

HEMATOLOGY**BLOOD AND PLASMA****Short Notes**

1. Composition and functions of blood (TMP 70-71, Fig 7.1) (GKP 71-72, fig 9.1)
2. Plasma proteins - functions and normal levels (TMP 73-74) (GKP 74-75)
3. Albumin/globulin ratio and its importance (TMP 75) (GKP 74, Clinical Box 9.2)
4. Plasmapheresis (GKP 73) (TMP 74)

ERYTHROCYTES**Essays**

1. Erythropoiesis - stages, factors affecting it esp. erythropoietin, sites, diagram (TMP 86-91, Fig 9.1, 9.8, 9.9) (G&H 113 Fig 20-3, 20-4) (GKP 90-96) (Refer DVD)
2. Anemia - classification, aetiology, symptoms, changes in MCV, MGH and MCHC (esp. iron deficiency anemia & pernicious anemia) (TMP 92-95) (GKP 109-114)
3. - Effect of Anemia on CVS (G&H 120)

Short Notes

1. PCV - definition, variations (TMP 77) (GKP 88) (Practicals)
2. ESR (TMP 78-79) (GKP 88) (Practicals)
3. Destruction/Metabolism/Fate of Hb (TMP 84 Fig 9.6) (GKP 99-101)
4. Hemoglobinopathies - HbS, HbC, HbE, HbJ, Thalassemia (TMP 82, 83) (GKP 105, 112-114)
5. Erythropoietin and its mechanism of action (TMP 89-90) (GKP 93-94)
6. Polycythemia vera and its effects on CVS (G&H 120) (GKP 114-115)
7. Reactions of Hb (GNG 557)

Give Reason

1. Fragility of RBCs on exposure to oxidative stress is seen in G6PD deficiency [G6PD - NADPH synthesis - keeps glutathione in reduced state - antioxidant action - reduces reactive oxygen species]
2. Hb is found within RBCs and not free in plasma (TMP 81)
3. Anemia occurs following partial gastrectomy [intrinsic factor deficiency - decrease in VitB12 absorption - pernicious anemia; HCl deficiency - decreased iron absorption - iron deficiency anemia] (TMP 94)
4. In pernicious anemia, VitB12 is given intravenously [lack of intrinsic factor - VitB12 will not be absorbed from GIT] (TMP 94)
5. Reticulocyte count increases after VitB12 therapy [actions of vit B12] (TMP Pg 94) (GKP Pg 97)
6. Polycythemia is seen in normal individuals residing at high altitude [low pO₂ - hypoxia - stimulates erythropoietin secretion - inc. erythropoiesis - polycythemia] (TMP 90)
7. MCHC remains relatively constant even though RBC size varies greatly [cell division and nuclear division occur as soon as critical Hb conc. is reached, so MCHC doesn't rise beyond a limit] (TMP 88)
8. Physiological jaundice in new born [Fetal stage: HbF - high O₂ affinity - hypoxia - inc. erythropoie-

- tin - polycythemia; Newborn: liver matures, HbF replaced by HbA w/ lesser O₂ affinity - excess RBCs destroyed by liver - inc. in serum bilirubin] (TMP 84)
9. Biconcave shape of RBC is advantageous [large surface area - exchange of gases; alteration in cell volume is possible - can squeeze through capillaries] (TMP 76)
 10. Rouleaux formation doesn't occur in live body [blood is in constant motion; presence of neg. charged sialic acid on RBC membrane] (TMP 78)
 11. Hematocrit value of capillary blood is lower than that of actual blood [plasma skimming, chloride shift - inc. in size - inc. in hematocrit]

LEUCOCYTES

Essay

- ✓ 1. Immunity (TMP 105-114)(GKP 158-182)
2. - Cell mediated and humoral immunity (TMP 108-110) (GNG 70 Fig 3-3) (GKP 170-172) (2000, 2009)
3. - Innate immunity (TMP 105-106) (GKP 159-160)

Short Notes

1. Properties and functions various leukocytes, esp. functions of neutrophils & respiratory burst (TMP 98-99) (GKP 133)
2. Reticuloendothelial system & its functions (TMP 103-104) (2007)
3. -Wandering, fixed, functions of Reticuloendothelial cells
4. Immunoglobulins - structure, properties, types, mechanism of action (TMP 110-111) (GKP 175-176, Fig 15.16) (GNG 77 Fig 3-10)
5. Role of lymphocytes in immune functions (TMP 107-109) (GKP 145)
6. Agranulocytosis & Arneht count (TMP 160) (GKP 133-134)
7. Leukemoid reaction and leukemia (TMP 134) (GKP 146)
8. Processing of endogenous antigen (TMP 109, Fig 10.9) (GKP 170-172)
9. Immunological disorders (TMP 113, 114)(GKP 179-180)

Give Reason

1. Opsonisation aids phagocytosis [makes antigen tasty for phagocytes] (TMP 99) (GKP 137)
2. Respiratory burst [phagocytosis of bacteria by neutrophils - degranulation - activation of cell membrane bound NADPH oxidase - production of toxic O₂ - sharp increase in O₂ uptake known as respiratory burst] (TMP 99) (GKP 138)

THROMBOCYTES AND BLOOD COAGULATION

Essays

- ① 1. Hemostasis - 4 stages (esp. blood coagulation - extrinsic & intrinsic pathways) (TMP 119-121, Fig 12.1-12.4) (GNG 567 Fig 31-11, 31-12) (GKP 200-202, Fig 21.1) (Refer DVD)
- ② 2. Hemophilia and other bleeding and clotting disorders (TMP 123-125) (GNG 569 Table 31-7) (GKP 209-212) (Refer DVD)

Short Notes

- ① 1. Platelets - properties and functions (TMP 116-117) (GKP 189-190)
- ② 2. Role of platelets in hemostasis (TMP 117) (GKP 190-192) (2005)

3. Role of Ca^{2+} and VitK in blood coagulation (TMP 121) (GKP200-201)
4. Fibrinolytic system - steps in fibrinolysis and significance (TMP 122, Fig 12.5) (GKP 202) (GNG 568 Fig 31-13) (2001)
5. Primary hemostasis (TMP 119) (GKP 190) (2010)
6. Anticoagulants & mechanism of action (TMP 121-123) (GKP 205-207) (2007)
7. Intrinsic mechanism of coagulation (TMP 120, Fig 12.2) (GKP 200-201) (2011)

Give Reason

1. Aspirin is given in MI and stroke [aspirin - blocks enzyme cyclooxygenase - inhibits synthesis of thromoxane A₂ - inhibits platelet aggregation] (TMP 117, fig 11.3)
2. Blood doesn't clot in vivo normally [blood is in constant motion; smooth vascular endothelium prevents platelet adhesion; liver removes activated clotting factors; presence of intravascular anticoagulants] (TMP 121)
3. Bleeding disorders in VitK deficiency [required for synthesis of factors II, VII, IX, X in liver] (TMP 125)
4. Prolonged clotting time in liver diseases [clotting factors are synthesized in liver] (2005)
5. Heparin prevents blood coagulation [potentiates the action of antithrombin 3; prevents coagulation by inhibiting factors IX, X, XI and XII] (TMP 123) 9/10/11/12
6. In thrombocytopenic purpura, BT is prolonged but CT remains normal [platelets are involved in the arrest of bleeding - platelet count is decreased - BT prolonged; but clotting factors are not affected - CT remains normal]
7. Streptokinase is used in the treatment of MI [fibrinolytic action] (TMP 122)
8. Physiological basis of purpura & hemophilia [purpura: due to vascular, platelet or combined defect, bleeding time is prolonged; hemophilia: clotting time prolonged, hemophilia A, B, C due to deficiency of factors VIII, IX, XI respectively] (TMP 123-124) (2011)

LYMPH AND TISSUE FLUID

Essay

1. Formation and functions of lymph (Starling's hypothesis, factors affecting formation and flow) (TMP 127-129, Fig 13.1) (GKP 156, Fig 79.4)

Short Notes

1. Hypoproteinemia & edema (malnutrition, nephrotic syndrome, hepatic damage, burns) (TMP 75, 129-130)
2. Formation of tissue fluid (TMP 127, Fig 13.1) (GKP 156)

BLOOD GROUPS

Short Notes

1. Bombay blood group (TMP 134) (GKP 118)
2. Erythroblastosis fetalis or HDN (TMP 137-138) (GKP 121)
3. Complications of blood transfusion / Transfusion reactions (hemolytic and non-hemolytic) (TMP 137) (GKP 125)
4. Changes in blood on storing / Preservation injuries (TMP 136) (GKP 125)
5. Indications of blood transfusion (TMP 136) (GKP 123)

6. Different blood grouping systems, Landsteiner's laws and exception to the second law (TMP 133-136, Fig 15.1, Table 15.1) (GKP 117-121, Fig 16.3)
7. Major and minor cross matching (TMP 135, Table 15.2) (GKP 124)
8. Rh blood group, Rh incompatibility & related complications - erythroblastosis fetalis, kernicterus (TMP 135-136) (GKP 120-122, Fig 13.2)

Give Reason

1. Anti-D injection should be given to an Rh -ve woman who has given birth to an Rh +ve baby [the woman becomes sensitised with Rh positive cells during the first delivery - anti-D antibodies are produced; during second pregnancy if the baby is Rh +ve - antibodies will destroy the fetal RBCs - erythroblastosis fetalis; if anti-D injection is given within 24h - sensitisation will not occur] (TMP 138)
2. Landsteiner's second law is not applicable to Rh system [unlike ABO system, the D antibodies are not present in the plasma of Rh -ve individuals, they develop only if Rh +ve cells enter the circulation] (TMP Pg 136)

DIAGRAMS

1. Stages in Erythropoiesis (TMP Fig 9.9) (GNG Fig 31-3)
2. Leucocytes (relative sizes, colours and nature of granules) (Hematology record) (TMP 98)
3. Acquired immunity (GNG Fig 3-9)
4. Enzyme cascade mechanism of blood coagulation (both intrinsic and extrinsic) (TMP Fig 12.2-12.4) (GNG Fig 31-12)

TABLES

1. Normal values of cellular elements in human blood (GNG 557 Table 31-1)
2. Characteristics of human red cells (GNG 559 Table 31-2)
3. Clotting factors (GNG 565 Table 31-5)

SOME TERMS

1. Plasmapheresis (TMP 74)
2. Autologous blood transfusion / Predonation (TMP 137)

MNEMONICS	Functions of blood	Stages of Erythropoiesis
	WATER ON MARS W-Water balance A-Acid-base balance T-Transport function E-Excretory function R-Respiratory function N-Nutritive function M-Maintenanc of BP & Osmotic Pressure A-Antibodies & Antitoxins For protection R-Regulation of body temperature S-Storage function	Powerful Businesses Pollute Our Reeling Environment P-Proerythroblast B-Basophilic erythroblast P-Polychromatic erythroblast O-Orthochromatophilic erythroblast R-Reticulocyte E-Erythrocyte

MNEMONICS	Relative White Blood Cell Concentrations Never Let Monkeys Eat Bananas (From greatest to least) N-Neutrophils (65%) L-Lymphocytes (25%) M-Monocytes (6%) E-Eosinophils (3%) B-Basophils (1%)	Complications of Blood Transfusion - Non-Hemolytic Reactions CAT Ate FISH C-Circulatory overload - heart failure A-Allergic reactions T-Transmission of diseases like AIDS A-Air embolism F-Fever I-Iron overload/Hemochromatosis S-Shock lung syndrome due to micro embolism H-Hyperkalemia
	Vit K independent clotting factors II, VII, IX, X & Protien A + Protien C	Properties of Neutrophils Masters Degree in Call Of Duty Margination, Diapedesis, Chemotaxis, Opsonisation, Degranulation

CARDIOVASCULAR SYSTEM

FUNCTIONAL ANATOMY OF HEART

Short Notes

1. AV nodal delay - causes (TMP 145) (GKP 742)
2. Spread of cardiac impulse (TMP 145-146 Fig 16.7, 16.8) (GKP 757, Fig 87.6)

Give Reason

1. Physiological hypertrophy of left ventricle [Systemic circulation is a high pressure, high resistance system, LV must work harder to maintain same output] (TMP 141) (GKP 738)
2. Cardiac muscle cannot be tetanised [Absolute refractory period is very long] (TMP 57-58, Fig 4.3) ^{200ms} **gkp748**
3. Atrial and ventricular muscles do not show auto-rhythmicity [potential in them is plateau potential; this potential is not spontaneous; it is produced only by the stimulus from pacemaker cells which is spontaneous]

RECORDING OF ELECTRICAL ACTIVITY OF HEART

Essays

1. ECG - waves, segments, intervals, normal duration, leads used in recording ECG, clinical applications (TMP 148-152, 154-157, Fig 17.1-17.7, Table 17.1-17.2) (GKP 762-763 Fig 88.2 A) (GNG Fig 29.5-29.6) (Refer DVD)

Short Notes

1. PR interval and its significance, abnormalities (P wave + PR segment, ventricular activation time) (TMP 152, 155) (GKP 762, 768)
2. ECG changes after MI (late MI - ST elevation, T wave inversion; early MI - tall T wave) (TMP 156, Fig 17.12 D,E) (GKP 774, Fig 88.14) (GNG Fig 29.17)

Give Reason

1. Negative waves in aVR [depolarisation wave moves away from the exploring electrode - i.e. to the left] (TMP 153, Fig 17.12 A) (GKP 766)
2. Significance of Q wave [interventricular septal depolarisation from left to right] (TMP 151-152) (GKP 764)

CARDIAC CYCLE**Essay**

1. Cardiac cycle - definition, phases, duration, pressure changes, Wigger's diagram (TMP 158-164, Fig 18.1-18.4, Table 18.1) (GKP 778-781, Fig 89.1-89.6) (GNG Fig 30-3)

Short Notes

1. Ventricular volume and pressure changes (TMP 162-164, Fig 18.2, 18.4) (GKP 781, Fig 89.3)
2. End diastolic volume (TMP 161) (GKP 788)
3. Heart sounds - duration, causes, physiological splitting, gallop rhythm, murmur, bruit (TMP 164-167, Table 18.5, 18.6, 18.7) (GKP 784-786)

Give Reason

1. Insisura [closure of SLV - increase in aortic pressure due to sudden cessation of back flow, momentary rise in aortic pressure] (TMP 163)
2. S2 splitting in deep inspiration [inspiration - dec. in intrathoracic pressure - inc. in time for right heart filling - inc. in duration of systole - P2 delayed - dec. in left ventricular ejection time - A2 preponed] (TMP 165) (GKP 784)
3. Heart sounds not produced on opening of valves [valve opening is a slowly developing process and produces no sound]

HEMODYNAMICS**Short Notes**

1. Laplace's law and its applications in CVS (TMP 174-175) (GKP 807)
2. Bernoulli's principle and its applications in CVS (TMP 170) (GKP 804)
3. Critical closing pressure (TMP 174) (GKP 806)

Give Reason

1. Even though the velocity of fluid is slow in the capillaries, the viscosity is not much increased [Fahraeus-Lindqvist effect and plasma skimming] (TMP 174) (GKP 806 Fig 92.4)

HEART RATE**Essay**

1. Regulation of heart rate - neural, chemical, physical
- Neural: effect of sympathetic and parasympathetic stimulation of heart, central influence on heart rate, medullary centres, baroreceptor reflex, Cushing reflex, Bainbridge and Bezold-Jarisch reflex (TMP 176-182 Fig 20.2-20.6) (GKP 798-799, 827, Fig 96.3, 96.8, 96.1, 96.3) (GNG Fig 32-2, 32-3)
- Chemical: hormones, pO₂, pCO₂, drugs (TMP 182-183) (GKP 799)
 - Physical (TMP 183)
 - Regulation of heart rate in transplanted heart: heterometric regulation, hormones (TMP 183)

Short Notes

1. Sinoaortic reflex and role of buffer nerves (TMP 179-180, Fig 20.3) (GKP 829-832 Fig 968) (GNG Fig 32-4)
2. Notes on Cushing reflex, Bainbridge reflex, Bezold-Jarisch reflex (TMP 181-182, Fig 20.5-20.6) (GKP 833-835, Fig 96.1, 963)
3. Vagal inhibition and escape (TMP 178) (GKP 828)
4. Pacemaker potential and pre-potential (TMP 56-57, 144) (GKP 755-756)

Give Reason

1. Bradycardia in raised intracranial tension [Cushing reflex] (TMP 181) (GKP 833)
2. Tachycardia in old age [fall in vagal tone]
3. Heart rate increase in forced inspiration [i. inhibitory signals from inspiratory centre to cardiac centre - inhibition of CIC; ii. inhibitory impulses from lungs via vagal afferent to inspiratory center; iii. increased venous return] (TMP 181)
4. Increase in heart rate during exercise [sympathetic stimulation]
5. Reflex bradycardia is seen with norepinephrine, but not with epinephrine [NE - net vasoconstrictor - inc. in mean arterial pressure - baroreceptor reflex - bradycardia; Epinephrine - vasodilator] (TMP 182)
6. Pressing the carotid sinus increases heart rate [reflex bradycardia by baroreceptor reflex] (TMP 183)

CARDIAC OUTPUT**Essay**

1. Cardiac output - definition, measurement, distribution, regulation (regulation of heart rate and stroke volume - heterometric & homometric) (TMP 185-190) (GKP 787-796)

Short Notes

1. End diastolic volume & factors affecting it (TMP 188-189) (GKP 788, Fig 90.2)
2. Fick's principle and its applications, formula for calculating cardiac output (TMP 185) (GKP 789)
3. Stroke volume - definition, regulation (TMP 185, 187, 188, 189, 190) (GKP 787, 790 Fig 90.4)
4. Frank-Starling's law (TMP 188) (GKP 750, 791) (GNG 5-11)
5. Regulation of cardiac output in transplanted heart (TMP 191)

VASCULAR SYSTEM & ARTERIAL BLOOD PRESSURE**Essays**

1. Arterial blood pressure - definition, determinants, short term and long term regulation (TMP 193, 197-202) (GKP 822) (GNG Fig 31-25, 31-26)
2. Shock - definition, causes, classification, clinical picture, stages of shock (TMP 203-207) (GKP 866)

Short Notes

1. Classification of blood vessels (TMP 193) (GKP 732)
2. Windkessel vessel and Windkessel effect (TMP 193) (GKP 732)
3. Mean arterial pressure and pulse pressure - normal values, definition (TMP 194) (GKP 824)
4. Peripheral resistance (TMP 197) (GKP 825)
5. Autoregulation of blood pressure - organs exhibiting autoregulation & theories (TMP 201-202) (GKP 842)
6. Hypertension - consequences, types (TMP 196)

Give Reason

1. During BP measurement, it is first measured by palpatory method [auscultatory gap] (TMP 195)
2. Fainting during emotion & pain [firing of sympathetic vasodilator fibres & stimulation of CIC - fall in ABP - blood flow to brain decreases - vasovagal syncope] (TMP 199)
3. Never apply warmth to a patient in circulatory shock [hypothalamic responses to warmth abolishes sympathetic vasoconstriction and increases severity of shock] (TMP 204)
4. Cold clammy skin & rapid pulse occur in hypovolemic shock [cutaneous vasoconstriction - increased perfusion of vital organs] (TMP 203-204)
5. Pulse waves are not obtained in arterioles [high resistance in arterioles, minimal distension] (TMP 203-204)
6. Skin is warm in septicemic shock [inflammatory mediators cause vasodilation]

ARTERIAL & VENOUS PULSE**Short Notes**

1. Jugular venous pulse - waves, alterations in JVP, clinical significance (TMP 209-210, 211, 212 Fig 23.1) (GNG Fig 30-3)
2. Peripheral pulse tracing - components, cause, abnormalities (TMP 208 Fig 23.1) (GKP 799 Fig 91.1) (GNG Fig 30-3)
3. Differences between arterial & venous pulse (TMP 210)

CARDIOVASCULAR ADJUSTMENTS IN EXERCISE**Essay**

1. Cardiovascular changes in exercise - changes in cardiac output, BP and regional circulation in various grades of exercise (central and local mechanism) (TMP 211) (GKP 1259)

Short Note

1. Effect of training on cardiovascular system (TMP 212) (GKP 1032)

Give Reason

1. Increase in heart rate during exercise [sympathetic stimulation, peripheral reflexes, hormonal factors & increase in temperature] (TMP 211) (GKP 1260)

EFFECT OF ACCELERATORY FORCES ON CIRCULATORY SYSTEM**Short Notes**

1. Effect of positive g and negative g (TMP 213)
2. Effect of zero gravity on body weight (TMP 214)

CIRCULATION THROUGH SPECIAL REGIONS**Short Notes**

1. Features of coronary circulation (TMP 222) (GKP 1848)
2. Phasic variation of coronary blood flow (TMP 220, Fig 26.2) (GKP 849, Fig 98.5) (GNG Fig 33-13)
3. Factors influencing coronary blood flow (TMP 220) (GKP 849)
4. Vascular responses to mechanical stimuli (white reaction, triple response) (TMP 217) (GKP 853)

5. Axon reflex (TMP 199,200, 218) (GKP 854) (GNG Fig 33-14)

Give Reason

1. Patients with aortic stenosis are prone to develop MI [greater compression of the heart on coronaries & increased O₂ required for pumping blood through stenosed valve] (TMP 221)
2. Myocardium is well perfused during diastole [greater flow in coronaries due to reduction of intramural pressure & high perfusion of subendocardial plexus] (TMP 222) (GKP 848)
3. If skin is stroked strongly there is swelling along the line of stroke [triple response - wheal] (TMP 218) (GKP 853)

DIAGRAMS

- ① Pattern of ECG in lead II (TMP Fig 17.6) (GKP Fig 88.2) (GNG Fig 29-5)
- ② Left ventricular pressure changes during cardiac cycle (TMP Fig 18.2) (GKP Fig 89.1)
- ③ Pressure changes in aorta during different phases of cardiac cycle (TMP Fig 18.2) (GKP Fig 89.1)
- ④ Atrial pressure changes during cardiac cycle (TMP Fig 18.3) (GKP Fig 89.1)
5. Normal pacemaker potential, effect of sympathetic & parasympathetic stimulation on pacemaker potential (TMP Fig 20) (GKP Fig 87.4)
6. Basic pathway involved in sinoaortic reflex (TMP Fig 20.3) (GKP Fig 96.8) (GNG Fig 32.4)
- ⑦ Arterial pulse tracing (TMP Fig 23.1) (GNG Fig 30.3)
- ⑧ Jugular venous pulse tracing (TMP Fig 23.1) (GNG Fig 30-3)
9. Blood flow in the left & right coronary arteries during various phases of cardiac cycle (TMP Fig 26.2) (GNG Fig 33-13)

MNEMONICS	Factors affecting EDV	Special features of Coronary Circulation
	Venous Return Vice President of State Bank of India V-Venous tone P-Posture & gravity S-Skeletal muscle pump B-Blood Volume I-Intrathoracic Pressure Venous Filling BIMA B-Blood volume I-Intrapericardial Pressure M-Myocardial Compliance A-Atrial Contraction	Coronary Circulation MADE Possible C-Capillary density - High A-Aerobic tissue C-Collateral circulation - Poor M-Metabolic factors - regulation A-Autoregulation D-Diastole - perfused more during diastole E-Extraction - high resting oxygen extraction P-Perfusion pressure - generated on its own

FLOW CHARTS

Sinoaortic reflex, Brainbridge reflex, Cushing reflex, Long term regulation of decreased BP due to hypovolemia

CLINICAL QUESTIONS

- A 60 yr old man presented with acute retrosternal chest pain radiating to inner aspect of left arm.

