# WAH MEDICAL COLLEGE

2022-2026

Department of Medical Education

STUDY GUIDE
2nd YEAR MBBS
Y2BV

2022-2026

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# VISION

National University of Medical Sciences envisions a world with a better quality of life for all by enhancing our contribution to healthcare, education, innovation, and research.

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# MISSION

"To produce competent medical professional graduates equipped with sound knowledge & research capabilities based on scientific principles, imbued with ethics and moral values primed to serve the community through the profession and pursue research & advanced training in any branch of medicine".

# 1. Outcomes of WMC MBBS Program:

| At the end of our five-year MBBS program, the graduates should be able to: |
|---|
| **1.** Independently manage common, non-critical clinical problems. |
| **2.** Assist in the management of critically ill patients & demonstrate competency in life saving procedures. |
| **3.** Exhibit the attributes of an ethical professional. |
| **4.** Conduct research which brings relevance to health care practices. |
| **5.** Act as an efficient community health promoter. |
| **6.** Exhibit scientific knowledge in all professional activities. |
| **7.** Demonstrate clear and efficient written & verbal communication skills. |
| **8.** Exhibit the habits of a lifelong learner. |

# 2. Introduction to the Study Guide:

## i. Objectives of the Study Guide

Dear Students,

We, at the Department of Medical Education, Wah Medical College, have developed this study guide especially for you. This study guide aims to:

- Inform you about the organization of learning programs in this block, which will help you to contact the right person in case of any difficulty.
- Help you in organizing and managing your studies throughout the block.
- Guide you on assessment methods, rules, and regulations.
- Define the expected outcomes which students should achieve at the end of the block.
- Identify the learning strategies used to achieve block outcomes such as lectures, small group discussions, clinical skills, demonstration, tutorial, and case-based learning.
- Provide a list of learning resources such as books, and journals for students to consult to maximize their learning.
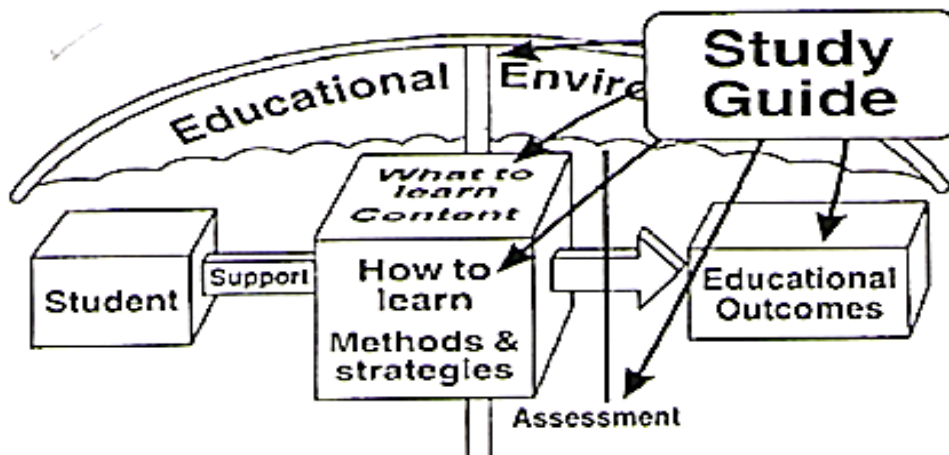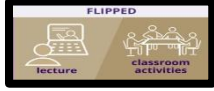


**Figure1: Objectives of the study Guide**(HARDEN, J.M. LAIDLAW, E.A. HESKETH, 1999)

## ii. **Commonly used abbreviations & Logos in the study guide**

**Learning Outcomes:**

Learning outcomes are statements that define the expected goal of your course, lesson, or activity in terms of demonstrable skills or knowledge that you will acquire because of instruction. In simple words, these are the things that you must be able to tell or do with the required attitude after learning a particular topic.

1. **Educational Strategies:** These are the methodologies used by your instructors. These include:

| Abbreviation | Logos |
|---|---|
| LGIS: Large Group interactive session/Lecture |  |
| Flipped Classroom |  |
| CBL: Case based learning. |  |
| Practicals |  |
| Demonstrations |  |
| SGD: Small group discussions |  |
| BST: Bedside Teaching |  |
| Skill Lab |  |
| Clinical Teaching (OPD/ OT/ IPD |  |
| Gamification |  |

**Large Group Interactive Sessions**

In a large group, the lecturer introduces a topic or common clinical condition and explains the underlying phenomena through questions, pictures, videos of patient's interviews, exercises, etc. Students are actively involved in the learning process.

