris lumbricoides
c. Ancylostoma duodenale
d. Strongyloides stercoralis

Ans. a. Enterobius vermicularis

Explanation: The likely causative organism for the child's abdominal pain, diarrhea, perianal itching, and the white thread-like worm found in the night clothes is Enterobius vermicularis, as evidenced by the worm's pointed end and wing-like cuticular expansions (cervical alae) shown in the left image, and the colorless, nonbile stained, planoconvex eggs with an outer albuminous layer that sticks to each other and other objects.

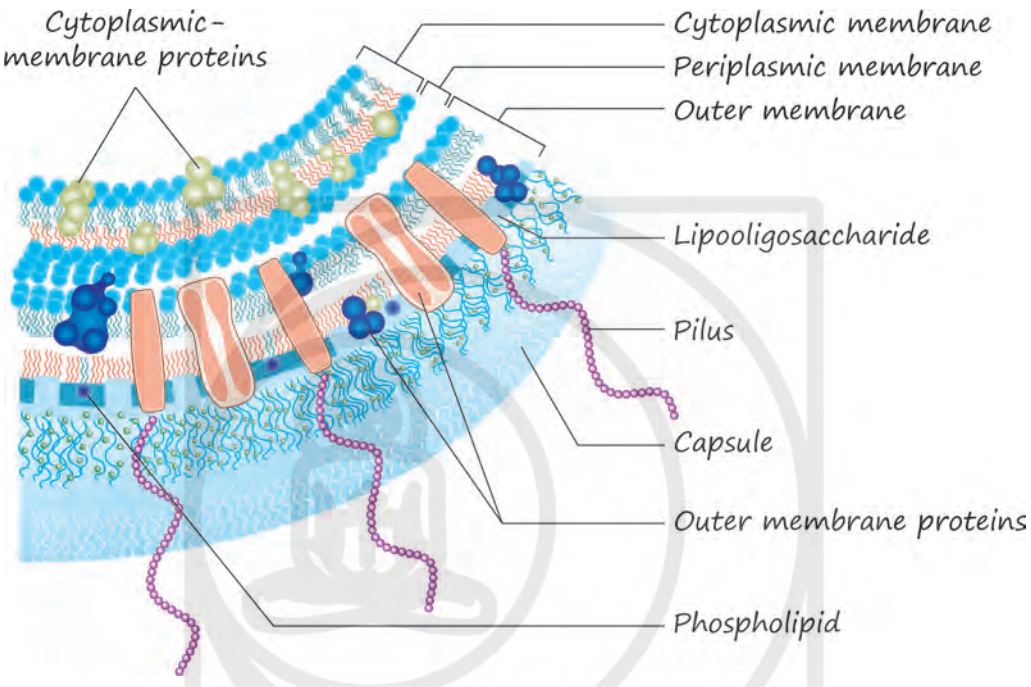
3. A farmer from South East India presents with fever, respiratory distress and neurological deficits. The vector of the causative organism is shown as follows. What is the associated organism?

a. Ebola virus
b. Zika virus
c. Malaria
d. Nipah virus

Ans. d. Nipah virus

Explanation: Microscopy showing broad, aseptate, ribbon-like hyphae with irregular branching is suggestive of mucor.

18. The given image of the cell wall belongs to which of the following organism?



a. Staphylococcus aureus
b. Escherichia coli
c. Neisseria meningitidis
d. Pseudomonas aeruginosa

Ans. c. Neisseria meningitidis

Explanation:

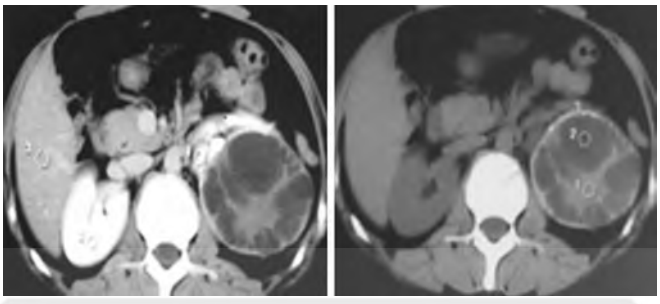
- The image showing a cell wall with a capsule and lipooligosaccharides (LOS) is suggestive of Neisseria meningitidis.
- Unlike lipopolysaccharide (LPS), LOS does not have a long O-antigen side chain. It is an important virulence factor and is found in a few organisms such as N. gonorrhoeae, N. meningitidis, H. ducreyi, etc.
- The genus Neisseria consists of Gram-negative, aerobic, nonsporulating, nonmotile, oxidase-positive cocci arranged typically in pairs (diplococci). It includes two pathogens, Neisseria meningitidis, and Neisseria gonorrhoeae. The important difference is the presence of a capsule in N. meningitidis.

19. Which of the following diseases is not transmitted by the vector shown in the image?

a. Ehrlichia
b. Babesiosis
c. Orientia
d. Crimean-Congo hemorrhagic fever (CCHF)

Ans. c. Orientia

26. A patient present to you with left-sided flank pain. A CT scan was done which is shown as follows. Which of the following statements is incorrect regarding the condition?