The ECG shows ST segment elevation in some of the leads.

- What is the most probable diagnosis?
- What are the other ECG changes that may occur in this condition?
- Explain the leads used in recording ECG.
- With the help of a diagram, describe the waves, intervals and segments of normal ECG recording in lead II (1 + 3 + 3 + 3 = 10)

• A 30 year old man was brought to the casualty after RTA with severe bleeding. O/E his skin was cold and clammy. Pulse - 120/min, low volume and thready in character. BP - 80/40 mm Hg.

- Identify probable condition
- Outline the immediate and delayed compensatory mechanisms operating in this condition.
- What is the immediate management of this condition? (1 + 3 + 3 + 3 = 10)

• Routine investigation in a man aged 40 yrs who presented himself for several health check up revealed the following:

Cardiac index - 3.21/min, Resting pulse rate - 70/min, Ejection fraction - 65%, BP - 130/80 mm Hg, no murmurs, no cyanosis, ECG - normal. But he complained of pain in the chest (retrosternal) when he exerted himself and the pain was proportional to the amount of exertion.

- Comment on the values obtained on investigation. Give their normal range also.
- Define murmur and mention 2 causes for it.
- Name the factors that determine systolic and diastolic blood pressure.
- Define cyanosis and give 2 examples when it can be seen.
- Explain the physiological basis for pain experienced by this subject and how does this pain differ from referred pain?

GASTRO INTESTINAL SYSTEM

INTRODUCTION

Short Notes

- ① Intrinsic innervation of gut - Enteric Nervous System - functions, effects, importance (TMP 308-309, Fig 37.3 C) (GKP 331) (GNG 473)
- ② Extrinsic innervation of gut (TMP 309-310, Fig 37.3 A) (GKP 331, Fig 36.6) (GNG 473)
- ③ Basal Electrical Rhythm (TMP 310, Fig 37.5) (GKP 394) (GNG 498 Fig 27-2) -45

SALIVARY GLANDS & ESOPHAGUS

Short Note

- ① Composition, functions, constituents, mechanism and regulation of salivary secretions (TMP 315-316, Fig 38.7) (GKP 345-347) (GNG Fig 25-3)

Give Reason

1. Sight or smell or even thought of food causes salivation [conditioned reflex] (TMP 319) (GKP 347)
2. Secretion of saliva increases when food is placed in mouth [unconditioned reflex] (TMP 319)

STOMACH

Essays

- ① Gastric juice secretion - composition, phases, regulation (neural and hormonal) and abnormalities (TMP 325-326, 330-333, Table 39.1, Fig 39.5) (GKP 350-352, 354-357) (GNG 457 Fig 25.5) (Refer DVD)
- ② Gastric HCl secretion - mechanism, functions of HCl, post prandial alkaline tide, factors affecting secretion (TMP 327-330, Table 39.2, Fig 39.4-39.5) (GKP 351-353, Fig 39.7) (GNG Fig 25.6, 25.8, 25.9) (Refer DVD)
- ③ Peptic ulcer or Acid Peptic Disease - factors affecting integrity of mucosa, causes of ulcer, signs and symptoms, complications, investigations, management (TMP 333-335, Table 39.4-39.5) (GKP 358-359) (GNG 458 Box 25-1) (Refer DVD)

Short Notes

1. Functions of stomach (TMP 322) (GKP 348)
2. Gastrin - secretion, actions, factors affecting secretion (TMP 331-332) (GKP 335-336) (GNG 459, 468)
3. Gastric mucosal barrier - factors contributing, functions, diagram (TMP 324, Fig 39.3)
4. Achalasia cardia and Chalasias (TMP 357-358) (GKP 402)
5. Differentiate between Gastric ulcer and Duodenal ulcer (TMP 334 Table 39.5)

Give Reason

1. Post prandial alkaline tide (TMP 327-328, Fig 39.4)
2. Anemia following gastrectomy [iron, folic acid, VitB12 absorption impaired] (TMP 322) (GKP 348)
3. Ranitidine or omeprazole is given in peptic ulcer [Ranitidine - H₂ blocker; Omeprazole - K⁺- H⁺ ATPase blocker] (TMP 335) (GKP 358)
4. Dizziness following a heavy meal in gastrectomised patients [dumping syndrome] (TMP 335) (GKP 294)
5. Vagally mediated gastrin release is not blocked by Atropine [neurotransmitter released is GRP not ACh]
6. Vagotomy - line of management in peptic ulcer
7. During anxiety, GI functions get altered [autonomic effect]

PANCREAS, LIVER AND BILIARY SYSTEM**Short Essays**

1. Composition and functions of pancreatic juice (TMP 336-337, Fig 40.2) (GKP 362-364, Table 40.1, Fig 40.4-40.5) (GNG 463 Table 25-13)
2. Regulation and phases of pancreatic juice secretion (TMP 338-339) (GKP 366, Table 29.2) (GNG 463 Fig 25-12)

Short Notes

1. Differentiate between Secretin and CCK-PZ (TMP 338, Table 40.1) (GKP 366)
2. Functions of liver and gall bladder (TMP 342, 346) (GKP 372, 381)
3. Properties and functions of bile salts (TMP 343-344) (GKP 379)
4. Jaundice - definition, types (TMP 345, Table 41.1) (GKP 374-376)
5. Enterohepatic circulation (TMP 343) (GKP 379-381)
6. Bile - composition, mechanism of secretion, differences between hepatic bile and gall bladder bile (TMP 343-344, Table 41.2) (GKP 378-379, 381-382, table 42.1, 42.2) (GNG Fig 28-8, 28-9, Table 28.3)

Give Reason

1. Bulky clay-coloured stools in obstructive jaundice (TMP 345) (GKP 376)
2. Steatorrhea occurs in pancreatic insufficiency [impaired fat digestion] (TMP 339)

SMALL INTESTINE & LARGE INTESTINE**Short Notes**

1. Functions of small intestine (TMP 350-351) (GKP 387)
2. Composition of intestinal juice (TMP 350) (GKP 387)
3. Functions of large intestine (TMP 353) (GKP 390)
4. Dietary fibres (TMP 354) (GKP 1283)

GASTROINTESTINAL MOVEMENTS**Short Essays**

- ✓ 1. Deglutition - stages (esp. second phase), associated disturbances (TMP 355-358)(GKP 398-399)
- ✓ 2. Gastric movements - types, gastric emptying, factors affecting, MMC (hunger pangs) (TMP 358-361, Fig 44.2) (GKP 406, 409)

Short Notes

- ✓ 1. Migrating motor complex (TMP 358) (GKP 396) (GNG 498)
- ✓ 2. Movements of small intestine and large intestine (TMP 361-363) (GKP 413, 414, 416)
- ✓ 3. Peristalsis - definition, mechanism and types (TMP 361-362) (GKP 396, 413) (GNG 497)
- ✓ 4. Mechanism of vomiting (TMP 360) (GKP 409-410) (GNG 502 Fig 27-7)
- ✓ 5. Mass peristalsis / mass action contraction (TMP 363) (GKP 417) (GNG 505)
- ✓ 6. Defecation reflex and abnormalities (TMP 363-364, Fig 44.4) (GKP 418-419) (GNG 506 Fig 27.9, Box 27-4, 27-5)

Give Reason

- ✓ 1. Defecation is a rule after meals in children [gastrocolic reflex] (TMP 417) (GNG 507)(GKP 417)
- ✓ 2. Rapidly changing movements cause vomiting OR Air sickness and sea sickness [stimulation of the vestibular apparatus - stimulation of vomiting centre in medulla] (GNG 502)

DIGESTION AND ABSORPTION OF FOOD**Essays**

- ✓ 1. Digestion and absorption of carbohydrates, proteins, fats, vitamins and minerals (TMP 366-371, Fig 45.1-45.2) (GKP 421-426) (GNG 478) (Refer DVD)
2. Gastrointestinal hormones and their actions (TMP 372-374, Table 46.1) (GKP 335-340) (GNG 468)

Give Reason

1. Glucose is administered in treatment of diarrhoea [Na and glucose utilize same cotransporter SGLT-II] (TMP 367, 370)
2. Plasma has a milky appearance after a heavy fatty meal (TMP 370) (GKP 351)

DIAGRAMS

- ✓ 1. Structural organization of GIT wall (TMP 307 Fig 37.2) (GNG 25-1) *Handwritten: Havers*
2. Regulation of gastric acid and pepsin secretion (TMP 329 Fig 39.5) (GNG 25-6)
3. Parietal cell receptor and morphological changes (GNG 25-8)
4. Mechanism of HCl secretion by parietal cells (TMP 327 Fig 39.4) (GNG 25-9)
5. Mechanism of pancreatic juice secretion by pancreatic duct cells (GNG 25-13)
6. BER of gastro intestinal smooth muscle (GNG 27-2)

MUSCLE AND NERVE PHYSIOLOGY

CELL

Short Notes

1. Channel blockers - Na^+ , K^+ , Ca^{2+} (TMP 5) (GKP 40-41)
2. Secondary active transport (TMP 7) (GKP 53)
3. Na^+ - K^+ pump (TMP 6, Fig 1.6) (GKP 50, Fig 6.8)

Give Reason

1. Digitalis is of great benefit in treating CCF [It increases the cardiac contractility by inhibiting secondary active transport of Ca^{2+} out of the cell] (TMP 7)
2. Na^+ - K^+ pump accounts for large part of basal metabolism [1/3rd of our energy expenditure is for the functioning of Na^+ - K^+ pump and in neurons it accounts for 70% of the energy utilised] (TMP 6)
3. Mannitol is given intravenously in cerebral edema [endothelial cells of blood-brain barrier are connected by tight junctions, and simple diffusion through them is impossible. Rather, active transport is necessary, requiring energy, and the only transporting molecule arterial endothelial cells have receptor signal for

- is Mannitol, which is capable of opening this channel](TMP 3)
- Hypotonic solution is used to treat dehydration (TMP 4) (GKP 49)

NERVE PHYSIOLOGY

Short Notes

- Difference between action potential and graded potential (TMP 27, 28, Table 2.2) (GKP 234)
- Monophasic action potential and its ionic basis (TMP 29-30, Fig 2.7) (GKP 228-231, Fig 23.3) (GNG 85 Fig 4.6)
- Resting membrane potential and its ionic basis (TMP 25-26) (GNG Fig 4.5)
- Absolute and relative refractory period (TMP 33-34, Fig 2.13) (GKP 232)
- All or none law (TMP 32) (GKP 231)
- Myelination, conduction of impulse through myelinated and unmyelinated axon & merits of saltatory conduction (TMP 24, 34-35) (GKP 233-234, Fig 23.80-23.9) (GNG Fig 4-9)
- Erlanger-Gasser classification of nerve fibres (TMP 36, Table 2.3) (GKP 237, Table 24.1)
- Wallerian and retrograde degeneration (TMP 37-38) (GKP 238-240, Fig 24.1)
- Regeneration - conditions for regeneration, regenerative changes in cell body and stem (TMP 38-39) (GKP 238-240)
- Factors influencing velocity of nerve conduction (TMP 36-37) (GKP 233)
- $\text{Na}^+ - \text{K}^+$ ATPase (TMP 25) (GKP 50, Fig 6.8)

Give Reason

- Regeneration is not possible for neurons in CNS [no centrosome, neurilemmal sheath, nerve growth factors, failure of oligodendrocytes to form cell cord & presence of nerve growth inhibiting factors] (TMP 38, 39)
- Increase in calcium concentration in ECF causes decrease in excitability [Ca^{2+} decreases membrane Na^+ permeability by binding and causing closure of Na^+ channel, which is a membrane stabilizer]

SKELETAL MUSCLE PHYSIOLOGY

Essays

- Molecular basis of muscle contraction (TMP 41-46) (GKP 258-264, Fig 27.1, 27.2) (GNG Fig 5.6)
 - Structure of muscle protein & mention the receptors
 - Excitation-contraction coupling
 - Mechanism of muscle contraction - sliding filament theory, changes in sarcomere.
 - Mechanism of muscle relaxation
- Neuromuscular junction - structure of NMJ & receptors involved,

CIPHERS

MUSCLE&NERVE

- INHIBITORS OF $\text{Na}^+ - \text{K}^+$ ATPase** - Ouabain, Digitalis, Glycosides (GOD)
- AT RESTING LENGTH** of skeletal muscle, active tension is maximum
- IN ISOMETRIC CONTRACTION**, no external work is done
- IN ISOTONIC MUSCLE CONTRACTION**, work is done but tension remains the same
- PLASTICITY**: Smooth muscle behaves more like a viscous mass than a rigidly structured tissue
- ANTICHOLINE ESTERASE**: Neostigmine, Physostigmine
- RYANODINE RECEPTORS**: Ca^{2+} channels in longitudinal sarcoplasmic reticulum (not voltage gated)
- DIHYDROPYRIDINE RECEPTORS**: voltage gated Ca^{2+} channel in T-tubules
- ACTION POTENTIAL** in nerve & skeletal muscle is spike potential while in ventricular muscle fibres & visceral smooth muscle plateau potential is observed
- EXCITABILITY OF NEURON**: Decreased with increase in Na^+ , increase in K^+ & decrease in Ca^{2+} in ECF
- Na^+ CHANNEL BLOCKERS**: Phenytoin, Quinidine
- K^+ CHANNEL BLOCKER**: 4-Aminopyridine
- Ca^{2+} CHANNEL BLOCKER**: Nifedipine, Verapamil

mechanism of neuromuscular transmission, drugs acting on NMJ & their mechanism, diseases affecting NMJ (TMP 50-53) (GKP 241-246, Fig 251, 25.2)

Short Essays

1. Denervation hypersensitivity (TMP 53) (GKP 247, Fig 25.5)
2. Excitation-contraction coupling (TMP 43) (GKP 258)

Short Notes

1. Differences between action potential and end-plate potential (TMP 51, Table 3.3) (GKP 234)
2. Role of contractile and regulatory proteins in skeletal muscle (TMP 41-43) (GKP 251-253)
3. Sarcotubular system and its functions (TMP 42, Fig 3.5) (GKP 254-256)
4. Role of Ca^{2+} in muscle contraction (TMP 43, 44) (GKP 256)
5. Role of end-plate potential and motor unit in muscle contraction (TMP Pg 47, 5) (GKP 272)

Give Reason

1. Neostigmine along with cortisol is given for the treatment of myasthenia gravis [in myasthenia gravis - antibodies against ACh receptors; neostigmine - anticholine esterase - ACh accumulates in synaptic cleft]

CARDIAC MUSCLE

Short Notes

1. Differences between cardiac, skeletal and smooth muscle (TMP Table 4.1) (GKP 283)
2. Action potential in cardiac muscle and its ionic basis (TMP 54-56) (GKP 753-755)
3. Pacemaker potential / prepotential and its ionic basis (TMP 56-57) (GKP 755-756) (GNG Fig 29-2, 29-3)
4. Refractory period in cardiac muscle (TMP 56) (GKP 748)
5. Excitation-contraction coupling in cardiac muscle (TMP 57) (GKP 741)

Give Reason

1. Cardiac muscle cannot be tetanised [whole of action potential is refractory since ARP is much longer] (TMP 56) (GNG Fig 5-16)
2. Treppe is possible in cardiac muscle [due to increased availability of Ca^{2+} to bind to Troponin C]
3. Myocardial cell acts as a functional syncytium [intercalated disc, gap junction - low resistance bridges, branched though unicellular] (TMP 55)
4. Cardiac muscle is not fatigued [abundant blood supply, mitochondria, myoglobin, mostly aerobic, basal condition caloric needs 60% by fats] (TMP 57-58)
5. Digitalis is used in treatment of Congestive Cardiac Failure (TMP 54)

SMOOTH MUSCLE

Short Notes

1. Molecular basis of contraction of smooth muscle (TMP 63) (GKP 279-280)
2. Plasticity of smooth muscle - explain with diagram (TMP 64, Fig 5.4)

CIPHERS
• RMP is produced by K^+ leaky channels and is maintained by Na^+/K^+ ATPase • ALL OR NONE LAW is applicable to a single skeletal muscle fibre/nerve fibre; but in cardiac muscle it can be applied to the entire atria & ventricular syncytium

RESPIRATION

STRUCTURE & FUNCTION OF RESPIRATORY SYSTEM

Short Note

1. Respiratory & non-respiratory functions of lungs (TMP 231-232) (GKP 884-885)

Give Reason

1. Exercise triggers asthmatic attack [exercise lowers airway temperature - cooling the airway causes bronchoconstriction - asthmatic attack]

MECHANICS OF VENTILATION

Essays

1. Lung volumes and capacities - Spirogram, definitions, normal values, functions (TMP 246-248, Fig 28.8) (GKP 892-893, Fig 104.7)
2. Timed Vital Capacity - components, importance, graphs (TMP 249-250 Fig 28.9) (GKP 903, Fig 104.17)

Short Notes

1. Mechanics of respiration (pump handle & bucket handle movement) (TMP 239) (GKP 887-888)
2. Intrapleural pressure changes - normal value, causes of negative value, variations, importance, Muller's & Valsalva's manœuvre, effects, graph (TMP 240-241, Fig 28.4) (GNG Fig 34-13) (GKP 889-890, Fig 104.4)
3. Laplace's law - its application in respiratory system (TMP 244, Fig 28.6) (GKP 898, Fig 104.12)

CIPHERS

RESPIRATORY SYSTEM

- **NORMAL INTRAPLEURAL PRESSURE** at the base of the lung is -2.5 mm/Hg (take atmospheric pressure as zero)
- **RESIDUAL VOLUME & FRC** cannot be measured using spirometry
- **HORMONAL FACTORS AFFECTING SURFACTANT:** thyroid, glucocorticoid, insulin.