**Flipped classroom.**

An inverted pedagogical approach from the conventional notion of classroom-based learning: the teacher introduces the learning material to students before class and uses the classroom time to deepen understanding through discussion with peers and problem-solving activities facilitated by teachers.

**Small Group Discussion**

This format helps students to clarify concepts, acquire skills or attitudes. Facilitators prepare structured sessions with specifically designed exercises such as patient case, interviews, or discussion topics. Students exchange opinions and apply knowledge gained from lectures, tutorials, and self-study. The facilitator's role is to ask probing questions, summarize, or rephrase to help clarify concepts.

**Case-Based Learning**

This is a small group discussion format where the teacher presents a series of questions to students based on a clinical scenario. The facilitator designs specific case scenarios and the learning outcomes and shares those with the student before the session. Students prepare for the CBL and during class they discuss and answer the questions applying relevant knowledge gained in clinical and basic health sciences during the block. Faculty members are present as a guide and an assessor.

**Self-Directed Study**

Students assume responsibilities of their own learning through individual study, sharing and discussing with peers, seeking information from the Learning Resource Center, teachers, and resource persons within and outside the college. Students can utilize the time within the college schedule hours for self-study under supervision.

**Gamification:**

The educators apply game design elements to an educational setting. The goal is usually to make learning more engaging.