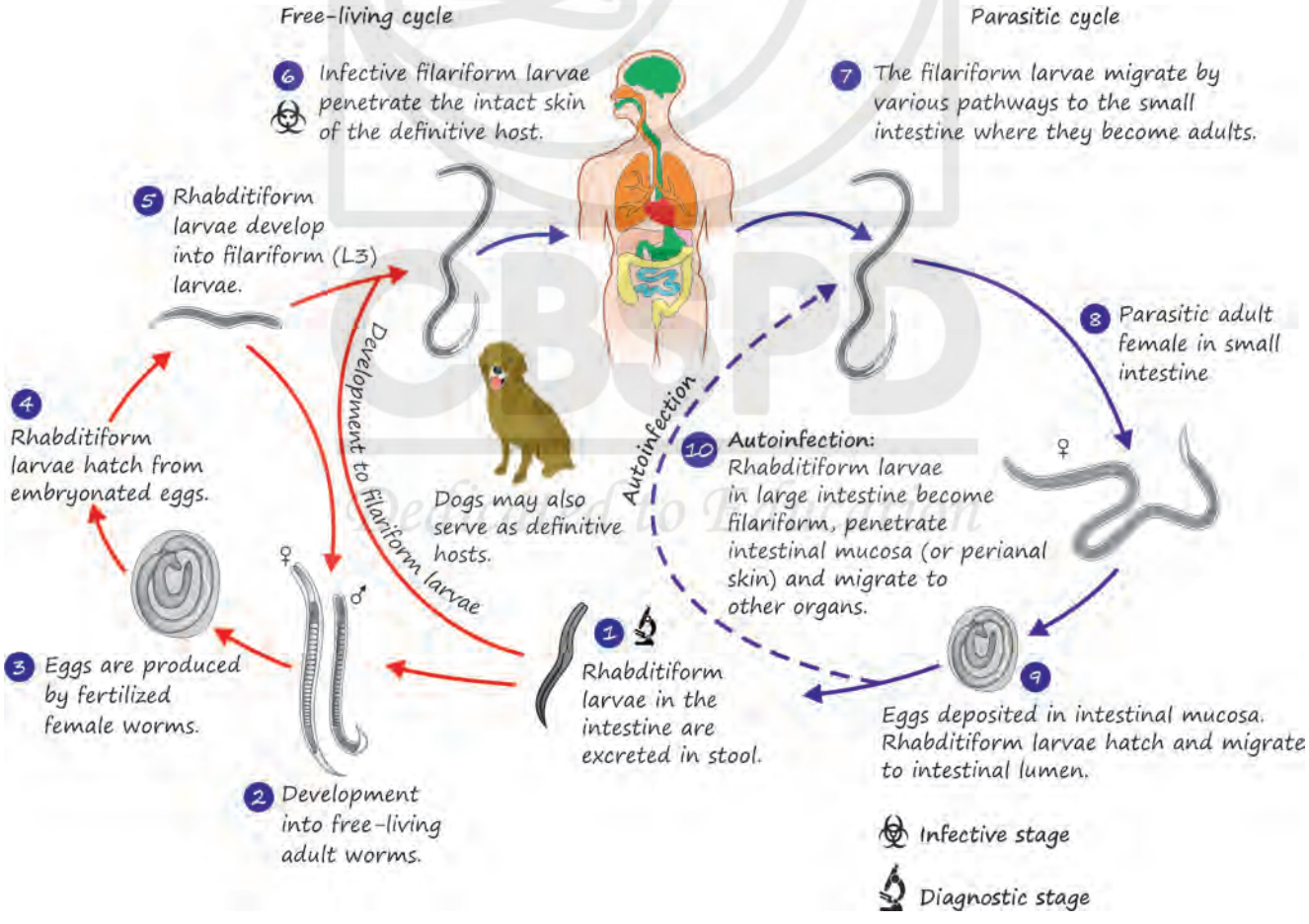


a. Albendazole can be started preoperatively
b. Cyst contents can produce anaphylactic reaction
c. A segmented dog tapeworm is the causative agent
d. FNAC or biopsy to be done before nephrectomy

Ans. c. FNAC or biopsy to be done before nephrectomy

Explanation: FNAC or biopsy to be done before nephrectomy is the incorrect statement regarding cystic echinococcosis. The given CT image shows left-sided renal hydatid cyst.

27. The organism with the following life cycle is:



a. Strongyloides stercoralis
b. Ancylostoma duodenale
c. Ascaris lumbricoides
d. Enterobius vermicularis

Ans. a. Strongyloides stercoralis

NEET PG 2024

1. During the postmortem examination following finding is seen. What is this indicative of_____?

a. Choking
b. Throttling
c. Hanging
d. Smothering

Ans. d. Smothering

Explanation: Abrasions around the mouth, cheeks, lips, or lesions within the lips may reliably indicate smothering.

2. A police officer brought a child to the hospital. There is redness and tenderness around the perianal region. A rectal swab is taken and the image given here shows the finding. What test is it indicative of?

a. Barberio test
b. Florence test
c. Teichmann test
d. Takayama test

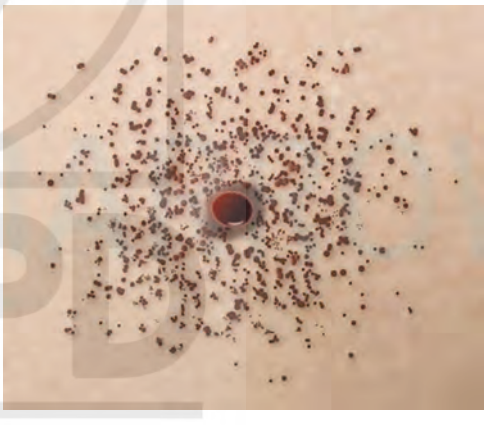
Ans. a. Barberio test

3. A patient presented to the OPD with findings as shown in the following images. Identify the type of poisoning in this patient.

a. Chronic malnutrition
b. Copper
c. Mercury
d. Arsenic

Ans. d. Arsenic

4. The following findings were noted during the autopsy of a patient with a gunshot injury. What is the likely range of the gunshot?



a. Cannot be opined
b. Distant range
c. Contact range
d. Close range

Ans. d. Close range

Explanation: The likely range of the gunshot injury shown above is close range, characterized by a circular wound with blackening and tattooing.

12. Identify the given plant.

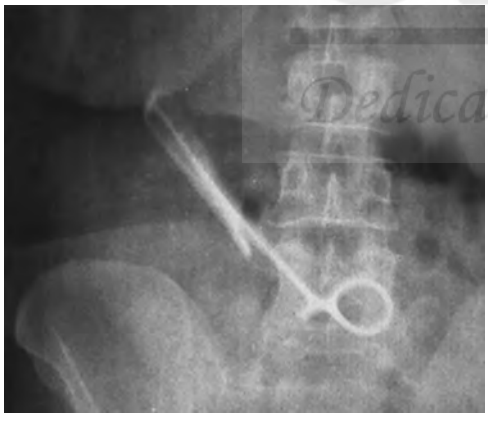
a. Datura alba
b. Argemone mexicana
c. Nerium odorum
d. Papaver somniferum

Ans. b. Argemone mexicana

Explanation:

- The given plant is **Argemone mexicana**.
- The flowers are yellow in color. All parts of the plant are poisonous. Oil extracted from argemone seeds is commonly used as an adulterant in mustard oil. Sanguinarine and dihydrosanguinarine are the toxic alkaloids present in the oil and they cause epidemic dropsy.