4. Vital capacity - definition, factors, variations, importance (TMP 247-248)
5. Respiratory dead space - definition, types, values (TMP 250-251) (GKP 907-908)
6. Functions of residual volume (TMP 246)
7. Compliance - definition, unit, types, normal values, factors affecting, compliance curve, reason for hysteresis (viscous & airway resistance) (TMP 252-255, Fig 28.13) (GKP 895-897)
8. Breath Sounds (vesicular, bronchial, added) (TMP 240)
9. Surfactant - functions, factors affecting production, IRDS (TMP 243-244 Fig 28.5) (GKP 899-901)
10. Factors keeping alveoli dry (TMP 245, 257)

Give Reason

1. Intrapleural pressure is always negative [elasticity and surface tension in alveoli oppose elastic recoiling; rapid absorption by lymphatics] (TMP 240-241, Fig 28.3)
2. Surfactant prevents pulmonary edema [by decreasing surface tension] (TMP 243)
3. Increased incidence of IRDS in infants born to diabetic mothers on treatment [decreased surfactant production due to hyperinsulinemia] (TMP 243)
4. Alveoli are always kept dry [by surfactant - to prevent pulmonary edema] (TMP 245, 257)
5. Residual volume to detect whether baby was stillborn or born alive [if the baby has taken the first breath - RV present - lungs float in water] (TMP 246)

MNEMONICS**Functions of surfactant****SAD Isaac Cried & Weeped (OR What Causes AIDS)**

S-Surface tension is decreased

A-Alveolar stability maintenance

D-Dry alveoli

I-Infant respiratory distress syndrome prevents

C-Compliance of lungs increased

W-Work of breathing reduced

Non-respiratory functions of lungs**READ PART**

R-Regulation of BP

E-Endocrine function

A-Acid-base balance

D-Degradation of substance

P-Protective function

A-Anticoagulant function & Filtration of blood

R-Regulation of blood volume

T-Temperature regulation

Factors affecting compliance**COMPLIANCE**

C-Collagen deposition(fibrosis)

O-Ossification of costal cartilage

M-Major obesity

P-Pulmonary viscous congestion

L-Lung size

I-Increasing expanding pressure

A-Age

N-No surfactant

C-Chest wall scarring

E-Emphysema

PULMONARY CIRCULATION**Short Notes**

1. Features of pulmonary circulation (TMP 256-257) (GKP 915)

2. Ventilation-perfusion ratio - definition, normal values, importance (TMP 258-260) (GKP 918-920)
3. Physiological & pathological shunt (TMP 257) (GKP 920)

Give Reason

1. Reduction of vital capacity in lying down posture & the cause for orthopnoea in cardiac failure [Pulmonary veins are distensible & act as a blood reservoir] (TMP 256)
2. Right ventricular output is a little less than that of left ventricular output [part of bronchial blood enters pulmonary vessels due to anastomosis; some venous blood flows from coronary veins to left side through thebesian veins] (TMP 257)
3. Pulmonary TB affects apex of the lung first [High V/Q at apex - increased alveolar O₂ at apex - Mycobacterium tuberculosis is an aerobic bacteria] (TMP 259) (GKP 729-730)
4. High ventilation-perfusion ratio in the apices of lung [gravity dependent reduction in flow is marked with perfusion than with ventilation] (TMP 259) (GKP 729)
5. Arterial pO₂ is less than alveolar pO₂ [physiological shunt, thebesian veins, septal defect] (TMP 257)

PULMONARY GAS EXCHANGE

Short Notes

1. Mechanism by which alveolar air is kept constant (TMP 262)
2. Respiratory membrane / Alveolar capillary membrane - thickness, layers, factors affecting diffusion across the membrane (TMP 263-264, Fig 30.2) (GKP 910-911)
3. Diffusion capacity - definition, factors affecting it, differences between diffusion capacity & diffusion coefficient (TMP 912) (GKP 724)

Features of pulmonary circulation

Satheesh Canteenile VADA kazhich BP Low aayi (OR VADAS Cause Low BP)

S-Shunt (physiological & pathological)

C-Cardiac output: entire CO received by lung

V-Veins (pulmonary): highly distensible, so act as blood reservoir, carry oxygenated blood

A-Arteries (pulmonary): thin walled, carries deoxygenated blood

D-Distance of pulmonary vessels from heart is less, so less affected by gravitational forces

A-Artery (bronchial): another set of blood vessel to lung (nutritional supply)

BP-BP maintained by ACE

L-Low pressure, Low resistance system

M N E M O N I C S

TRANSPORT OF GASES

Essay

1. Transport of O₂ & CO₂ (TMP 267-273, Fig 31.3-31.4) (GNG Fig 35.2, 35.6, 35.7) (GKP 922-930)
2. ODC - reason for sigmoid shape, factors affecting ODC, P₅₀, diagram (TMP 268-269, Fig 31.1-31.2) (GNG 35.2-35.3) (GKP 924-928, Fig 107.3, 107.7)

Short Notes

1. Heme-heme interaction (TMP 267) (GKP 923)
2. Bohr effect, Haldane effect, chloride shift/hamburger phenomenon (TMP 269, 271, Fig 31.4-31.5) (GKP 929-930, Fig 107.9)

Give Reason

1. Hb in the systemic arterial blood is only 97% saturated [physiological shunt]
2. Hematocrit of venous blood is normally 3% greater than arterial blood [water & chloride shift; amount of plasma in venous blood is less than the arterial blood - increase in size of RBC] (TMP 271) (GKP 929)
3. Sigmoid shape of ODC (TMP 268) (GKP 924)

REGULATION OF RESPIRATION**Essays**

1. Neural regulation of respiration - voluntary control, automatic control, reflex control, diagrams (TMP 274-278, Fig 32.1-32.2) (GKP 932-936, Fig 108.2, 108.5)
2. Chemical regulation of respiration - central chemoreceptors, peripheral chemoreceptors, effects of $p\text{CO}_2$, $p\text{O}_2$, H^+ on respiration, diagrams (TMP 278-282, Fig 32.6, 32.7, 32.8) (GKP 937-948, Fig 108.9) (Refer DVD)

Short Notes

1. Periodic breathing - Cheyne-Stoke's, Biot's, voluntary hyperventilation (TMP 284-285, Fig 32.12-32.14) (GKP 958-959, Fig 96.1)
2. Hypoxia - types, definition, features, causes (TMP 287-289) (GKP 950-952)
3. Hering-Breuer reflex, J reflex (TMP 276-277, Fig 32.4) (GKP 943)
4. Inspiratory ramp signal (TMP 274, Fig 32.2)
5. Apneusis (TMP 275)
6. Ventilatory response to CO_2 , hypoxia, acidosis, alkalosis (TMP 281-283)
7. Asphyxia (TMP 287) (GKP 957)
8. Cyanosis (TMP 290)

Give Reason

1. Cyanosis is not seen in anemic hypoxia [Hb concentration is less - hence reduced Hb < 5gm% - for cyanosis reduced Hb > 5gm%] (TMP 290) (GKP 950-951)
2. Apnoea occurs after voluntary hyperventilation [hyperventilation - decreased arterial CO_2 - depression of respiratory centre - apnoea] (TMP 284) (GKP 959)
3. Overinflation and collapse of lung are physiologically resisted during forced inspiration & expiration respectively [Hering-Breuer inflation & deflation reflex] (TMP 276-277) (GKP 943)
4. Respiratory chemoreceptors are not stimulated in anemia / CO poisoning [PCR - respond only to reduction in dissolved O_2 in blood; anemic hypoxia - $p\text{O}_2$ is normal - no stimulation of PCR] (TMP 281)
5. Mild to moderate hypoxia stimulates respiration, but severe hypoxia depresses it (TMP 282) (GKP 938-939)
6. Hypoxic hypoxia often causes cyanosis, but histotoxic hypoxia doesn't [histotoxic hypoxia - inability of tissue to use O_2 - blood level of reduced Hb is not affected] (TMP 288)
7. Tetany in hyperventilation [increase in pH - Plasma proteins ionize - bind with Ca^{2+} - fall in ionic Ca^{2+} - increase in excitability - tetany] (TMP 286)
8. O_2 therapy alone is of no use in histotoxic hypoxia [inability of tissue to utilize O_2] (TMP 289)

CIPHERS**RESPIRATORY SYSTEM**

- IN PURE BLOOD, 19.8mL O_2 is bound to Hb per 100mL blood.
- SIGMOID SHAPE OF ODC: Cause is heme-heme interaction.
- AFFINITY OF Hb for CO is 210 times its affinity for O_2
- CYANOSIS is not seen in anemic hypoxia
- KEY FACTORS determining rate & rhythm of respiration - switch off mechanism coming from pneumotaxic centre & vagus
- INCREASE IN VENTILATION AFTER EXERCISE is due to lactic acidemia & not due to increased $p\text{CO}_2$ or hypoxia

9. O₂ therapy must be started with care in hypercapnic patients who are in pulmonary failure [high pCO₂ depresses respiratory centre - patient breathes by hypoxic stimulation] (TMP 289)

ENVIRONMENTAL PHYSIOLOGY

Essay

1. Physiological adjustments in high altitude & deep sea - effects of hypoxia, a/c & c/c mountain sickness, acclimatisation at decreased barometric pressure, N₂ narcosis, O₂-He mixture, Caisson's disease & symptoms, effects of O₂ & CO₂ at high barometric pressure (TMP 291-295) (GKP 947-949)

Short Notes

1. Mountain sickness & acclimatization (TMP 292-293) (GKP 949)
2. Caisson's disease / bends / decompression sickness / dysbarism / diver's paralysis (TMP 294-295) (GKP 955)
3. SCUBA (TMP 295) (GKP 955)
4. Nitrogen narcosis (TMP 294) (GKP 954)
5. Respiratory changes in high barometric pressure (TMP 294) (GKP 954)

Give Reason

1. O₂-He mixture is used in SCUBA [He is less dense than N₂ - decreases airway resistance, less soluble, less narcotic effect] (TMP 294) (GKP 955)
2. How N₂ causes narcosis at high barometric pressure [N₂ dissolves in fat - alters ionic conductance in neuron - reduces neuronal excitability] (TMP 294) (GKP 954)
3. He cause HPNS during deep dives [inert gas act as an anesthetic at high barometric pressure] (TMP 294) (GKP 954)
4. Severe hypoxia causes pulmonary edema [arteriolar constriction - fluid exudation]

RESPIRATORY ADJUSTMENTS IN EXERCISE

Short Notes

1. Respiratory adaptations to exercise - changes in ventilation, changes in diffusion, changes in metabolism, recovery phase of exercise, O₂ debt, changes in trained athletes (TMP 299-301) (Fig 34.1)
2. O₂ debt (TMP 300)
3. Respiratory changes in trained athletes (TMP 301)

Give Reason

1. Increase in ventilation for several minutes after exercise [continues till O₂ debt is paid - due to lactic acidemia - not due to increased pCO₂ or hypoxia] (TMP 300)

ARTIFICIAL RESPIRATION

Short Note

1. Mouth to mouth breathing (TMP 302) (GKP 962)

DIAGRAMS

1. Graphs of intrapleural and intrapulmonary pressure relative to atmospheric pressure (TMP 242 Fig 28.4) (GKP 890 Fig 104.4) (GNG 34-13)

2. Spirogram (TMP 247 Fig 28.8) (GKP 893 Fig 104.7) (GNG 34-8)
3. TVC - normal, obstructive & restrictive lung diseases (TMP 249 Fig 28.9) (GKP 904 Fig 104.19)(GNG 34-9)
4. Compliance - hysteresis loop (TMP 254 Fig 28.13)
5. ODC - Oxygen Dissociation Curve (TMP 269 Fig 31.2) (GKP 924 Fig 107.3) (GNG 35--2)
6. Organization of carotid body (TMP 280 Fig 32.8) (GKP 937 Fig 108.9) (GNG 36-5)
7. Respiratory neurons in brain stem (TMP 275 Fig 32.1) (GKP 933 Fig 108.2) (GNG 36-2)

FLOW CHARTS

1. Regulation of respiration including reflexes
2. Effect of hypoxia & CO₂ on respiration
3. Features of different types of hypoxia - table
4. CVS response to exercise

RENAL PHYSIOLOGY

FUNCTIONAL ANATOMY OF KIDNEY

Short Notes

1. Functions of kidney - renal and extrarenal (TMP 375-376) (GKP 659-660) (GNG 692-693)

GOVT. MEDICAL COLLEGE, THIRUVANANTHAPURAM

2. Differentiate between cortical and juxtamedullary nephron - with diagram (TMP 380, Table 47.1, Fig 47.5) (GKP 663, Table 75.1, Fig 75.5) (GNG 673-674 Fig 38-1)
3. Juxtaglomerular apparatus - with diagram (TMP 380, Fig 47.3) (GKP 666-667, Fig 75.11) (GNG 705 Fig 38-9)
4. Renal circulation - vessels, special features, autoregulation and theories (myogenic, tubuloglomerular feedback, JG hypothesis), measurement of renal blood flow (Fick's principle, substance used and its criteria) (TMP 381-384, Fig 47.8) (GKP 671-675) (GNG 676-678, Fig 37-3)
5. Describe structure of filtration membrane (TMP 378-379, Fig 47.4) (GKP 664-666, fig 75.7b)(GNG 673)

Give Reason

1. Chronic renal disease results in anemia [decreased erythropoietin production]
2. Renal medulla is more exposed to hypoxic damage than cortex [Blood flow to the cortex is greater than that to the medulla] (TMP 383) (GNG 678)
3. Larger proteins do not appear in urine [negativity of sialo-proteins] (TMP 379)
4. Renal blood flow does not change with the systolic pressure range of 90-220mmHg [autoregulation] (TMP 383) (GNG 678)

MECHANISM OF FORMATION OF URINE

Essays

Mechanism of concentration and dilution of urine in the kidney - countercurrent multiplier and exchange system (TMP 399-401, fig 48.8, 48.9) (GKP 700-704) (GNG 687-690 Fig 37-16)

Mechanism of reabsorption of Na⁺, glucose, urea and water in renal tubules (TMP 390-397, Fig 48.2, 48.3, 48.6) (GKP 685-688) (GNG 681-686, Fig 37.7-37.9)

Acidification of urine and maintenance of acid-base balance - four mechanisms (TMP 402-405, fig 48.1) (GKP 709-713) (GNG 681-686 Fig 39.1-39.2)

RAAS mechanism (TMP 388, fig 48.1) (GKP 667-669) (GNG 702-706)

Short Notes

1. GFR - definition, normal value (125mL/min), measurement and factors affecting it (TMP 385-388) (GKP 678-681) (GNG 678-680)
2. Clearance of a substance - normal values for inulin, PAM, urea; their significance (TMP 387) (GKP 679) (GNG 676-678)
3. Renal threshold and tubular maximum (TMP 390) (GKP 684-685) (GNG 682-683)
4. Glomerulotubular balance (TMP 390) (GKP 697) (GNG 684-685)
5. ADH - receptors, action, regulation of secretion, abnormalities, diabetes insipidus (types, differences) (TMP 401) (GKP 477-479) (GNG 697-700)
6. Renal handling of Na⁺ and H⁺ (TMP 390, 401, 402) (GKP 685) (GNG 712-716)
7. Maintenance of medullary osmotic gradient in kidney (TMP 399, fig 48.1, 48.2, 48.3) (GKP 700-704)

CIPHERS

RENAL PHYSIOLOGY

- **CLEARANCE** $X = UP/V$
(U-urine conc. of X, V-urine flow rate, P-Plasma conc. of X)
- **RENAL CLEARANCE** - PAH, Creatinine
- **GFR MEASUREMENT** - Inulin, Mannitol, Radio labelled Vit B₁₂
- **DIAMETER** of efferent arteriole is less than afferent arteriole
- **LACIS CELLS** - Extraglomerular mesangial cells
- **JG CELLS** - modified tunica media; **MACULA Densa** - modified afferent arteriole.
- **FUNCTIONS OF KIDNEY**
MAR³E²
M-Metabolic function
A-Acid base balance
R³-Regulation of (Blood volume & composition of body fluids, BP, electrolyte balance)
E-Excretory function
E-Endocrine function
- **NEPHROTIC SYNDROME** (>3.5 g/day): Hypoalbuminemia, Hyperlipidemia, Hypercoagulability, Edema
- **CHRONIC RENAL FAILURE**
Cause: Nephritis, polycystic kidney, renal calculi, hypertension, atherosclerosis, TB, slow poisoning
Features: Uremia, acidosis, edema, blood loss, anemia, hyperparathyroidism.

(GNG 687-688)

8. Types of dialysis (TMP 406, fig 48.8)
9. Facultative reabsorption of water (TMP 397) (GKP 705) (GNG 685-687)
10. Hormones acting on renal tubules (TMP 406,407) (GKP 695) (GNG 697)
11. Name 2 abnormal constituents of urine and clinical conditions where these constituents appear (TMP 405) (GKP 716)
12. Effects of disordered renal functioning (GNG 692-693)

Give Reason

1. Dopamine infusion is given to prevent renal ischemia (TMP 384)
2. Albuminuria in nephrotic syndrome [due to reduction in the negative charges on the filtration barrier since glomerular membrane is damaged] (TMP 386)
3. Osteomalacia in chronic renal failure [VitD deficiency]
4. Inulin is used for determination of GFR by clearance method [inulin is neither reabsorbed nor secreted] (TMP 387) (GKP 579) (GNG 678-679)
5. Acidosis is common complication of chronic renal disease [excretion of acid is reduced leading to acidosis] (TMP 402) (GNG 716)
6. In patients with hypertension and renal failure, administration of ANP is of great benefit [ANP - inc. GFR, dec. water retention and oedema and thus dec. BP] (TMP 388-389) (GKP 696) (GNG 707)
7. Theoretical value of renal threshold is 300 mg/100 mL of blood whereas actual value is about 180 mg/100 mL of venous blood OR splay in glucose absorption curve (TMP 394) (GKP 688) (GNG 683)

LOWER URINARY TRACT**Short Notes**

1. Innervation of bladder - sympathetic, parasympathetic and somatic (TMP 409-410, Fig 49.1) (GKP 722, Fig 83.2) (GNG 694, Fig 37-19)
2. Micturition reflex and abnormalities (TMP 410-411) (GKP 724-726, Fig 83.5) (GNG 694-695)
3. Cystometrogram and its components and correlation with micturition reflex (TMP 411, Fig 49.2) (GKP 724, Fig 83.4) (GNG 694 Fig 37-20)
4. Osmotic and water diuresis (TMP 412, Table 49.1) (GKP 707) (GNG 689-692)
5. Diuretics (TMP 412) (GKP 707-708) (GNG 692)

Give Reason

1. Plateau phase in cystometrogram [Plasticity of detrusor muscle]

DIAGRAMS

1. Typical nephron (TMP 377 Fig 47.2) (GNG Fig 37.1)
2. Structure of renal corpuscle and juxtaglomerular apparatus (TMP 378 Fig 47.3) (GNG Fig 38.9)
3. Countercurrent system (TMP Fig 48.8-48.9) (GNG Fig 37.15-37.16)
4. Reabsorption of Sodium (TMP 391, Fig 48.2-48.3) (GNG Fig 37-7, 37-14)
5. Splay (TMP 395, Fig 48.5) (GNG Fig 37-9)

CIPHERS

- **GLUCOSE:** Renal threshold - 180mg%, transport maximum - 300mg%, Clearance - ZERO
- **COUNTER CURRENT EXCHANGE:** Vasa recta; **MULTIPLIER:** Loop of Henle.
- **ANGIOTENSIN EFFECTS:** Increased Aldosterone secretion, Increased Na^+ secretion, Decreased GFR, Vasoconstriction
- **DIURETICS**
 - Loop diuretics: Furosemide
 - K^+ sparing diuretics: Spironolactone
 - Carbonic anhydrase inhibitors: Acetazolamide

6. Reabsorption of water in different segments of nephron (TMP 396, Fig 48.6)
7. Cystometrogram (TMP 411, Fig 49.2) (GNG Fig 37-20)
8. Innervation of bladder (TMP 410, Fig 49.1) (GNG Fig 37-19)

CENTRAL NERVOUS SYSTEM

PHYSIOLOGY OF NERVOUS SYSTEM AND REFLEX ACTION

Short Essays

1. Synapse - definition, classification, functional anatomy, functions, conduction across synapse (GNG Fig 6-3) (TMP 568-572) (GKP 981-983, 987)
2. Types of synaptic inhibition - pre-synaptic & post-synaptic (GNG Fig 6-9) (TMP 572-574) (GKP 988-989)
3. Muscle spindle - structure, functions, innervations, spindle responses, diagram (GKP 1048-1052, Fig 127.2) (TMP 585, Fig 71.4)
4. Stretch (monosynaptic) reflex, inverse stretch (bisynaptic) reflex, polysynaptic reflex (GKP 1054-1058, Fig 112.2-112.4) (TMP 584-590, Fig 71.3-71.7)
5. Golgi tendon organ (GNG Fig 12.5) (TMP 588, Fig 71.7A) (GKP 1052, Fig 127.6)
6. Properties of synapse (TMP 572-579)

Short Notes

1. Neuroglia - functions, types, applied aspects (TMP 563-564) (GKP 977-978)
2. Lumbar puncture - level of puncture in children & adults, uses (TMP 565) (GKP 1158)
3. Mechanism of transmission at chemical synapse (TMP 571, Fig 70.3)
4. EPSP and IPSP - definition, ionic basis, differences (TMP 576) (GKP 985-986)
5. Synaptic plasticity, post tetanic potentiation, synaptic fatigue (TMP 578) (GKP 990)
6. Summation & occlusion (TMP 577) (GKP 989)
7. Mechanism and significance of after discharge (TMP 576, Fig 70.9-70.10)
8. Reflex arc and its components (TMP 583) (GKP 1058, Fig 128.1)
9. Describe how muscle spindle and Golgi tendon organ help in motor control (TMP 585, 588) (GKP 1050)

1052)

10. Clonus (TMP 588)

Give Reason

1. Discharge of post-synaptic neuron even after cessation of pre-synaptic impulse [after discharge]
2. Cessation of seizures during an epileptic attack without treatment [synaptic fatigue]
3. CNS is not necessary for a reflex action [pseudo reflex or axon reflex]
4. Mechanism of strychnine poisoning [feedback inhibition]
5. Role of gamma motor neuron in muscle tone (TMP 587)

SENSORY DIVISION OF NERVOUS SYSTEM**Short Notes**

1. Generator potential or receptor potential - ionic basis (TMP 595) (GKP 999, fig 117.6)
2. Classification of sensory receptors (TMP 594) (GKP 996-997)
3. Weber-Fechner law, law of projection (phantom limb), doctrine of specific nerve energies (TMP 596-597) (GKP 1000-1001)
4. Lateral inhibition - physiological basis and significance (TMP 597-598, 608)
5. Paccinian corpuscle (TMP 595) (GKP 997, Fig 117.1)
6. Superficial senses & Synthetic senses (TMP 597-598) (GKP 1010-1011)
7. Sensitization and desensitization of receptors (TMP 595-596) (GKP 989, 990)

SENSORY PATHWAYS**Essays** (Refer DVD for all essays)

1. Pathway for fine touch (dorsal column), crude touch (anterior spinothalamic) (TMP 604-605, Fig 73.5) (GKP 1008-1010, Fig 119.1, 119.2)
2. Pathway for sensations from face (TMP 605-606, Fig 73.6, 73.6a) (GKP 1024-1025, Fig 121.2)
3. Pathway for fast and slow pain (TMP 610-611, Fig 73.9-73.11) (GKP 1016-1018, Fig 120.2)
4. Pathway for temperature (lateral spinothalamic) (TMP 606, Fig 73.7) (GKP 1023, Fig 119.2)
5. (For all the above - sensations carried, fibres, neurotransmitters involved, receptors, 1st, 2nd & 3rd order neurons, crossing, structures crossed)
6. Referred pain - definition, examples, dermatomal rule, projection theory, facilitation theory (TMP 613) (GKP 1019, Fig 124.4-124.5) (GNG Fig 8-6)
7. Control of pain - spinal (gate-control theory) and supraspinal (endogenous analgesia system) levels, mechanisms, neurotransmitters (TMP 613-615, Fig 73.14-73.15) (GKP 1020-1021, Fig 120.6, 120.7)