# 3. Assessment Map, Policies & Strategies:
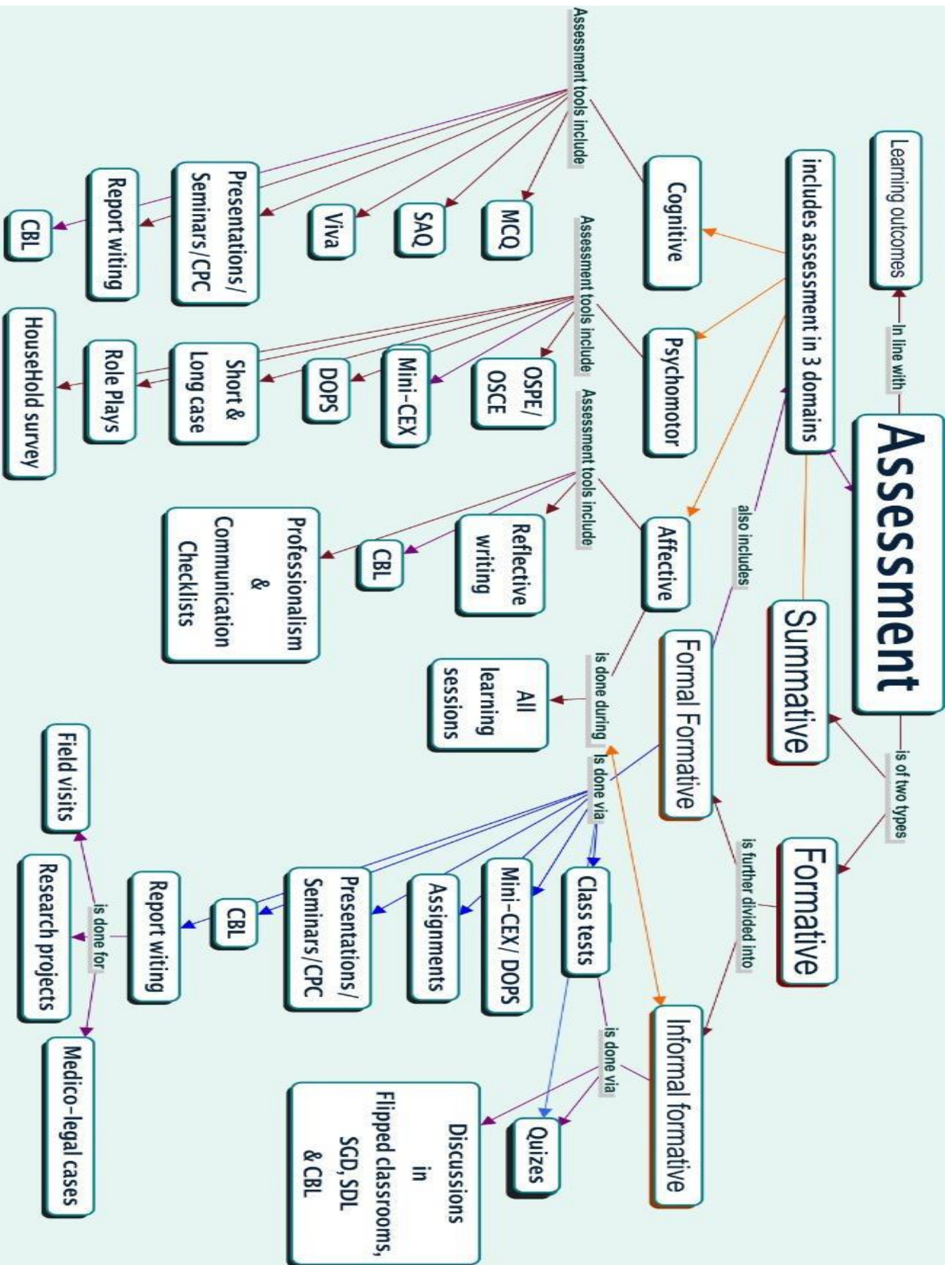
# 4. Assessment Strategies:

All relevant disciplines will continually assess the students during the block, in all three learning domains i.e., Cognitive, Psychomotor & Affective.

- ➤ The weighting of internal assessment shall be 20% in 1st professional MBBS Examination.
- ➤ There shall be three EBE and one pre-annual examination. To be eligible to sit in the pre-annual exam a student must pass at least 50% of all the formal formative & summative assessments conducted during the year. Departmental heads & the dBOS will make the final decision of eligibility for the student to sit in the pre-annual exam if one fails to meet the requirements. They will take the decision on a case-to-case basis depending upon the student's performance in all 3 learning domains throughout the year.
- ➤ Each department will calculate the internal assessment according to NUMS curriculum including the scores of class tests, all EBE & pre-annual examination.

| Internal Assessment Structure for theory | |
|---|---|
| **Weighting 20%** | |
| **Component** | **Weightings** |
| 1. Attendance in theory learning sessions.<br>a. >90%=10<br>b. 80-89% = 7<br>c. 75-79%  = 5 | 10% |
| EBE/ ECE (Theory) | 45% |
| Continuous formal formative assessments-<br>Average score in all the class tests or quizzes during the academic year | 20% |
| Pre-Annual Exam | 25% |
| Total | 100% |
| **Internal Assessment Structure for Practical** | |
| **Weighting 20%** | |
| **Component** | **Weighting** |
| 1. Attendance in practical learning sessions<br>  a. >90%=10<br>  b. 80-89% = 7 | 10% |

| | |
|---|---|
| c.  75-79%  = 5 | |
| 2.  OSPE/ OSCE conducted in EBE/ ECE | 45% |
| 3.  Continuous formal formative assessments-Average score in all the skill tests during the academic year | 20% |
| Pre-Annual Exam | 25% |
| Total | 100% |

## End Block and Pre-Annual Examination:

> There will be three-EBE, one at the end of each block & one pre-annual examination at the end of the academic year.
> The structure of the paper of all the end block examination and pre-annual will be the same as that for the annual examination though syllabus will be different.
> The department will announce the syllabus for EBE at least 02 weeks prior to examination.
> Pre-annual examination will be from the whole syllabus.
> Coordinators of 1st & 2nd year will prepare the date sheet for EBE and pre-annual examinations, and respective departments will conduct the examinations.
> The department heads will submit internal assessment to NUMS examination branch at least two weeks prior to the annual exam.

## Annual Professional Examination:

> The university shall take the 1st professional Examination as per PMC guidelines at the end of the academic year.
> Annual theory and practical Examination shall be of 200 marks each in Anatomy, Physiology and Biochemistry.
> The pass score shall be 50% in theory and practical separately.

# 5. Block Development Committee

| Chairperson | Prof. Dr. Sumera Gul | |
|---|---|---|
| Block In-charge | Dr. Somia Iqbal | |
| Members/ Resource persons | Anatomy<br>Physiology<br>Biochemistry<br>Medicine<br>Surgery<br>Behavioral Sciences<br>EBM & RM<br>P-CMILE | Dr. Fauzia Siraj<br>Dr. Somia Iqbal<br>Dr. Anas Khalil<br>Dr. Ayesha Rani<br>Dr. Sadia Farhan<br>Mr. Hassan Ali<br>Dr. Khola Waheed Khan<br>Dr. Ambreen Ansar |
| Study guide developed by | Department of Medical Education<br>Wah Medical College<br>under Supervision of<br>Prof. Dr. Musarat Ramzan | |
| Resource person for Study Guide | Dr. Ambreen Ansar | |