13. A lady underwent cholecystectomy and now she presents with abdominal pain, one month later. An erect abdomen X-ray was taken, and the image is given here. The following offense comes under___



a. Novus actus interveniens
b. Res ipsa loquitur
c. Res judicata
d. Respondeat superior

Ans. b. Res ipsa loquitur

Explanation:

- The X-ray shows a pair of surgical scissors left in the abdomen after surgery. The offense comes under res ipsa loquitur. It is obvious evidence of the negligent act committed.
- "Res ipsa loquitur" means "the thing or fact speaks for itself." The negligent act is so obvious that the patient does not need to prove it. She has to merely state what according to her was the negligent act.

14. Identify the pattern of abrasion shown in the following image.

a. Ligature mark
b. Graze abrasion
c. Pressure abrasion
d. Imprint abrasion

Ans. c. Pressure abrasion

15. A man was brought to the emergency department with a history of assault by a mob using heavy blunt objects and sharp objects. On examination, crushing of the hair bulb was seen. Identify the type of wound.

a. Clean cut incised wound
b. Lacerated wound
c. Chop wound
d. Avulsion injury

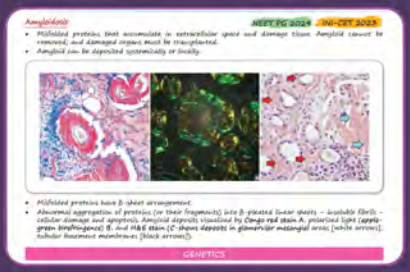
Ans. b. Lacerated wound

ONE Touch Picture Recap

Subjects Covered

Anatomy • Physiology • Biochemistry • Pharmacology • Pathology • Microbiology • Forensic Medicine & Toxicology

Salient Features



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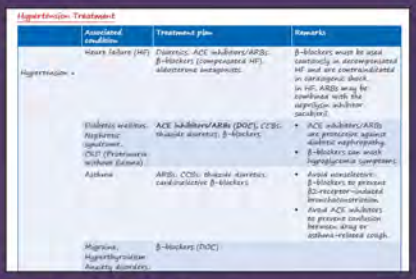

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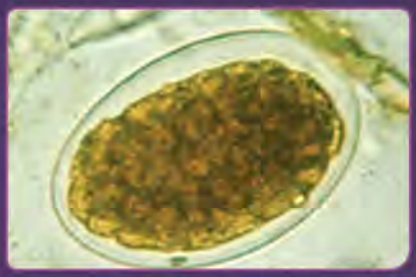

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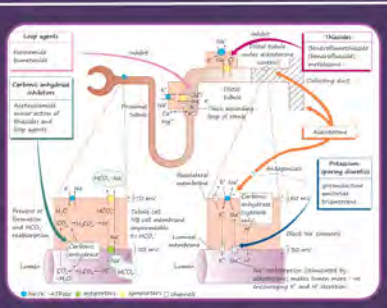
Entrance corner:

- An increase in the filtration coefficient enhances GFR, as K_f = **GFR/Net filtration pressure**. In conditions like diabetic nephropathy, GFR decreases due to a reduced filtration coefficient caused by the destruction of glomerular capillaries, resulting in reduced surface area and lower filtration.
- Oncotic pressure in the glomerulus opposes filtration. A decrease in this pressure reduces opposition to filtration, thereby increasing GFR.
- Hydrostatic pressure in glomerular capillaries promotes filtration. An increase in this pressure leads to an increase in GFR.

Entrance Corner—Must know facts covered extensively throughout the book from exam point of view.



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