CIPHERS**SOME IMPORTANT CELL GROUPS IN SPINAL CORD**

Substantia Gelatinosa of Rolando: receives pain, temperature

Clarke's column/ Nucleus dorsalis: afferents from muscle spindle, Golgi tendon organ

Chief sensory nucleus/ Nucleus propius: proprioception, two-point discrimination

Gamma motor neuron: supplies muscle spindle

Alpha motor neuron: supplies skeletal muscles

SENSORY RECEPTORS

Touch and pressure: Merkel's disc, Meissner's corpuscle, Pacinian corpuscle

Warmth: Ruffini's end organ

Cold: Krause's end bulb

Pain: free nerve endings of A and C nociceptors

SENSORY PATHWAYS**AMORPHOSYNTHESIS:**

Lesion of sensory association area causing loss of analysis and interpretation of the sense of form of the body

TRACT OF GOLL AND TRACT OF BURDACH:

Dorsal column pathway; fibres end up in nucleus gracilis and nucleus cuneatus of medulla

Short Notes

1. Sensory homunculus (TMP 603, Fig 73.3) (GKP 1034-1035, Fig 123.3)(GNG 168 Fig 8-9)
1. Proprioception - conscious and unconscious (TMP 606-608, Fig 73.8) (GKP 1010)
2. Deep pain - deep somatic and visceral - cause, site, pathway, features (TMP 611) (GKP 1018)
3. Synthetic senses (TMP 608)
4. Functions of SSA-I, SSA-II and sensory association area (TMP 602) (GKP 1034-1035)
5. Spinocerebellar tracts - direct and indirect (TMP 602)
6. Stress-induced analgesia (GNG 173)

Give Reason

1. Accupuncture relieves pain [gate-control theory, release of endorphins, enkephalins]
2. In pathology of diaphragm pain is felt at the tip of shoulder or during MI pain is experienced at the tip of left shoulder, spreading into inner aspect of left arm [referred pain - dermatomal rule]
3. Pre-frontal lobotomy is done in untreated cases of pain [emotional component of pain is abolished once connections between thalamus and prefrontal areas are cut]
4. Wounded soldiers in battle field are unaware of pain [stress analgesia]
5. Rubbing or vibratory stimulation of injured area reduces pain [gate-control theory]
6. Exact localization is not possible in case of crude touch [convergence of many 1st order fibres on chief sensory nucleus - many fibres from chief sensory nucleus converge on one 3rd order neuron in PVN of thalamus]
7. If the skin is pricked with a sharp pin, double sensation is felt [fast pain followed by slow pain]
8. If the cortex is removed, pain perception is possible but exact localization is not possible [crude pain perception occurs at thalamic level, in the PVLN; but localization requires the cortex]
9. Myocardial ischemia is associated with pain [release of P factor of Lewis]
10. Morphine is used as an analgesic (TMP 614)
11. Nociceptors are non-adapting type of receptors [pain is a protective sensation]
12. Visceral pain is associated with autonomic symptoms [some substance P containing afferent pain fibres send collaterals to post ganglionic sympathetic neurons in the sympathetic ganglia]

THALAMUS

Short Notes

1. Connections and functions of thalamus (TMP 619) (GKP 1030)
2. Thalamic syndrome - features (TMP 619) (GKP 1031)

DIAGRAMS

1. CS of spinal cord at thoracic level showing nuclei and Rexed's laminae (TMP 567 Fig 69.7) (GKP 1005 Fig 111.4)
2. Pre and post-synaptic inhibition (TMP 574 Fig 70.5) (GNG Fig 6-9)
3. Reflex arc (TMP 513 Fig 71.1) (GNG Fig 12-1)
4. Stretch and inverse stretch reflex / bisynaptic reflex (TMP 584 Fig 71.3, 71.6-71.7) (GKP 1055-1056 Fig 128.2-128.3) (GNG Fig 12-3)
5. Muscle spindle (TMP 586 Fig 71.4) (GKP 1048 Fig 127.2) GNG Fig 12-2)

CIPHERS

THALAMUS

- THALAMIC SYNDROME: Thrombosis of thalamo-geniculate branch of posterior cerebral artery
- FEATURES OF THALAMIC SYNDROME (Code: TOPICS A to H)
Thalamic hand, Over-reaction, Phantom limb, Intension tremor, Choreaethetosis, Sensory ataxia, Astereognosis, Hemianesthesia

6. CS of spinal cord at thoracic level showing all ascending & descending tracts (TMP 601 Fig 73.2)
7. Gate control of pain (TMP 615 Fig 73.14) (GKP 1021 Fig 120.7)
8. Thalamic nuclei (TMP 618 Fig 74.1)

All sensory pathways - Points to remember:

- Diagram with a central line - Receptor structure and site
- 1st, 2nd, 3rd order neurons - Site of crossing
- Arrangement of fibres - Cortical representation

MOTOR DIVISION OF NERVOUS SYSTEM

Essay

1. Pyramidal / Corticospinal tract - origin, components, course, termination, types, functions and effects of lesions at various levels (esp. at the level of internal capsule) (TMP 623-628, Fig 75.3) (GKP 1062-1067, Fig 129.3) (GNG Fig 12-9) (Refer DVD)

Short Notes

1. Descending pathways contributing to extra pyramidal system (TMP 624-625) (GKP 1067-1068)
2. Babinski sign and its clinical significance (TMP 627) (GKP 1065)
3. Muscle tone, hypotonia and hypertonia (TMP 620) (GKP 1057)
4. Alpha-gamma linkage (TMP 621) (GKP 1052)
5. Differentiate between UMN & LMN lesions (TMP 627, Table 75.1) (GKP 1064, 1068, table 129.1)
6. Differentiate between clasp-knife phenomenon, lead pipe rigidity, cog wheel rigidity (TMP 588, 638) (GKP 1057, 1085-1086)
7. Pyramidal tract lesion and crossed hemiplegia (TMP 627-628)

Give Reason

1. Spastic paralysis in UMN lesion and flaccid paralysis in LMN lesion [release phenomenon, denervation hypersensitivity]
2. Deep tendon reflexes are exaggerated in spastic paralysis [decrease in supraspinal inhibition of gamma efferents - increase in alpha motor discharge]
3. Ankle clonus and clasp-knife effect in UMN lesion [loss of inhibitory impulses from higher centres]
4. Positive Babinski's sign in infants, before the child starts walking [Pyramidal tract becomes fully developed and myelination is complete only after the child starts walking]
5. Upper part of face is spared in UMN lesion

DIAGRAMS

1. Pyramidal tract (GKP 853, Fig 113.3) (GNG Fig 12-10)
2. Motor homunculus (GNG Fig 12-7)

CIPHERS

MOTOR SYSTEM

LOCALISATION OF PYRAMIDAL TRACT LESIONS

- Area 4: Monoplegia of opposite side
- Corona radiata: Hemiplegia
- Internal capsule: Contralateral hemiplegia; UMN type of facial palsy
- Midbrain: Crossed hemiplegia (ipsilateral cranial nerve palsy, contralateral hemiplegia)
- Pons: Ipsilateral facial palsy, contralateral hemiplegia
- Medulla: Fatal (vital centres afferent); ipsilateral 9,10,11,12 cranial nerve palsy, contralateral hemiplegia

LESIONS OF SPINAL CORD

Essay

1. Transection of spinal cord (esp. hemisection) (TMP 629-631) (GKP 1038)

Short Notes

1. Stages of section of spinal cord - spinal shock, reflex activity, degeneration (TMP 629) (GKP 1072-1074)
2. Hemi section of spinal cord / Brown-Sequard syndrome (TMP 630, Fig 76.1) (GKP 1038-1039)
3. Mass reflex and its significance - for reflex evacuation of bladder & bowel in paraplegic patients (TMP 630) (GKP 1073)
4. Dissociated anaesthesia (TMP 630) (GKP 1111-1112)
5. Diseases affecting spinal cord - syringomyelia, tabes dorsalis (TMP 631)

DIAGRAMS

1. Brown sequard syndrome (TMP 630 Fig 76.1)

BASAL GANGLIA

Essays

1. Basal ganglia - components, connections, direct and indirect pathway, functions & diseases associated with its lesions - Parkinsonism, chorea, athetosis, Huntington's disease, kernicterus and Wilson's disease (TMP 634-638, Fig 77.2-77.6) (GKP 1082-1087, Fig 131.2-131.5) (Refer DVD)
2. Parkinsonism - manifestations, pathophysiology and treatment (TMP 638) (GKP 1085)

Short Notes

1. Physiological basis of rigidity & akinesia in Parkinson's disease (TMP 638-639) (GKP 1085)
2. Hyperkinetic features seen in lesions of basal ganglia (TMP 638) (GKP 1085-1086)
3. Wilson's disease / Progressive hepatolenticular degeneration (TMP 640)

Give Reason

1. Parkinsonism is related to neurotransmitter imbalance in specific nuclei of basal ganglia (TMP 638) (GKP 1085)
2. Intentional and resting tremor in different neurological patients (TMP 639, 647) (GKP 1086, 1095)
3. Lesions of basal ganglia causes rigidity [basal ganglia inhibit stretch reflex by stimulating caudate nucleus] (TMP 638) (GKP 1085)
4. Combination of L-dopa with carbidopa is given in Parkinsonism [L-dopa crosses BBB; carbidopa - peripheral decarboxylase inhibitor] (TMP 639) (GKP 1086)
5. Statue-like posture and mask-like facies in Parkinsonism (TMP 639)

DIAGRAMS

1. Basal ganglia and Parkinsonism (GNG 248 Fig 12-16)
2. Connections, pathways of basal ganglia (GKP 1084)

CEREBELLUM

Essays

1. Cerebellum - connections and functions, connections in cerebellar cortex (TMP 643-647, Fig 78.4-78.5) (GKP 1088-1095, Fig 132.5-132.6) (GNG Fig 12-19)

2. Clinical manifestations of lesions of cerebellum / Signs of cerebellar dysfunction (TMP 647) (GKP 1095-1096)

Short Note

1. Role of cerebellum in co-ordination of movements (TMP 646) (GKP 1093-1095)

Give Reason

1. Pendular knee jerk, rebound phenomenon in cerebellar lesion / finger nose test is positive (dysmetria) in cerebellar lesion [Hypotonia of quadriceps; loss of damping effect]
2. Intension tremor in cerebellar lesions [lesions in pathways of superior cerebellar peduncle, loss of damping effect]
3. Hypotonia in cerebellar lesion [loss of facilitatoryneocerebellar output to dorsal inhibitory cerebellar formation]
4. Signs of cerebellar lesion manifest ipsilaterally [double crossing w/ diagram]
5. Effects of lesion of cerebellum are mainly motor and not sensory in nature
6. Cerebellum is capable of producing suppressor effect on cerebral firing level [due to balancing action & damping effect]

DIAGRAMS

1. Neuronal connections in cerebellum (TMP 644 Fig 78.4) (GKP 1093 Fig 132.6) (GNG Fig 12-19)

HYPOTHALAMUS & LIMBIC SYSTEM

Essay

1. Functions of hypothalamus (TMP 669-671) (GKP 1105-1110)
2. (Mnemonic - TEACH)

Short Notes

1. Regulation of food intake by hypothalamus (TMP 670) (GKP 1107)
2. Temperature regulation by hypothalamus (TMP 670, 421-422) (GKP 1107, 1243)
3. Functions & connections of limbic system (TMP 673-674) (GKP 1129-1131)
4. Role of limbic system in emotions - Papez circuit and its importance (TMP 673) (GKP 1125)
5. Kluver-Bucy Syndrome (TMP 674) (GKP 1133)

RETICULAR FORMATION

Short Notes

1. ARAS - components, functions and significance (TMP 648-649) (GKP 1114)
2. Functions of reticulospinal tract (TMP 649) (GKP 1016)

Give Reason

1. Soldiers don't feel pain until the fight is over [suppression of pain fibres by the corticofugal fibres and fibres from reticular formation, i.e. periaqueductal grey matter, at the level of substantiagelatinosa of Rolando] (TMP 650)

CIPHERS

HYPOTHALAMUS

- **FUNCTIONS OF HYPOTHALAMUS** (Code: TEACH)
Thirst & satiety centre, Emotional & sexual behaviour, Autonomic centre, Circadian rhythm, Heat regulation & Hormone secretion
- **AREAS IN HYPOTHALAMUS**
Anterior and medial regions: Control of parasympathetic activity
Lateral and posterior: Control of sympathetic activity
- **CENTRES**
Feeding centre: Lateral hypothalamic area
Satiety centre: Ventromedian nucleus of hypothalamus
Thirst centre: Lateral hypothalamus
Centre for heat loss: Anterior part
Centre for heat gain: Posterior part

(GNG 173)

2. Painful stimuli can arouse a drowsy or sleepy person (TMP 611) (GKP 1017)

VESTIBULAR APPARATUS

Short Notes

1. Vestibular apparatus - components, structure, mechanism of detection of rotational and linear acceleration (TMP 652-653, Fig 80.1-80.3) (GKP 1097-1101, Fig 133.4-133.8)
2. Vestibular pathway (TMP 654, Fig 80.4) (GKP 1101, Fig 133.9)
3. Functions of vestibular apparatus and disorders (TMP 656-657)

POSTURE & EQUILIBRIUM

Short Notes

1. Differentiate between decerebrate and decorticate preparations (TMP 661, Table 81.2) (GKP 1074, 1078)
2. Release phenomenon and righting reflexes (TMP 659) (GKP 1077)

Give Reason

1. Righting reflexes are present in midbrain animal except for visual reflex (TMP 660) (GKP 1077)

EEG, SLEEP, YOGA & MEDITATION

Short Notes

1. EEG - waves, variations, applications (TMP 680-681, Fig 86.1) (GKP 1116, Fig 136.2)
2. Physiological changes during sleep (TMP 681-682)
3. Differences between REM & NREM sleep (TMP 683, Fig 86.2) (GKP 1117-1119, Table 136.1)
4. Changes in EEG during different stages of sleep (TMP 682) (GKP 1116-1117)
5. Alpha block (TMP 680) (GKP 1116)

Give Reason

1. REM sleep is called paradoxical sleep [difficult to arouse the person despite having desynchronized EEG characteristic of alert, awake state] (TMP 682) (GKP 1119)

HIGHER FUNCTIONS OF BRAIN

Short Notes

1. Conditioned reflex (TMP 689) (GKP 1136-1137)
2. Differences between conditioned and unconditioned reflex (TMP 691, Table 87.1)
3. Mechanism of long term memory (TMP 692) (GKP 1139)
4. Speech abnormalities - define & classify aphasia; three differences between aphasia & dysarthria (TMP 694-695) (GKP 1144-1145)

CIPHERS

VESTIBULAR APPARATUS

- **UTRICLE & SACCULE (MACULA):** Linear acceleration
- **SEMICIRCULAR CANALS (CRISTAE):** Rotational acceleration
- **BALANCING TEST:** Test for utricle, saccule
- **TEST FOR SEMICIRCULAR CANALS:** Revolving chair test/Barany test; Calorie test/ice water test
- **MANIERE'S DISEASE:** Vestibular dysfunction with progressive hearing loss

POSTURE AND EQUILIBRIUM

- **STRETCH REFLEX:** Major reflex involved in maintenance of posture
Receptor involved: Muscle spindle
- **ANTIGRAVITY MUSCLES:** Flexors of Upper limb & Extensors of Lower limb

CEREBROSPINAL FLUID

Short Notes

1. CSF - formation, circulation, absorption (TMP 698-699) (GKP 1156-1157)
2. Blood brain barrier & blood-CSF barrier (TMP 700-701) (GKP 1160)

Give Reason

1. Fundus of eye is examined when raised intracranial tension is suspected (TMP 701) (GKP 1159)

SPECIAL SENSES

VISION

Essay

1. Visual pathway, effects of lesions at various levels, diagram (TMP 729-733, Fig 89.32, 89.35) (GKP 1181, Fig 145.1)

Short Notes

1. Aqueous humour, interocular pressure, applied - glaucoma (TMP 706-707) (GKP 1168)
2. Near response or near reflex or accommodation reflex (TMP 712, Fig 89.10) (GKP 1174)
3. Refractory errors of eye (TMP 713-714, Fig 89.11-89.13) (GKP 1175, Fig 143.4)
4. Field of vision and perimetry (TMP 716) (GKP 1189)
5. Binocular vision and its advantage (TMP 717, Fig 89.19) (GKP 1189)
6. Structure of rods and cones (TMP 719, Fig 89.21) (GKP 1177, Fig 144.1)
7. Differences between rods and cones (TMP Table 89.3)
8. Light and dark adaptation (TMP 725, Fig 89.27) (GKP 1190-1191, Fig 146.3)
9. Macular sparing (TMP 730) (GKP 1190)
10. Pupillary light reflex - direct and indirect (TMP 734, Fig 89.36) (GKP 1191, flow chart 146.1, 146.2)
11. Lateral inhibition (TMP 727, Fig 89.30)
12. Phototransmission in rods and cones (TMP 722) (GKP 1178) (GNG Fig 9-9)
13. Theories of colour vision (TMP 736-738, Fig 89.37-89.38) (GKP 1194-1195, Fig 147.1)
14. Tests for colour vision and colour blindness (TMP 738-739) (GKP 1195-1196)
15. Refractive power (TMP 709) (GKP 1173)
16. Blind spot, fovea centralis and macula (TMP 705, 716) (GKP 1170, 1190)
17. Electroretinogram - waves and interpretation with diagram (TMP 728, Fig 89.31) (GKP 1200, Fig 148.3)

Give Reason

1. Corneal transparency (TMP 704)
2. Presbyopia is specific to old age group [loss of elasticity of lens due to progressive denaturation of lens proteins as age advances] (TMP 714) (GKP 1176)
3. Cataract occurs at an earlier age in diabetes mellitus [glucose acts on lens proteins making it easily coagulable by light] (TMP 715)
4. Maximum visual acuity at fovea (TMP 721) (GKP 1170)
5. Consensual light reflex [partial decussation of fibres from pretectal nuclei in midbrain going to EWN; incomplete decussation of fibres at the optic chiasma] (TMP 734) (GKP 1191)

6. Bitemporal hemianopia in pituitary tumors [pressure on optic chiasma by enlarged pituitary damaging the nasal fibres of both eyes] (TMP 731) (GKP 1190)
7. Wearing of red goggles by aircraft pilots and radiologists while on duty in bright light [to reduces dark adaptation time] (TMP 725) (GKP 1191)
8. Macular sparing (TMP 731) (GKP 1190)
9. Three primary colours are responsible for perception of all colours [mixing of primary colours in different proportions] (TMP 735) (GKP 1194)
10. Pupillary light reflex is sluggish or lost in increased ICT [damage to pretectal nucleus] (TMP 732, Table 89.6)

DIAGRAMS

1. Structure of rods and cones (TMP Fig 89.21) (GNG Fig 9-5)
2. Visual pathway, pupillary light reflex (TMP Fig 89.35) (GNG Fig 9-14)
3. Dark adaptation curve (TMP Fig 89.27)
4. Electroretinogram (TMP Fig 89.31) (GNG Fig 9-6)
5. Lateral inhibition in retina (TMP 89.30)
6. Absorption spectra of cones (TMP Fig 89.26)
7. Spectral sensitivity curve (TMP Fig 89.25)

MNEMONICS	Argyll-Robertson Pupil (ARP-PRA)	Accommodation Reflex (3Cs)
	Accommodation Reflex Present Pupillary Reflex Absent	Convergence of eyeball, Constriction of pupil, increase in anterior Curvature of lens

AUDITION

Essay

1. Physiology of Hearing; describe the role of basilar membrane in hearing (TMP 747-750, Fig 90.7) (GKP 1205-1206, 1211-1214 Fig 149.6)

Short Notes

1. Functions of middle ear - impedance matching, attenuation of loud sound, equalization of pressure (TMP 745-746) (GKP 1204, Box 149.3)
2. Middle ear muscles - functions, tympanic reflex (TMP 744, Fig 90.3) (GKP 1204, Box 149.1)
3. Organ of Corti (TMP 747-748, Fig 90.6) (GKP 1206, Fig 149.5)
4. Differences between outer and inner hair cells (TMP Table 90.2) (GKP 1206)
5. Theories of audition (TMP 751) (GNG Fig 10-11)
6. Auditory pathway (TMP 753-754, Fig 90.12) (GKP 1208-1210, Fig 150.1)
7. Cochlear microphonics (TMP 755-756) (GKP 1215)
8. Types of deafness and their characteristic features (TMP 756-757) (GKP 1217-1218)
9. Tests to distinguish between nerve-deafness and conduction-deafness - Weber's, Rinne's and Schwabach's tests (TMP 757) (GKP 1218)
10. Audiometry (TMP 758-760, Fig 90.14-90.17) (GKP 1219)

Give Reason

1. In Weber's test, the sound is lateralized to the side with conduction deafness [masking effect of environmental noise is reduced on the affected side] (TMP 757) (GKP 1218-1219)
2. In conditions like common cold, there is pain in the ear and partial deafness [obliteration of nasopharyngeal opening of eustachian tube due to inflammation & swelling of mucosa - O₂ is trapped in the middle ear cavity - fall in pressure - retraction of tympanic membrane] (TMP 745) (GKP 1204, Box 149.2)

DIAGRAMS

1. Structure of Organ of Corti (TMP Fig 90.6) (GNG Fig 10-4)
2. Auditory pathway (TMP Fig 90.12) (GNG Fig 10-12)
3. Audibility curve (TMP Fig 90.14) (GNG Fig 10-9)
4. Audiogram - normal, conduction and nerve deafness (TMP Fig 90.15-90.17)

GUSTATION

Short Notes

1. Gustatory pathway with diagram (TMP 762, Fig 91.2) (GKP 1225, Fig 154.2)
2. Structure of taste bud with diagram (TMP 761, Fig 91.1)
3. Basic taste modalities (TMP 762-763, Table 91.2) (GKP 1225-1226)
4. Abnormalities of taste sensation - ageusia, hypogeusia, dysgeusia, parageusia (TMP 763-764) (GKP 1228)

OLFACTION

Short Notes

1. Structure of olfactory epithelium - esp. olfactory receptors (TMP 765-766) (GKP 1220)
2. Olfactory pathway- with diagram (TMP 766-767, Fig 92.1-92.2) (GKP 1221, Fig 153.2-153.3)
3. Abnormalities in the sense of smell - anosmia, parosmia, hyposmia, hyperosmia (TMP 769) (GKP 1223)

DIAGRAMS

1. Taste pathway (TMP Fig 91.2) (GNG Fig 11-6)
2. Olfactory pathway (TMP Fig 92.1-92.2) (GNG Fig 11-3)

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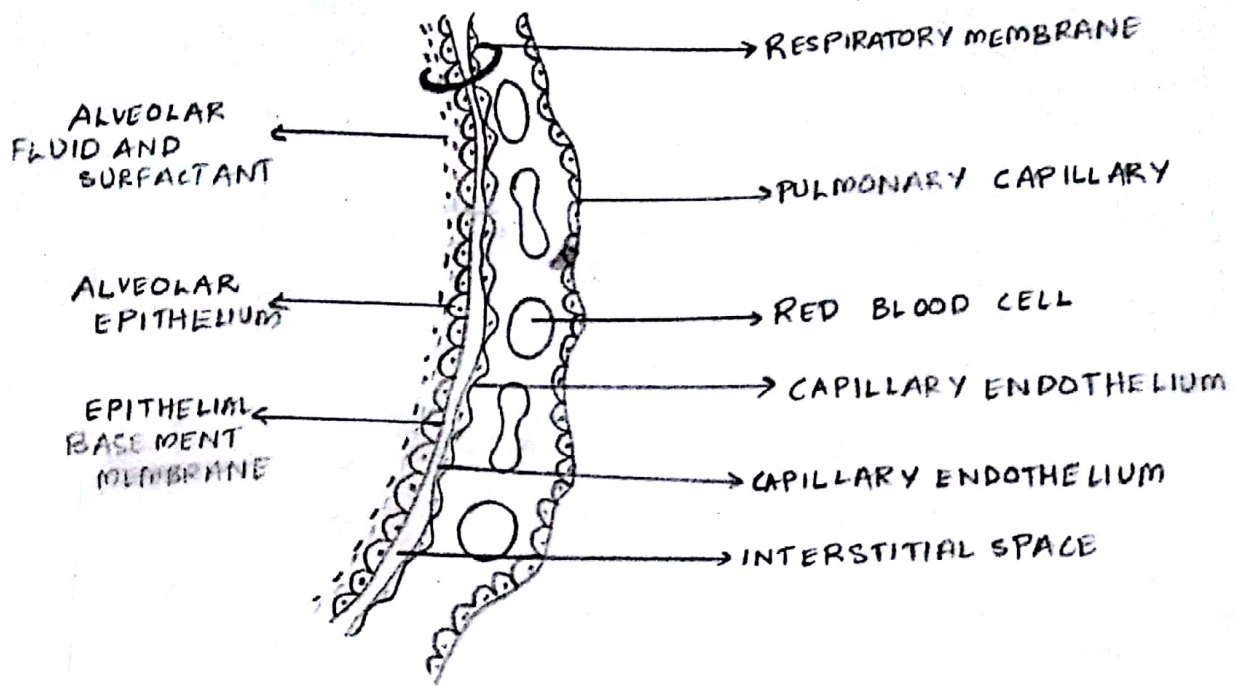
(R)2441912

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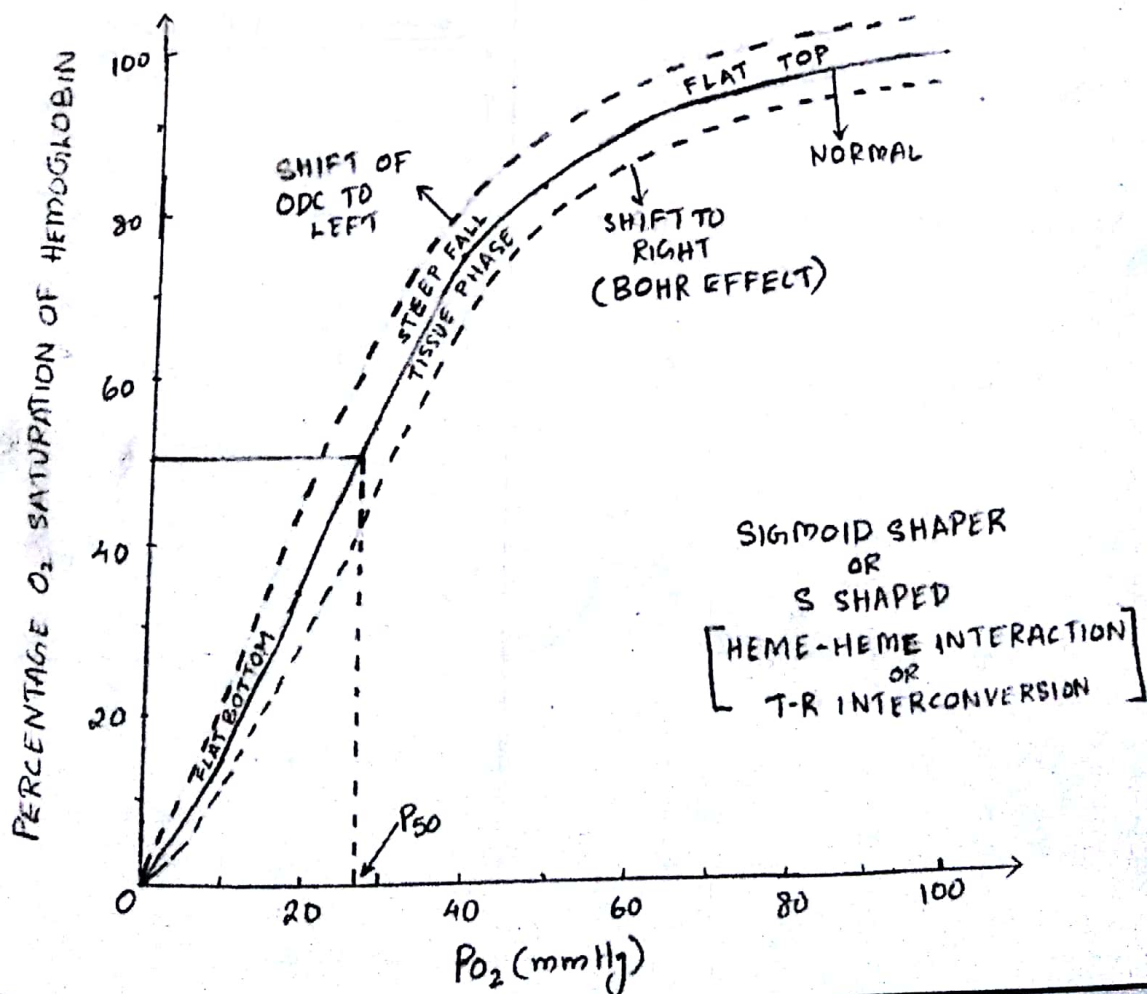
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Dealers in : Surgical, Medical, Dental, Ortho., X-ray,
chemicals & Laboratory Equipments, Mfg. of all kinds of hospital furniture
repairs and services undertaken

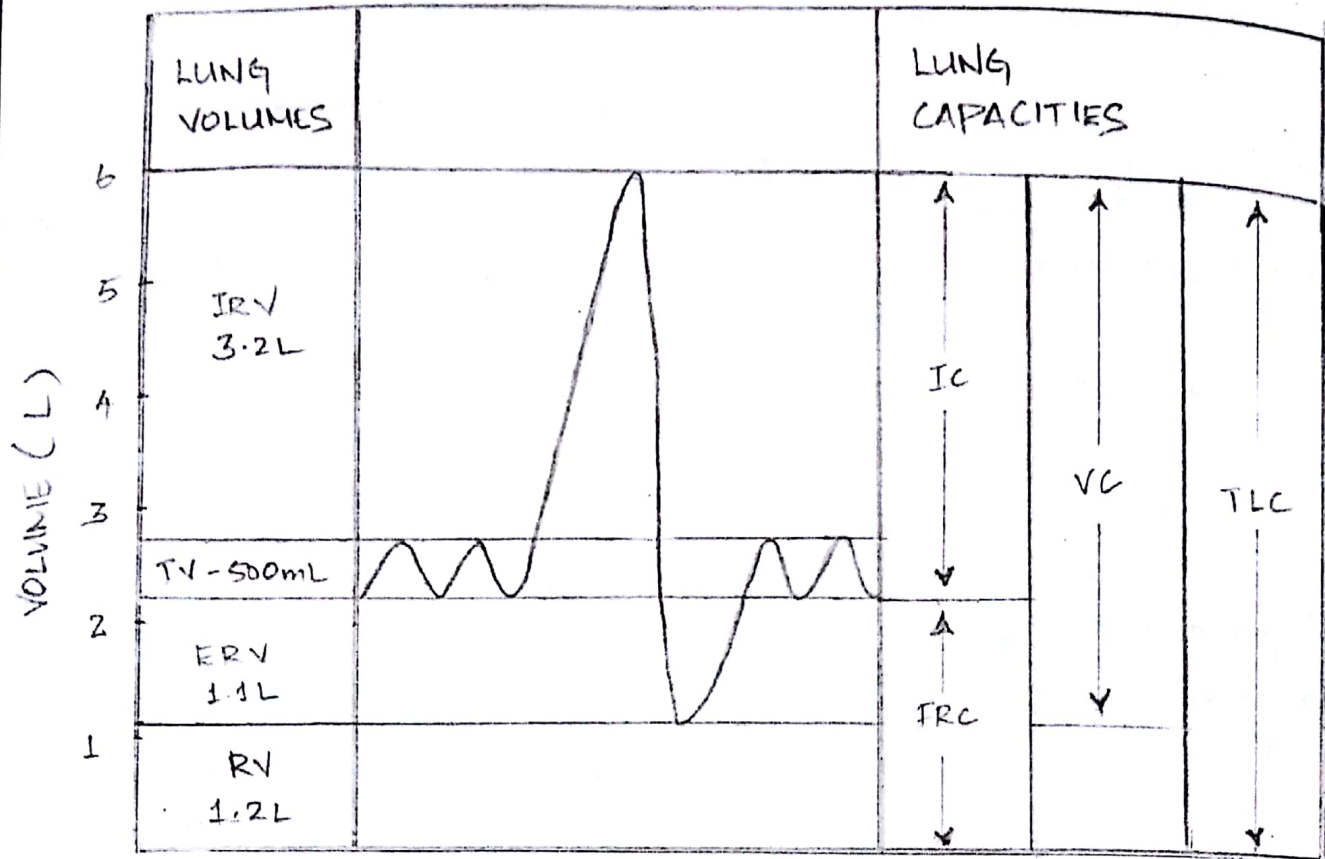
Rehabilitations Aids for the handicapped



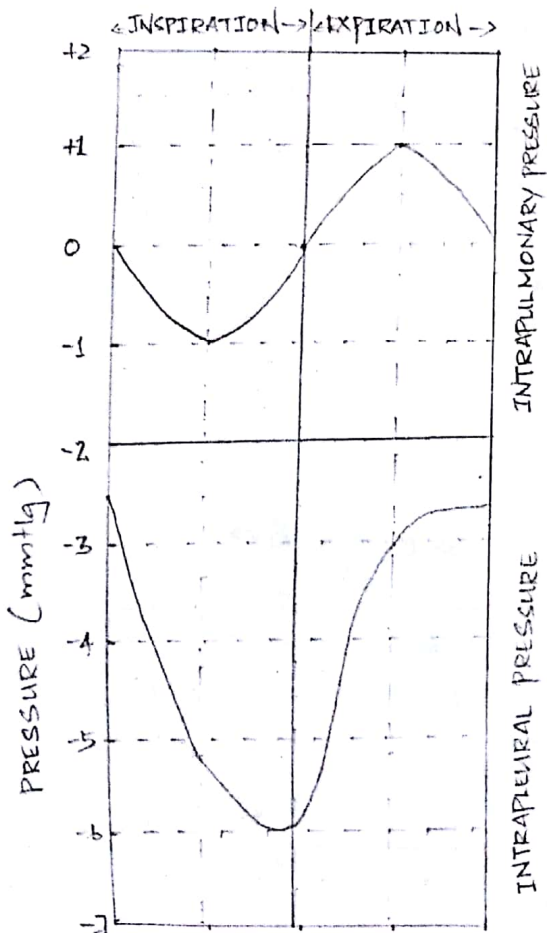
RESPIRATORY MEMBRANE



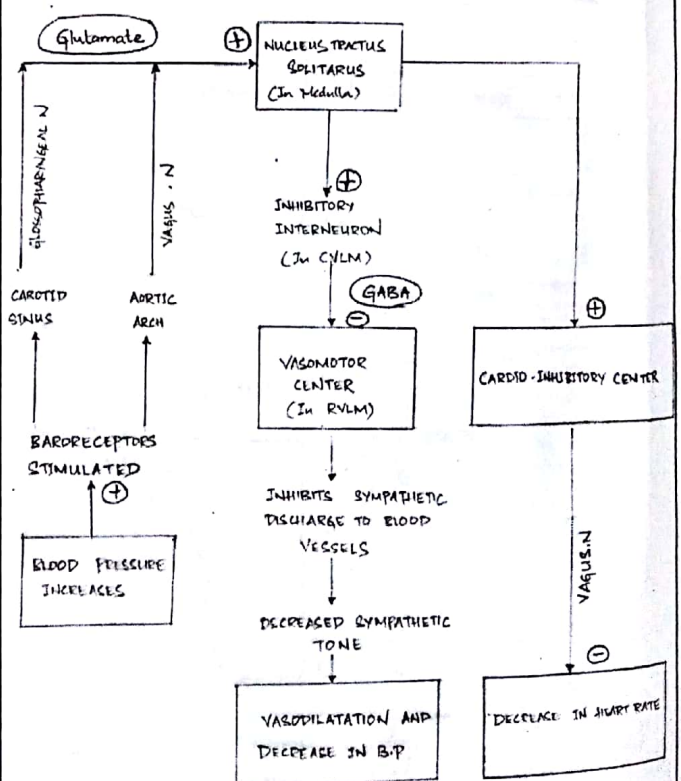
OXYGEN DISSOCIATION CURVE



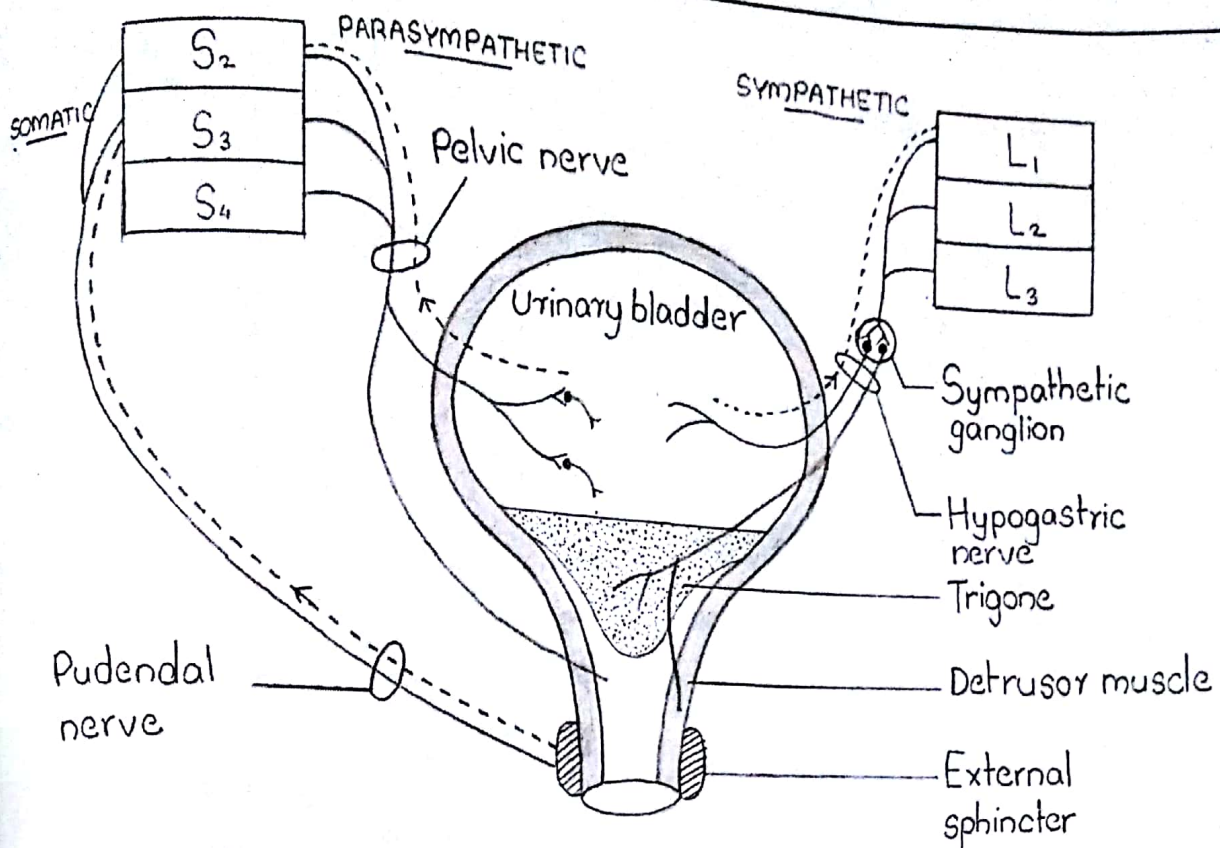
SPIROGRAM



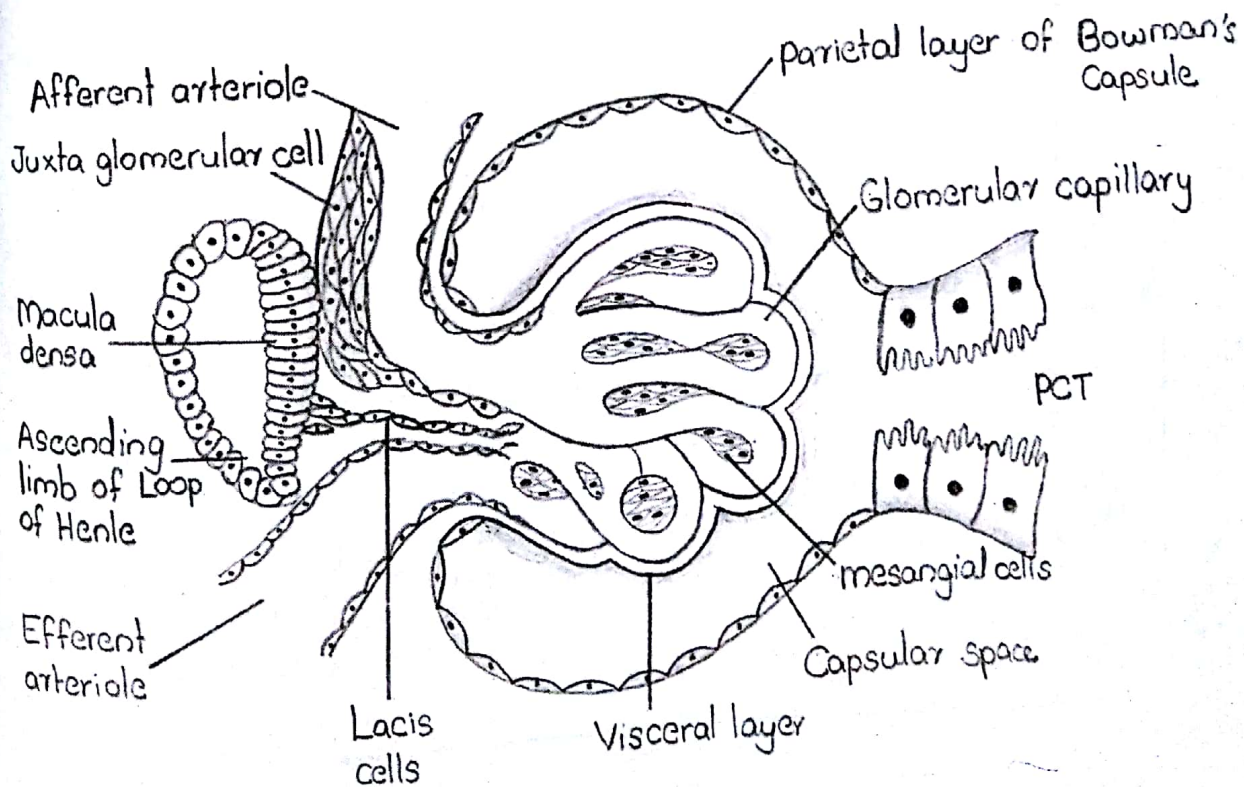
INTRAPULMONARY & INTRAPLEURAL PR.



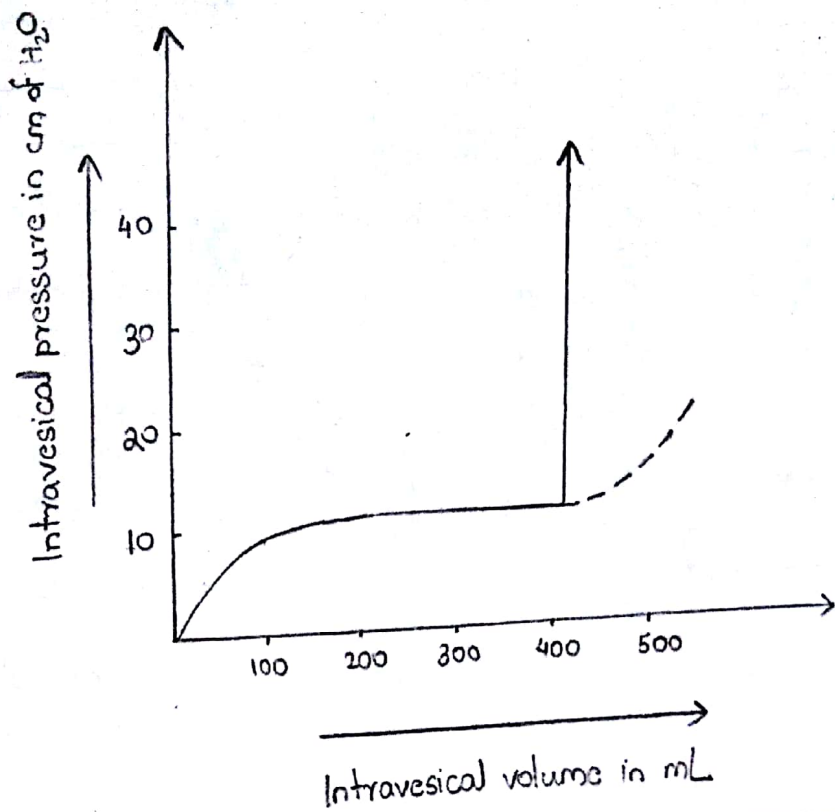
SINOARTIC REFLEX-



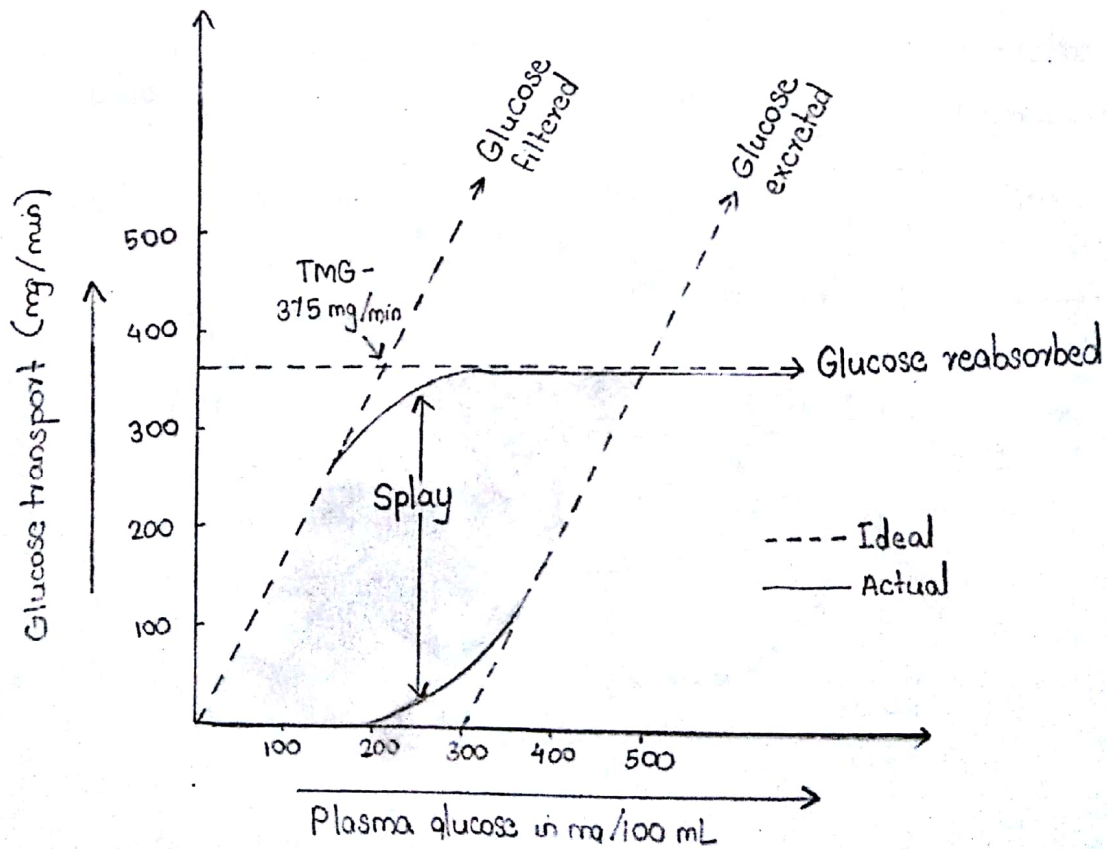
INNERVATION OF URINARY BLADDER



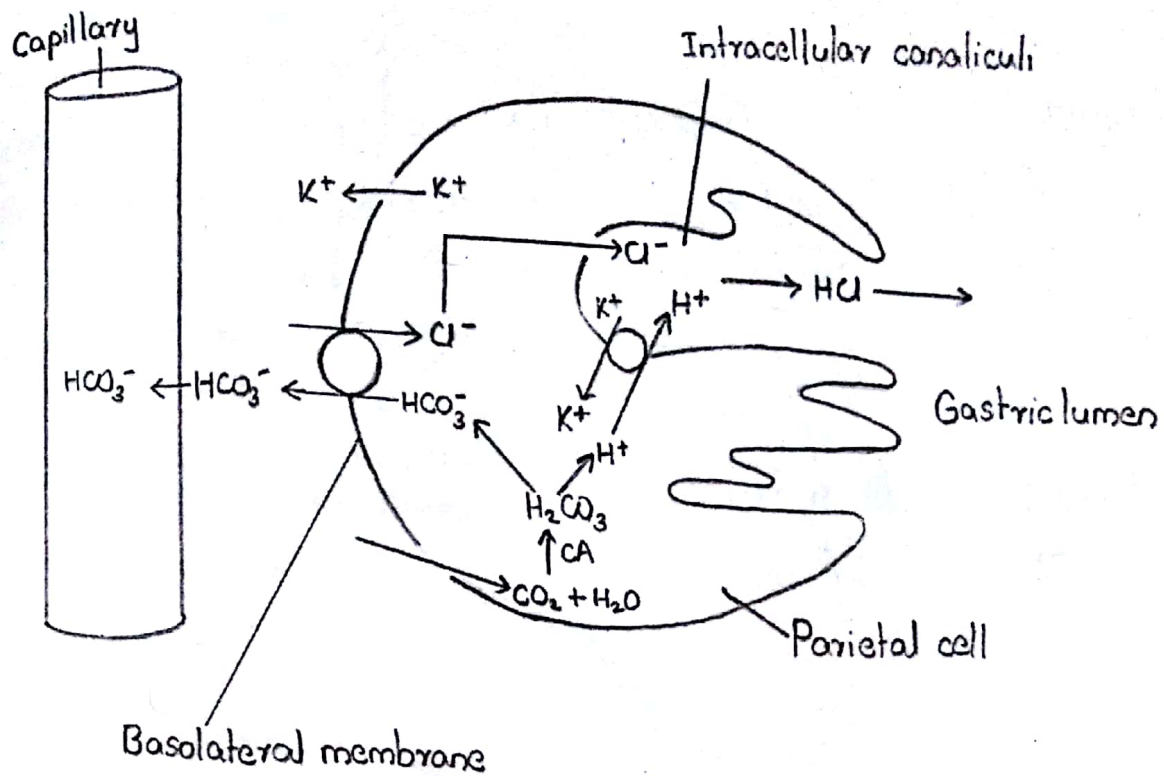
JUXTA GLOMERULAR APPARATUS



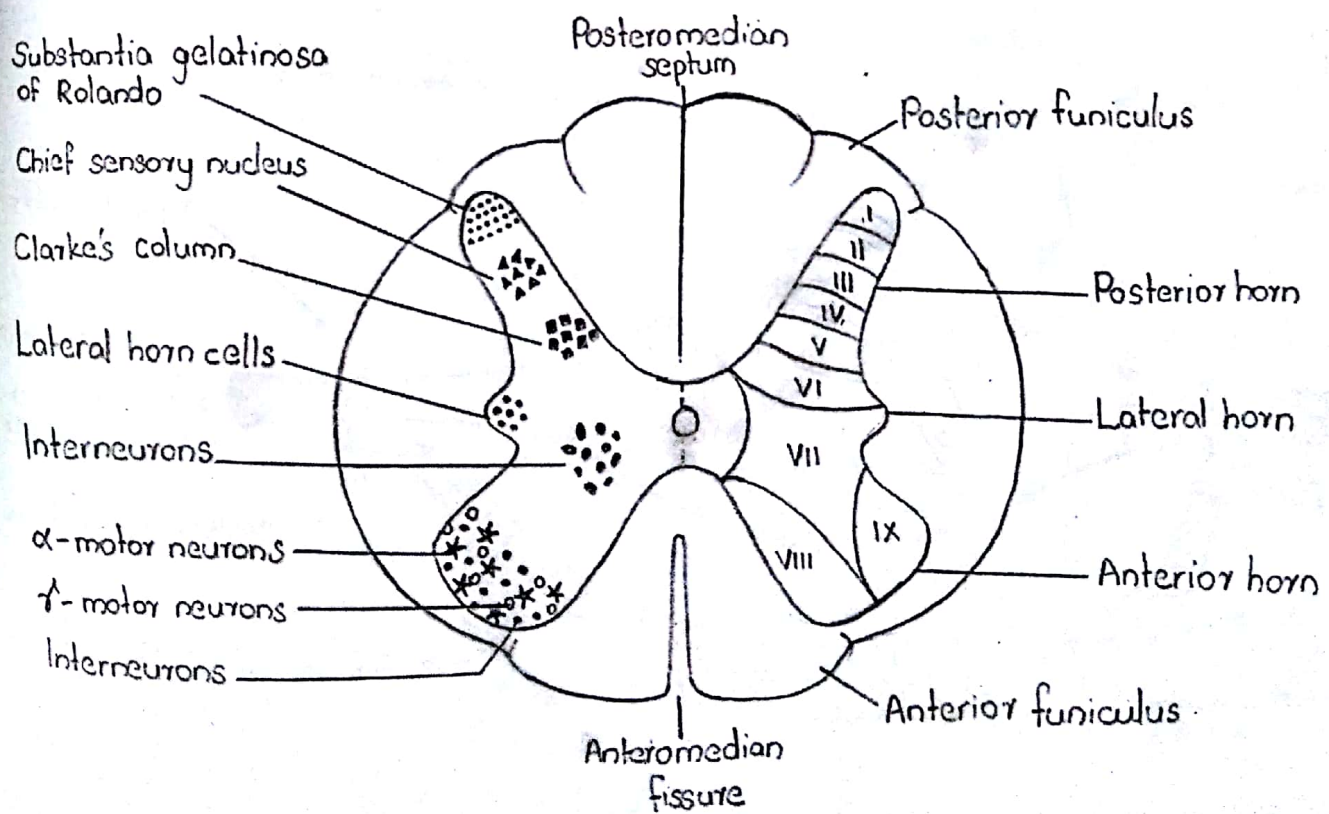
CYSTOMETROGRAM



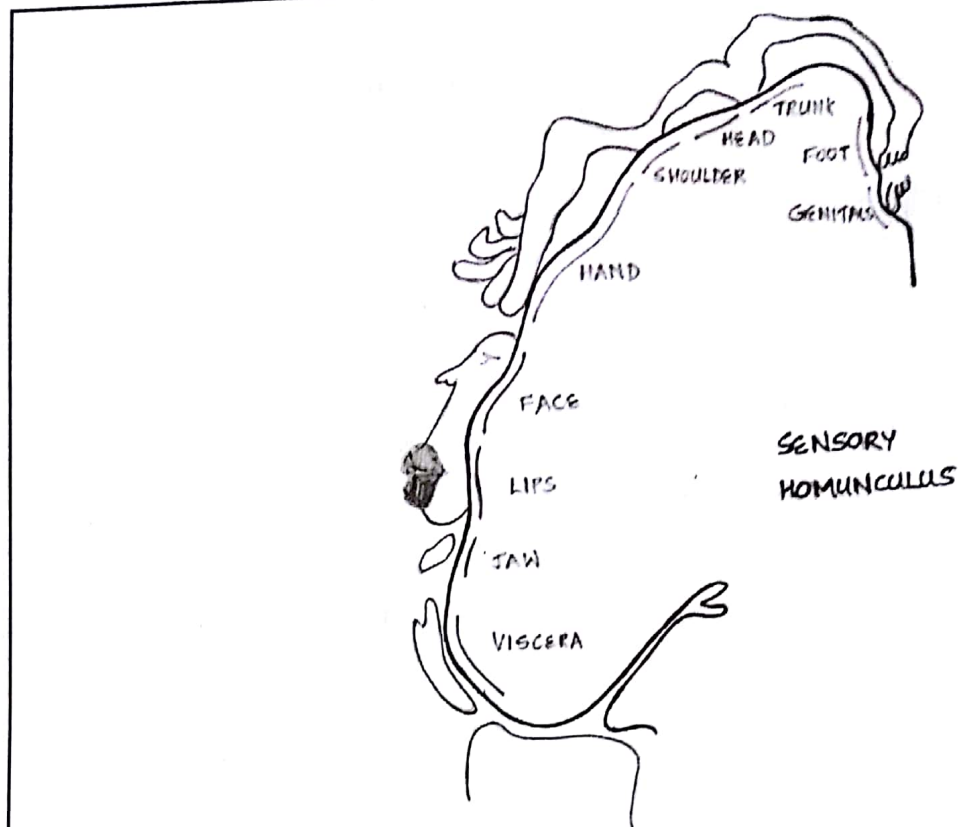
SPLAY



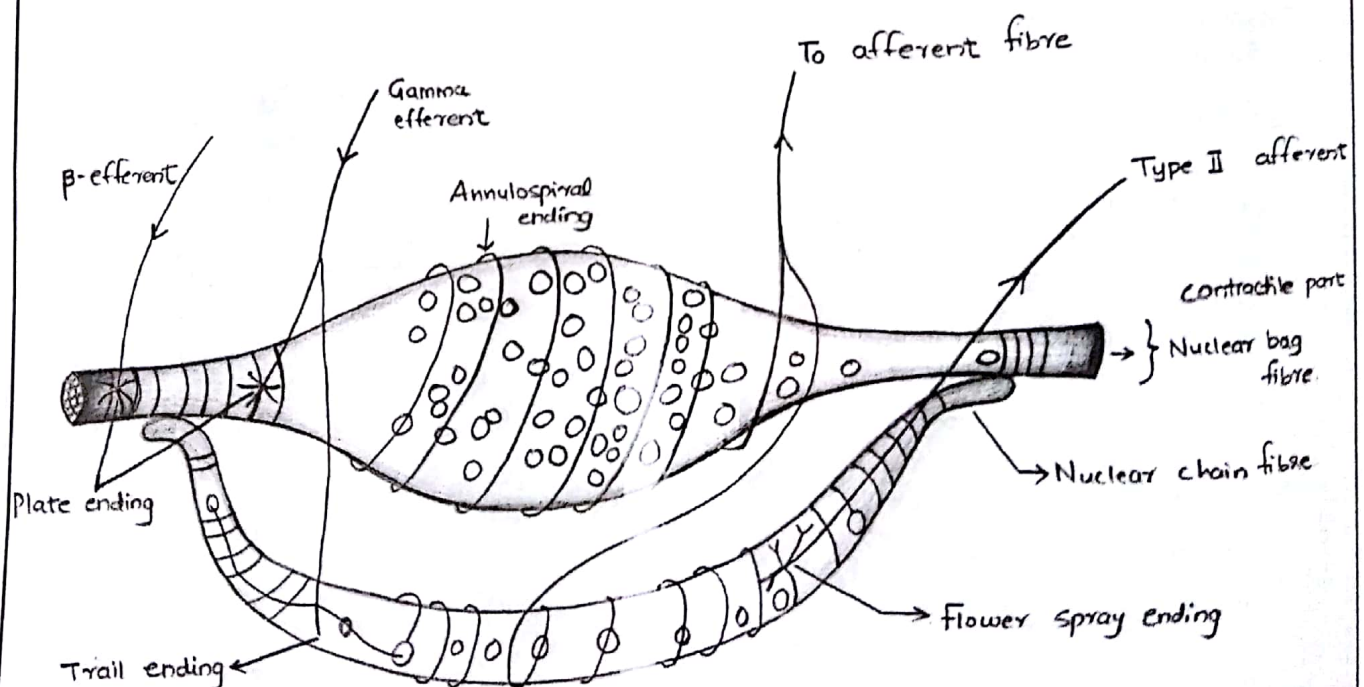
MECHANISM OF HCl SECRETION



NUCLEI & LAMINAE IN GRAY MATTER OF SPINAL CORD



SENSORY HOMUNCULUS



MUSCLE SPINDLE

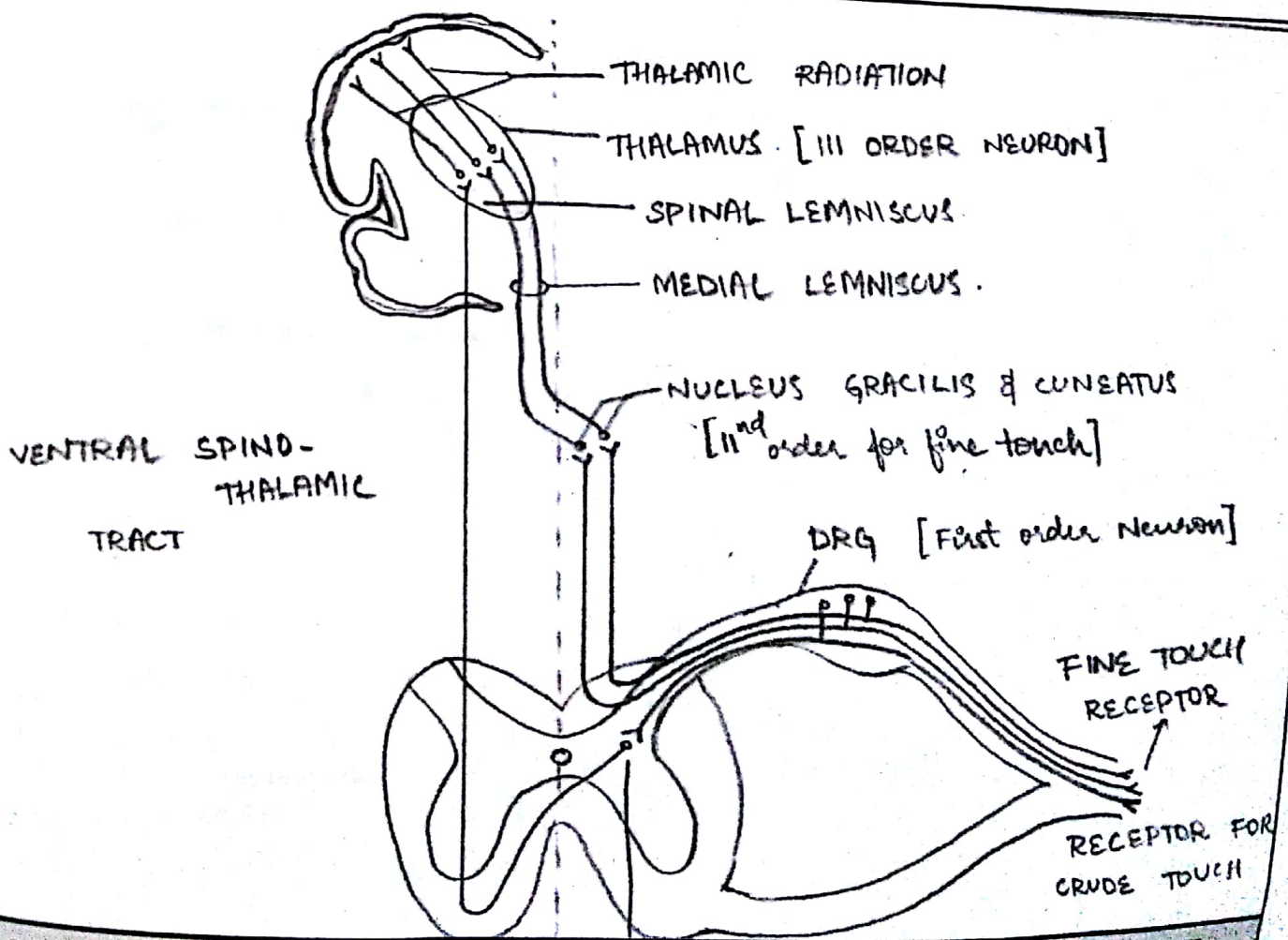
POST CENTRAL
GYRUS

POSTERO-VENTRAL NUCLEUS
OF THALAMUS

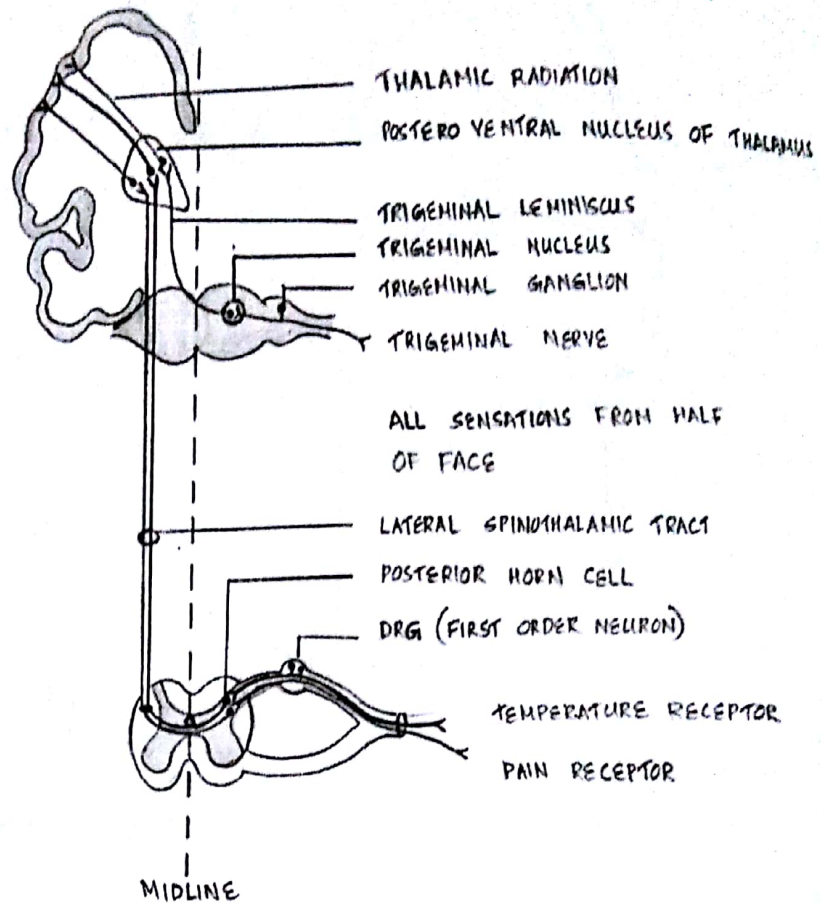
TRIGEMINAL GANGLION

MIDLINE

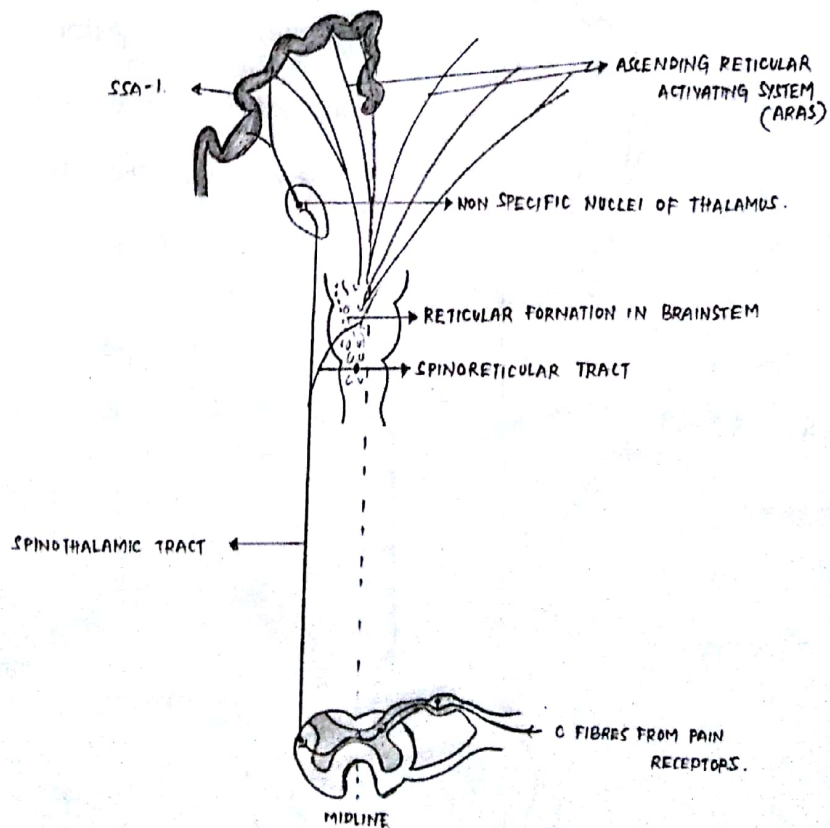
PATHWAY FOR ALL CONSCIOUS SENSATIONS FROM FACE



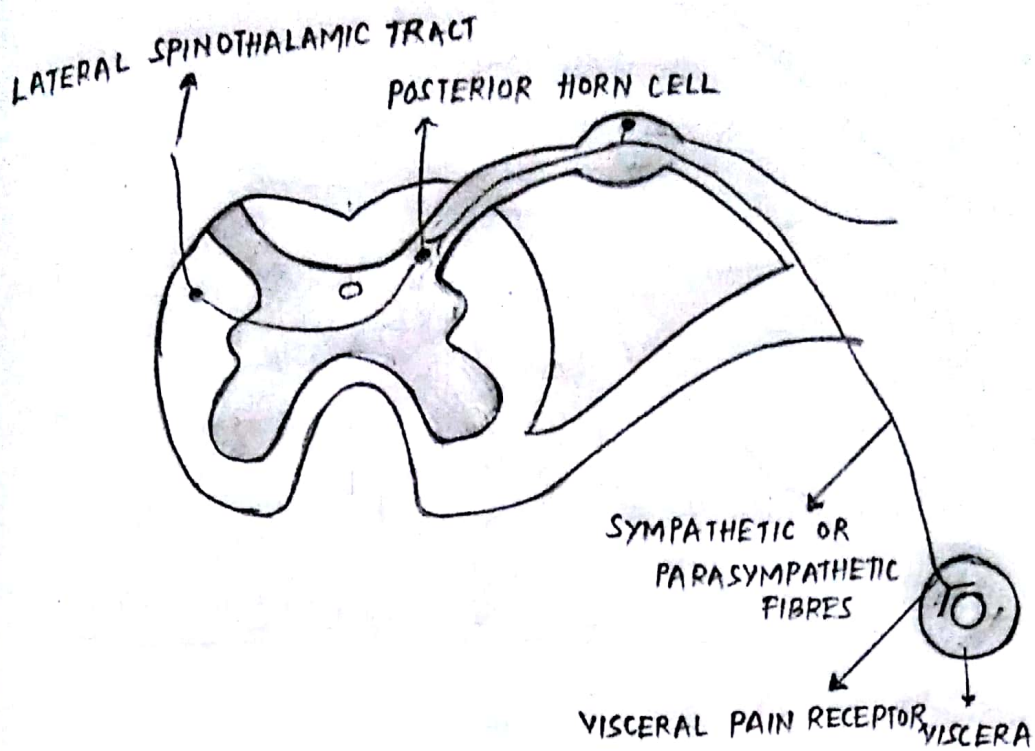
DORSAL COLUMN PATHWAY (FINE TOUCH) & VENTRAL SPINOTHALAMIC TRACT



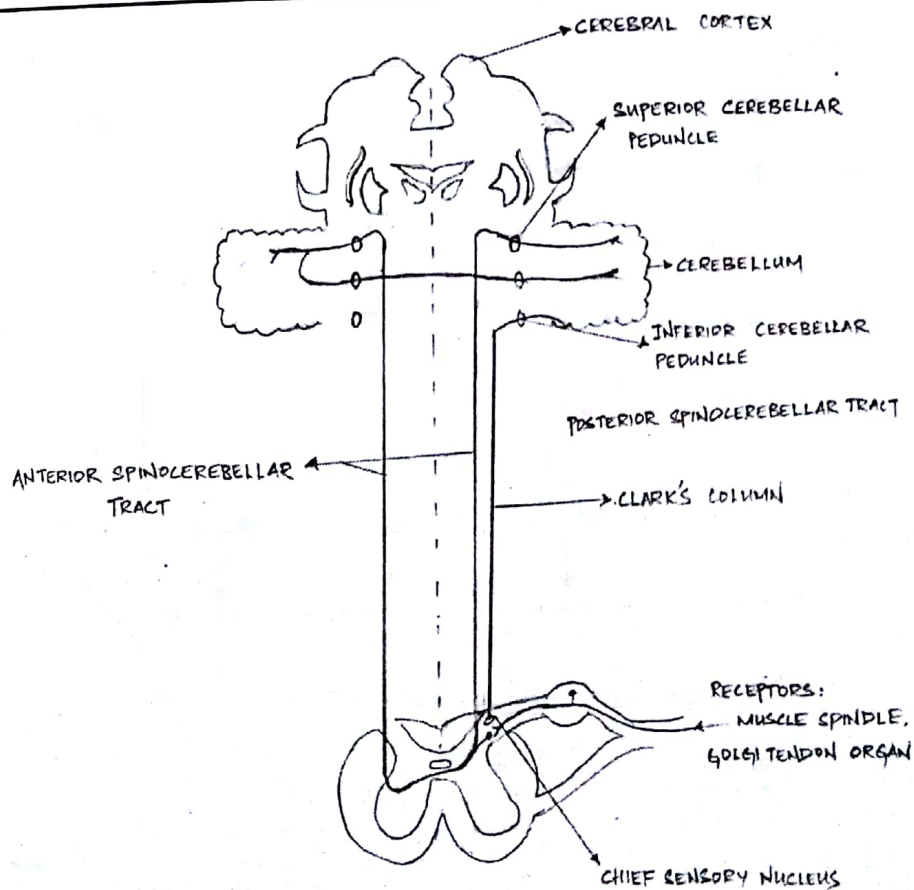
PAIN & TEMPERATURE PATHWAY



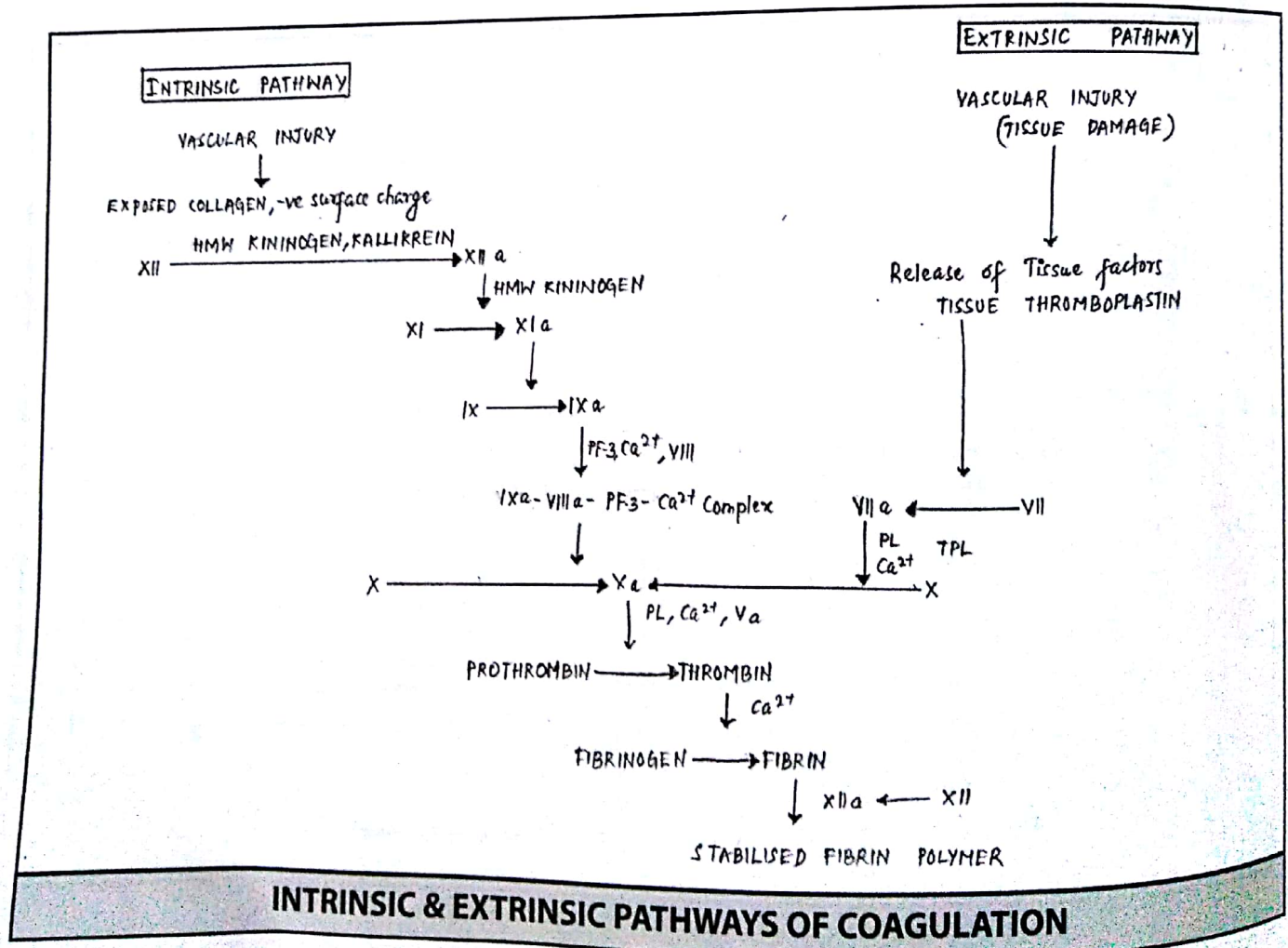
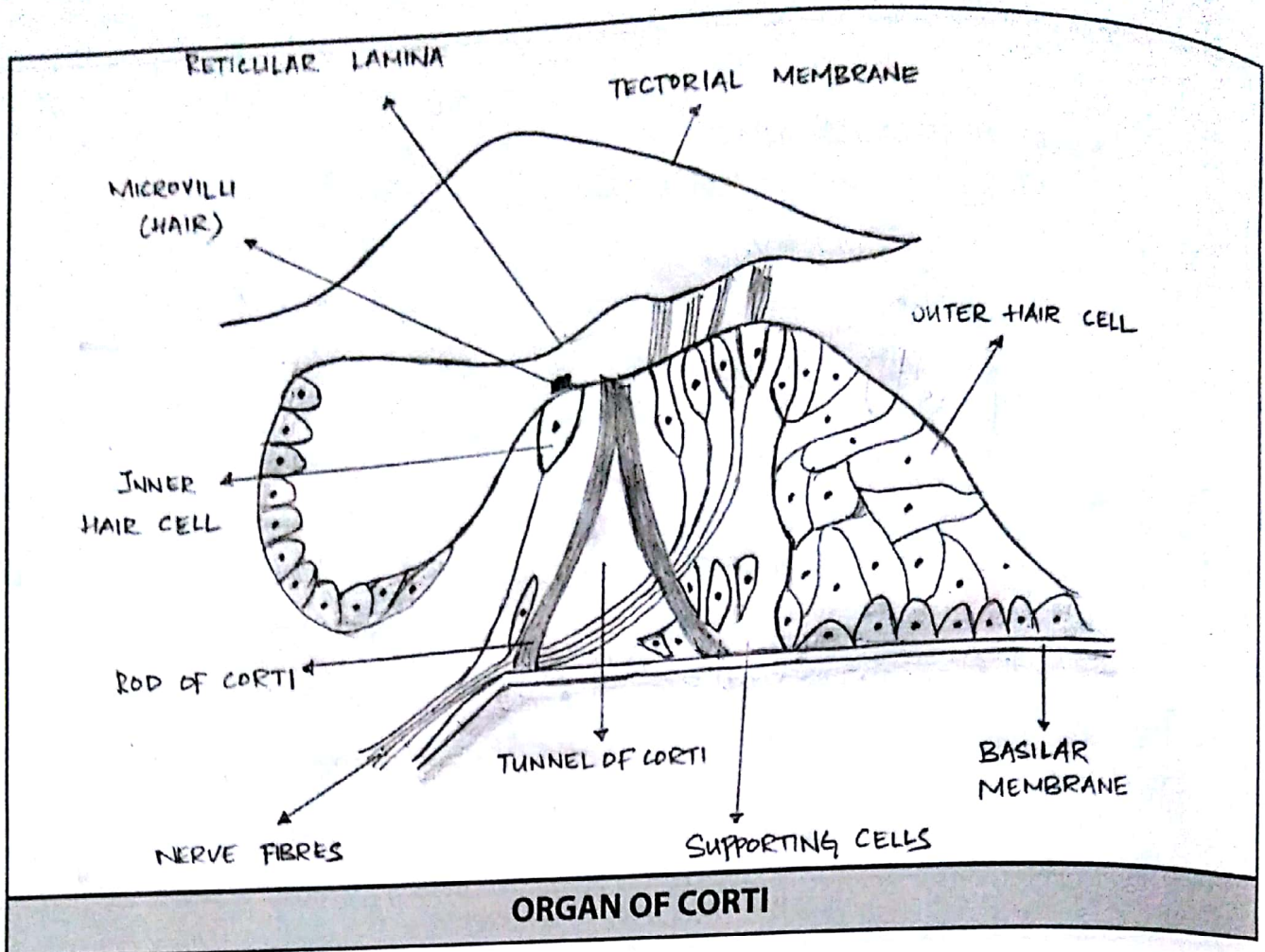
SLOW PAIN PATHWAY

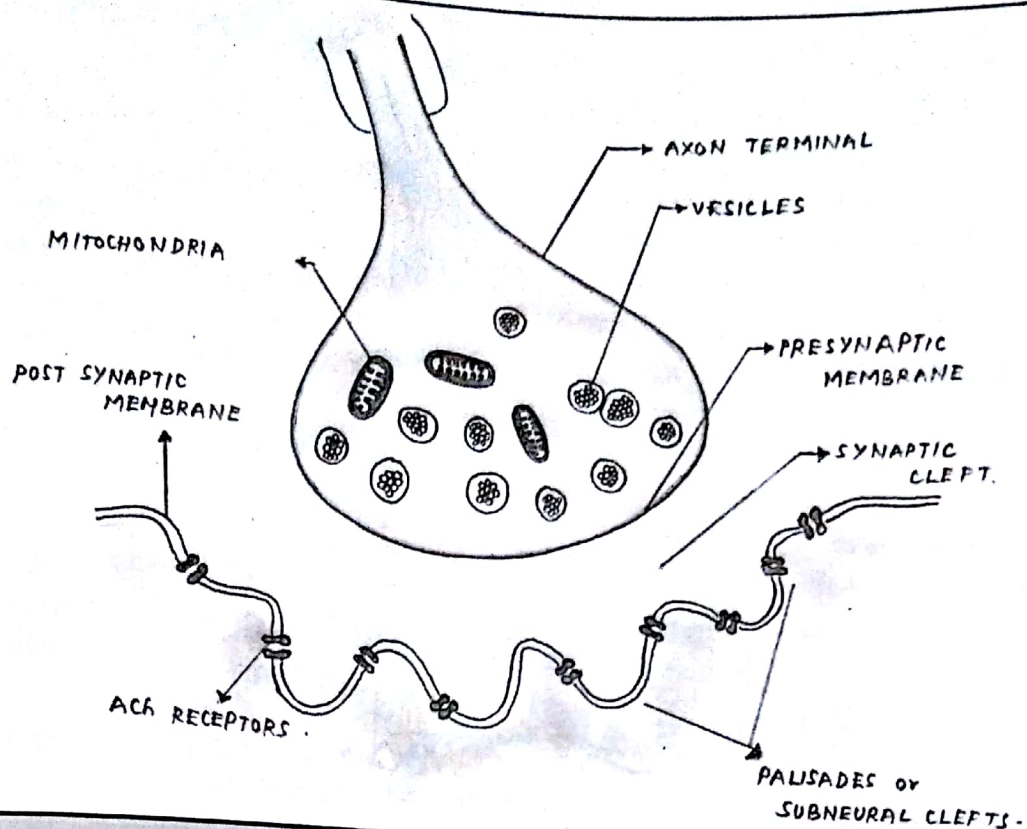


VISCERAL PAIN PATHWAY

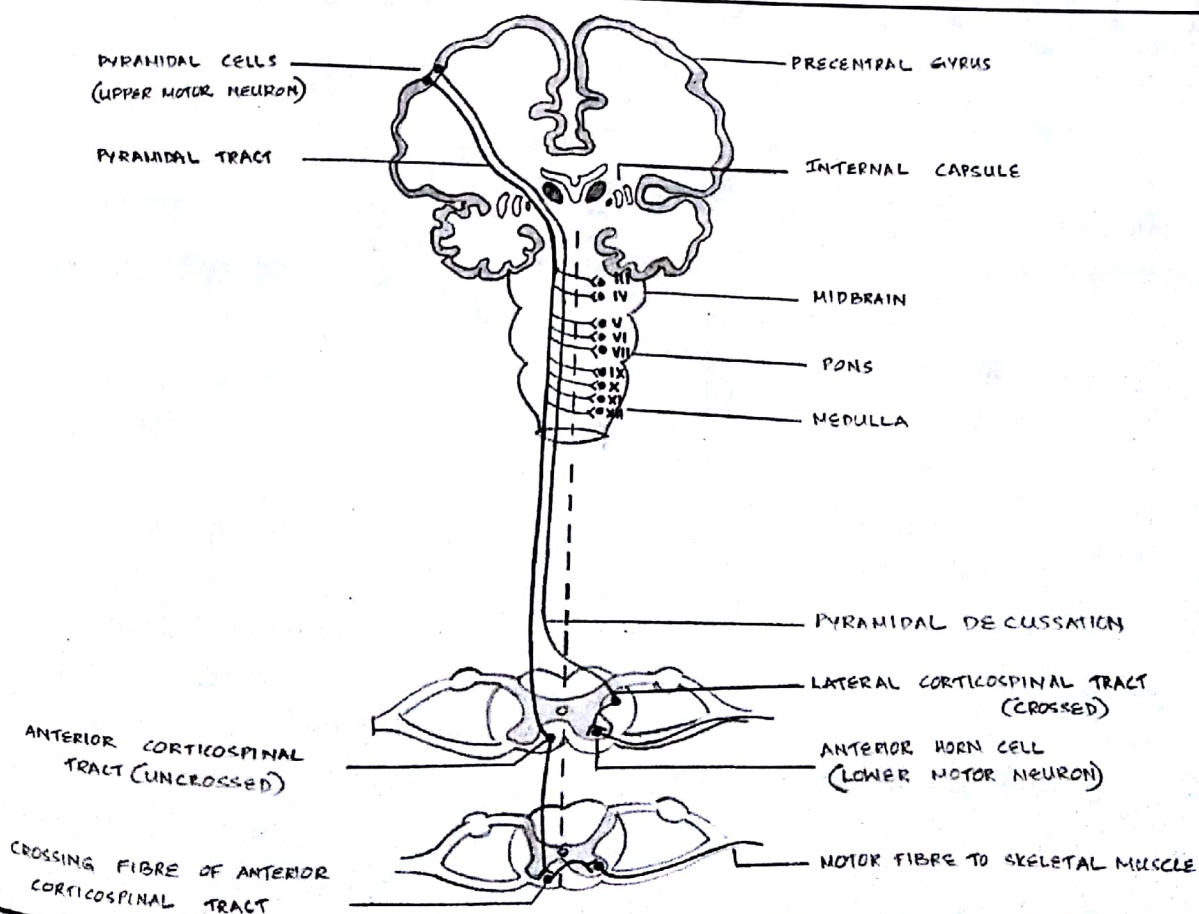


PATHWAY FOR UNCONSCIOUS PROPRIOCEPTION





NEUROMUSCULAR JUNCTION



PYRAMIDAL TRACT

ENDOCRINOLOGY

INTRODUCTION

Short Notes

1. Mechanism of cellular action of hormones (TMP 430-433) (GKP 436-437)
2. Up-regulation & down-regulation of receptors (TMP 430) (GKP 442)
3. Second messengers (TMP 430-433, Fig 53.2-53.3) (GKP 444-448)
4. Feedback mechanisms involved in control of hormone secretion with examples (TMP 434-436, Fig 53.5-53.7) (GKP 434-435)
5. Paracrine & autocrine secretions (TMP 428, Fig 53.1)

PITUITARY GLAND

Essay

1. Growth hormone (TMP 443-447) (GKP 461-468)
 - Structure, secretions & transport
 - Physiological actions on growth and metabolism
 - Regulation
 - Abnormalities - acromegaly, gigantism, dwarfism

Short Notes

1. Acromegaly (TMP 446) (GKP 461-467) ; Gigantism (TMP 446) ; Dwarfism (TMP 447)(GKP 467)
2. Somatomedins - role in growth, factors influencing secretion of somatomedins, Lorain dwarfism (TMP 443, 447) (GKP 466)
3. Regulation of and factors affecting growth hormone secretion; hypothalamo-hypophyseal axis (TMP 444-445, 451) (GKP 462-463, 457)

4. ADH - source, action, receptors, regulation & abnormalities in secretion (TMP 453-455) (GKP 475-479)
5. Oxytocin - source, actions, stimulus for secretion, suckling reflex (TMP 455-456) (GKP 479-480)
6. Neuroendocrine reflexes - action of MSH, milk ejection reflex, melatonin secretion, parturition reflex (TMP 455-456, Fig 54.12) (GKP 479-480)
7. Normal physiology of growth - role of hormones (TMP 447-449) (GKP 1046-1047) (GNG Fig 18-09)
8. Role of growth hormone in somatic growth, mechanism of growth promoting action of growth hormone (TMP 443-444) (GKP 463-464)
9. Prolactin - actions, factors affecting its secretion and applied physiology (TMP 468-470)
10. Panhypopituitarism (TMP 453)

Give Reason

1. Visual disturbances in gigantism [compression of optic chiasma by enlarged pituitary gland - Bitemporal Hemianopia] (TMP 446)
2. V2 receptor mutation results in diabetes insipidus [V2 receptor present on the DCT cells of renal tubule is the way through which ADH exerts antidiuretic action - so absence of V2 - diuresis occurs - DI] (TMP 454-455) (GKP 478)
3. Prolactin cannot initiate lactation during pregnancy [Pregnancy - high serum levels of estrogen & progesterone - inhibitory to prolactin action; after delivery - estrogen & progesterone levels fall - prolactin initiates lactation] (TMP 450)
4. Excess GH secretion in adult does not cause increased stature [In adults all the epiphyseal plates of long bones are fused - thus GH acts on these membranous bones and promote only their thickening and not their length] (TMP 446) (GKP 466)
5. Hyperprolactinemia leads to hypogonadism in males [Hyperprolactinemia - decreased levels of LH & FSH, which are important for the normal development of primary sex organs & spermatogenesis] (TMP 451) (GKP 469)

DIAGRAMS

1. Feedback control of growth hormone (GNG Fig 18-6)
2. Growth of different tissues at various ages as a percentage of size at age 20 (GNG Fig 18-8)
3. Relative importance of hormones in human growth at various ages (GNG Fig 18-9)
4. Neuroendocrine reflex (TMP Fig 54.12)

PINEAL GLAND

Short Notes

1. Regulation of melatonin secretion - retinohypothalamic tract (TMP 458, Fig 55.3) (GKP 567-568)
2. Functions of melatonin (TMP 459) (GKP 568)

Give Reason

1. Puberty is delayed in blind girls (TMP 459)(GKP 568)
2. Pineal activity exhibits a circadian rhythm (TMP 458)(GKP 567)

DIAGRAMS

1. Synthesis of melatonin (TMP 458 Fig 55.2)(GKP 63.1)

2. Regulation of melatonin secretion (TMP 458 Fig 55.3)
3. Circadian rhythm in melatonin secretion (TMP 458 Fig 55.4)

THYROID GLAND

Essays

1. Thyroid hormones (TMP 461-468) (GKP 481-492)
 - synthesis
 - actions in general metabolism, special metabolisms, role in growth and differentiation, systemic actions
 - regulation of secretion
2. Diseases of thyroid gland (TMP 468-471) (GKP 492-495)
 - simple goitre
 - hypothyroidism (cretinism and myxedema)
 - hyperthyroidism (Grave's disease)

Short Notes

1. Synthesis and secretion of thyroid hormones; NIS, thyroglobulin (TMP 461-463) (GKP 483-485)
2. Mechanism of action of thyroxine (TMP 466) (GKP 485-486)
3. Calorigenic action of thyroid hormones (TMP 464) (GKP 489)
4. Regulation of secretion of thyroid hormones - Wolff-Chaikoff effect, Jod-Basedow effect (TMP 466-467, 471) (GKP 487-488)
5. Thyroid function tests (TMP 467-468) (GKP 495-496)
6. Cretinism - causes, features, differences between cretin & pituitary dwarf (TMP 469) (GKP 495)
7. Clinical features of hyperthyroidism (TMP 468-470) (GKP 492-494)

Give Reason

1. T₃ is more active than T₄ (TMP 463) (GKP 485-486)
2. Use of T₄ metabolite as cholesterol lowering agent [increases breakdown of cholesterol in liver, increases excretion of cholesterol in bile] (TMP 464-465)
3. Iodine preparation is given before thyroidectomy (TMP 471) (GKP 483)
4. Exophthalmos in Grave's disease [preadipocyte fibroblasts in the orbit contain TSH receptors] (TMP 470) (GKP 494)
5. Carotenemia in hypothyroidism [Thyroxine stimulates conversion of beta-carotene to vitA] (TMP 465-469)
6. Hoarseness of voice in hypothyroidism (GKP 494)
7. Cretins have short stature & mental defects (TMP 465-466, 469) (GKP 495)

DIAGRAMS

1. Regulation of thyroid hormone secretion (TMP 467 Fig 56.5)

ADRENAL GLAND

Essays

1. Cortisol (TMP 480-484) (GKP 512-522)
2. - synthesis, transport, regulation

3. - actions - metabolic, systemic, anti-inflammatory, anti-allergic, permissive actions, role in reactions to stress, adverse effects of long term therapy of cortisol
4. Cushing's syndrome (TMP 485-486) (GKP 520-521)
5. Aldosterone - source and functions, mechanism of action, regulation, abnormalities (TMP 486-489) (GKP 523-526)

Short Notes

1. Transport, metabolism and mechanism of action of glucocorticoids (TMP 480-481) (GKP 513)
2. Permissive action of glucocorticoids (TMP 483) (GKP 515)
3. Regulation of secretion of glucocorticoids (TMP 484-485, Fig 58.5)
4. Therapeutic uses of glucocorticoids (TMP 486)
5. Aldosterone escape (TMP 486-487) (GKP 524)
6. Regulation of secretion of aldosterone (TMP 487-488) (GKP 523-524)
7. Renin-angiotensin-aldosterone mechanism (TMP 488, Fig 58.7) (GKP 523, flowchart 59.10) (GNG Fig 20-23)
8. Primary hyperaldosteronism or Conn's syndrome; Secondary hyperaldosteronism (TMP 488) (GKP 524)
9. Adrenogenital syndrome (TMP 488-489) (GKP 526)
10. Congenital virilizing adrenal hyperplasia (TMP 489)
11. Primary adrenal insufficiency or Addison's disease, Addisonian crisis; Secondary adrenal insufficiency (TMP 489) (GKP 522)
12. Actions of catecholamines (TMP 492-493) (GKP 502-504)
13. Systemic actions of adrenaline and noradrenaline; differences in actions on CVS (TMP 493, Table 58.2)
14. Sympathoadrenal system - regulation of secretions of adrenal medulla; Fight or Flight response (TMP 494) (GKP 502-503)
15. Hormones produced during stress - adrenaline, glucocorticoids
16. Pheochromocytoma (TMP 494-495) (GKP 504)

Give Reason

1. Higher levels of aldosterone causes diuresis and natriuresis / no edema in Conn's syndrome [aldosterone escape] (TMP 486)
2. Purplish striae, truncal obesity and red cheeks are seen in Cushing's syndrome [Truncal obesity - redistribution of fat; Purplish striae - thinning of skin, rupture of collagen fibres, deposition of fat, blood vessels become prominent] (TMP 482-483)
3. Hyperpigmentation in aldosteronism [reduction in levels of adrenal steroids - reduction in feedback suppression of ACTH which has MSH-like activity]
4. Bilateral adrenalectomy results in death [Na⁺ and water loss - decrease in ECF - hypotension - dehydration - hyperkalemia - circulatory collapse - death]
5. Cushing's syndrome is not seen in pregnancy even though there is an increase in level of glucocorticoids [Estrogen - increased hepatic production of CBG - bound form is more than free form] (TMP 480)
6. Latent tetany in Conn's syndrome [Hypokalemia produces metabolic alkalosis & lowers plasma ionic calcium level]
7. Use of corticosteroids in chronic inflammatory diseases (TMP 484)
8. Hypotension in adrenocortical insufficiency [Hyponatremia - dehydration - decrease in blood volume,

vascular tone & cardiac output]

9. Hyperpigmentation in Addison's disease [Increase in ACTH which has MSH-like activity] (TMP 489)
10. Exaggerated CNS & CVS manifestations are seen in pheochromocytoma [Effects due to increase in adrenaline]
11. Administration of adrenaline causes adrenaline apnoea [Irradiation of impulses from VMC to respiratory centre]
12. Hyperglycemia in Cushing's syndrome (TMP 481) (GKP 514)

DIAGRAMS

1. Steps in the synthesis of adrenal cortical hormones (TMP 481 Fig 58.3)
2. Feedback control of secretion of cortisol and other glucocorticoids (GNG Fig 20-17)
3. Feedback mechanism regulating aldosterone secretion (GNG Fig 20-23)

CALCIUM METABOLISM

Essays

1. Regulation of Ca^{2+} level in the body (TMP 473-478, Fig 57.1) (GKP 547-548, 550, Fig 61.1, 61.2) (GNG Fig 21-3)
 - normal plasma calcium level
 - factors affecting ionization of calcium in the plasma
 - role of PTH, calcitonin & calcitriol in calcium homeostasis

Short Notes

1. Functions of ionic Ca^{2+} in the body (TMP 473) (GKP 547-548)
2. Parathormone - synthesis, actions (on bone, kidney, intestine), mechanism of action and regulation of secretion (TMP 474)
3. Hypoparathyroidism & hyperparathyroidism - causes, symptoms, ECG changes, diagnosis (TMP 475-476) (GKP 559-560)
4. Tetany - conditions producing it, Accoucher's hand, laryngeal stridor, latent tetany, diagnosis (TMP 475) (GKP 559-560)
5. PTH-related protein (TMP 476)
6. Calcitonin & calcitriol - source, actions, regulation of secretion (TMP 476-478) (GKP 561-564)

Give Reason

1. Alkalosis produces tetany (TMP 475)
2. Osteoporosis is common in postmenopausal woman [Estrogen level falls - calcium depletion in bones] (TMP 472) (GKP 554-555)
3. Carpopedal spasm in tetany [Decrease in calcium ions]
4. Blood calcium level increases after administration of parathyroid extract (TMP Fig 57.1) (GKP Fig 50.11)
5. Bile increases calcium absorption from GIT [bile & bile salts increase solubility of Ca^{2+} salts]

ENDOCRINE PANCREAS

Essays

1. Insulin (TMP 497-499) (GKP 529-543) (GNG Fig 24-6, 24-11)

- Synthesis, regulation of secretion, mechanism of action
 - actions on cell membrane, growth and metabolism
2. Abnormalities of insulin secretion - Diabetes Mellitus - types, signs, symptoms, metabolic derangements, tests for diagnosis, treatment (TMP 500-502) (GKP 538-543)

Short Notes

1. Insulin receptor (w/ upregulation and downregulation) and mechanism of action of insulin (TMP 498-499) (GKP 533-534)
2. Regulation of and factors affecting secretion of insulin and glucagon (TMP 499, 504, Table 59.2, 59.4) (GKP 531-532, 544 Table 60.1)
3. Hypoglycemia - signs, symptoms, compensatory mechanisms (TMP 502-503)
4. Metabolic syndrome or Syndrome X (TMP 503) (GKP 539, Box 60.3)
5. Houssay animal (TMP 503)
6. Actions of glucagon (TMP 503) (GKP 543-544)
7. Insulin-like substances in the body and their importance (GNG Table 18.2, Fig 18.4) (TMP 497, 438)
8. Somatostatin and pancreatic polypeptide - synthesis and actions (TMP 504-505) (GKP 545-546)
9. Endocrine pancreatic secretions (TMP 496) (GKP 527-529)

Give Reason

1. Diabetic patients are advised to exercise regularly (TMP 497)
2. Ketoacidosis associated with diabetes mellitus (TMP 501) (GKP 542)
3. Food related release of pancreatic hormones [Cholinergic post ganglionic fibres, vagus] (TMP 496)
4. Severe impairment of brain function in hypoglycemia (TMP 502) (GKP 542-543)
5. Insulin is called 'Hormone of abundance' (TMP 498)
6. Kussmaul's breathing in diabetic ketoacidosis (TMP 501) (GKP 541)
7. Atherosclerotic vascular disease is a major complication of diabetes mellitus (TMP 502) (GKP 543)
8. Polyuria, polydipsia and polyphagia in diabetes mellitus (TMP 501) (GKP 541-542)

DIAGRAMS

1. Structure of insulin receptor (GNG Fig 24-6) (TMP Fig 59.3)

OTHER ENDOCRINE ORGANS AND LOCAL HORMONES

Short Notes

1. Endocrine functions of kidney (TMP 507-508) (GKP 573)
 - renin, actions of angiotensin-II
 - erythropoietin, calcitriol, prostaglandins
2. Atrial natriuretic peptide - source, actions, regulation of secretion (TMP 508) (GKP 573)

Note on prostaglandins (TMP 509-510) (GKP 572-573)
3. Histamine - actions and mechanism of action (TMP 509) (GKP 569)
4. Serotonin - actions (TMP 509) (GKP 570)
5. Nitric oxide and endothelins (TMP 511-512) (GKP 680)

REPRODUCTIVE PHYSIOLOGY

MALE REPRODUCTIVE SYSTEM

Essay

1. Spermatogenesis - definition, stages, factors affecting spermatogenesis (TMP 522-525, Fig 63.4) (GKP 594-597, Fig 67.10, 67.11) (GNG 420-422, Fig 23-3)

Short Notes

1. Structure and functions of testis (TMP 521, Fig 63.3) (GKP 588-593 Fig 67.3) (GNG 419, 424-426)
2. Functions of Sertoli cells (TMP 524) (GKP 591-592, Fig 67.7) (GNG 419-420)
3. Factors influencing spermatogenesis - hormonal factors, Sertoli cells, general factors (TMP 524-525) (GKP 597) (GNG 420-422)
4. Testosterone - actions, regulation, note on fetal testosterone (TMP 526-528, Fig 63.3) (GKP 599-601, Fig 67.13, 67.14) (GNG 424-426)
5. Cryptorchidism, methods of correction - surgical or general treatment (TMP 528) (GKP 603)
6. Blood-testis barrier and its functions (TMP 524) (GKP 591)

Give Reason

1. Hyperprolactinemia leads to sterility [prolactin inhibits the secretion of GnRH from hypothalamus - gonadotrophin secretion from anterior pituitary also decreases - sterility]
2. Sterility in men working in hot surroundings [High temperature impairs spermatogenesis] (TMP 525) (GNG 422)
3. Androgen when given orally is ineffective [It is inactivated in liver by getting converted into less potent androsterone & DHEA] (TMP 527) (GNG 424)

FEMALE REPRODUCTIVE SYSTEM

Essay

1. Menstrual cycle - especially ovarian cycle, endometrial cycle and hormonal changes; mention changes in cervix, vagina, breast and fallopian tubes; note on abnormalities of female sexual cycle (TMP 532-536, 540, Fig 64.5) (GKP 614-618, Fig 69.1) (GNG 401-406, Fig 22-12)

Short Notes

1. Ovulation - definition, mechanism, safe period (TMP 533, 541, 544) (GKP 618-619) (GNG 401, 405)
2. Uterine / Endometrial cycle with diagram showing changes in endometrium (TMP 535, Fig 64.5) (GKP 615, Fig 69.1 C) (GNG 402-404, Fig 22-12)
3. Actions of estrogen and progesterone (TMP 537-538) (GKP 623-626)
4. Tests for ovulation (TMP 541) (GKP 619) (GNG 405)
5. LH and FSH - actions, regulation of secretion (TMP 533, 539) (GKP 611-612, 628 Fig 70.2) (GNG 333, 410-411)

MNEMONICS

Tests of Ovulation

BE Very Calm & Prepare For Model Exam

B-Basal body temperature increases

E-Endometrial biopsy

V-Vaginal smear

C-Cervical mucosa

P-Pregnandiol in urine

F-FSH & LH increases

M-Mittelschmerz

Give Reason

1. LH surge is necessary for ovulation / role of LH in ovulation (TMP 533) (GKP 611-612) (GNG 410-411)
2. Basal body temperature increases by 0.5°C after ovulation [Thermogenic action of progesterone] (TMP 538) (GKP 626) (GNG 409)
3. Menstrual blood does not contain clots normally [Clots are liquefied by fibrinolysis in the vagina] (TMP 536)
4. Swelling and tenderness of breast prior to menstruation [Pre menstrual syndrome - mainly due to retention of salt and water; peak of estrogen is seen before the onset of symptoms] (TMP 540) (GKP 628-629) (GNG 404)

FERTILIZATION, PREGNANCY & LACTATION

Essay

1. Placenta - functions and fetoplacental unit (TMP 545-547, Fig 65.3) (GKP 638-640, Fig 72.6) (GNG 414-416, Fig 33.16)

Short Notes

1. Fetoplacental unit (TMP 547, Fig 65.3) (GKP 639-640, Fig 72.6) (GNG 415, Fig 22-23)
2. Pregnancy tests - types and principle (TMP 549)
3. Prevention of polyspermy (TMP 544) (GKP 636) (GNG 414)
4. Placental hormones - name and functions (TMP 547) (GKP 641-642) (GNG 415)
5. hCG - site of production and actions (TMP 547) (GKP 641) (GNG 414)
6. Role of oxytocin in parturition (TMP 550) (GKP 647) (GNG 416, Fig 22-24)
7. Lactation - phases, important hormones in regulation of lactation (TMP 553-555, Fig 67.2) (GKP 651) (GNG 416-417)
8. Prolactin - actions and regulation (TMP 554) (GKP 468-470, Fig 55.11) (GNG 333-334)

Give Reason

1. Removal of ovary is not advised in first trimester of pregnancy [It is the only source of progesterone in first trimester; progesterone is the pregnancy maintaining hormone]
2. Prolactin cannot initiate lactation during pregnancy [high level of estrogen & progesterone inhibits prolactin]
3. Higher incidence of Patent Ductus Arteriosus in children with history of fetal distress [pO₂ of ductus blood will be reduced in fetal distress]
4. Lactational amenorrhea [Prolactin inhibits pituitary gonadotropin by inhibiting secretion of GnRH from hypothalamus]
5. Foetus is not rejected by maternal body in spite of paternally derived antigens which are foreign to the mother's body [Placenta - restricts entry of antigens & toxins; prevents immunological maternal attacks by destroying T-lymphocytes]
6. Progesterone prevent abortion [Decreases uterine contractility]

CONTRACEPTION AND INFERTILITY

Essay

1. Contraception (TMP 556-558) (GKP 653-656) (GNG 412)

- temporary: esp. oral and IUD contraceptives
- permanent: vasectomy and tubectomy

Short Notes

1. Mechanism of action of contraceptives & different types of pills (TMP 557) (GKP 654-655) (GNG 412)
2. Mechanism of action of IUDs (TMP 556) (GKP 653-654) (GNG 412)
3. Infertility - male & female infertility, treatment (TMP 558) (GKP 640) (GNG 414)

Give Reason

1. Life span of ovum and spermatozoa is critical in rhythm method of family planning [Fertilization is possible 3 days before and 3 days after ovulation, so life span is important] (TMP 556)
2. Oral contraceptives prevent pregnancy [Estrogen and progesterone administration - negative feedback - inhibition of LH and FSH secretion - no LH surge - inhibition of ovulation]

DIAGRAMS

1. Diagram showing ovarian cycle, uterine cycle and hormonal changes in menstrual cycle (TMP 535 Fig 64.5) (GKP 616 Fig 69.1) (GNG Fig 22-12)
2. Structure of Graafian follicle (TMP 533 Fig 64.4) (GKP 610 Fig 68.7)
3. Pathways for milk secretion & milk ejection (TMP 554 Fig 67.2)

Suckling of breast



Stimulation of touch receptors of nipple



Touch pathway



Supraoptic and paraventricular nuclei of hypothalamus



Oxytocin



Contraction of myoepithelial cells of breast



Milk ejection

Fig. 54.6

Suckling reflex or neuroendocrine reflex