# 6. Structured Summary of Y2BV- MX Genetics & Neuroscience I

| Block Code | Y2BV- MX Genetics & Neuroscience I |
|---|---|
| Prerequisite | Passing the first professional MBBS examination. |
| Duration | 09 weeks |
| **Rationale** | This module of the block aims to form the basis of knowledge and skills related to the Anatomy, Physiology and Biochemical aspect of the genetics and neurosciences. This module of 9 weeks duration focuses on histo-morphological and embryological structure as well as physiological and biochemical functioning of neurosciences. It is part of the second-year integrated curriculum at WMC. |
| **Anatomy** | • Developmental and microscopic Anatomy of Neuroscience. |
| **Physiology** | • Central nervous system including sensory, motor and autonomic nervous system |
| **Biochemistry** | • Chemistry & Metabolism of Nucleotides, Molecular Genetics, Neurotransmitters |
| **Surgery & Radiology** | • Neurological assessment of patients with brainstem and spinal cord lesions, CNS. |
| **Medicine** | • Motor system examination, Upper and Lower motor neuron lesions, Epilepsy, Parkinson disease. |
| **Behavioral sciences** | • Communication, professionalism, Ethics, Patient and doctor, Psycho-social Aspects, Clinical Practice |

# 7. Course content

# Anatomy

**Subject Learning outcomes:**

After studying two years in anatomy department, the student should be able to:

1. Correlate the histomorphological features of tissues and organs of the human body with their functions.
2. Correlate the developmental events of the human body with common congenital anomalies.
3. Interpret the topographic and radiographic anatomy of human body and its presentations in common clinical conditions.

**Block Learning outcomes:**

1. Interpret the anatomical basis of common neurological clinical presentations by correlating the structures forming the nervous system with their functions.
   (SLOs 1)

2. Demonstrate the structure of brain and spinal cord on prosected specimens and models. (SLOs 1)
3. Identify the normal structure of brain and spinal cord in the images of CT scan & MRI. (SLOs 1,2)

4. Correlate the developmental process of nervous system with embryological basis of relevant congenital anomalies. (SLOs 1,2,3)
5. Identify the histomorphological features of nervous system under light microscope by focusing the H&E-stained slides at different magnifications. (SLOs 1,2,)

| Neuro Anatomy | | | | |
|---|---|---|---|---|
| **Sr. No.** | **Topics** | **Educational Strategies** | **Name of instructor** | **Importance (Must Know Should Know Could Know)** |
| **1.** | Introduction & organization of the nervous system | LGIS | Dr Fauzia Siraj | Must Know |
| **Learning Outcomes:** <br> • Demonstrate the structure of brain and spinal cord on prosected specimens and models and radiological images BLO1. <br> • Interpret the anatomical basis of common neurological clinical presentations by correlating the structures forming the nervous system with their functions BLO1 | | | | |
| **2.** | Gross Anatomy of Skull | SGD | Dr Fauzia Dr Bushra Dr Maryam | Must Know |
| **Learning Outcomes:** <br> • Demonstrate the anatomical position of skull with special emphasis on planes of anatomical position. BLO 1 <br> • Describe and demonstrate the boundaries of cranial fossae, their gross features with emphasis on foramina along with structures passing through them. BLO 1 | | | | |

- Recognize and demonstrate the important sutures, fontanelle, and impressions on the interior of cranial vault. BLO 1
- Identify important bony landmarks on Norma lateralis, verticalis, basalis, frontalis, and occipitalis.
- Identify the bones forming the fascial aspect of cranium with their gross features ( orbit, nasal cavity, oral cavity, temporal, infratemporal fossa & pterygopalatine fossa on the given bone. (Details with relevant topics). BLO 1
- Explain the clinical presentations relevant to fracture of various bones of skull . BLO 1

| 3. | Gross Anatomy of Spinal cord | LGIS SGD | Dr Kaukab Dr Fauzia Dr Bushra | Must know |
|----|------------------------------|----------|-------------------------------|-----------|

**Learning Outcomes:**
- Explain the gross appearance and the nerve cell groups in the anterior, posterior, and lateral gray columns of spinal cord. BLO 1
- Enumerate and illustrate the arrangements of ascending and descending tracts (white matter) in spinal cord at various levels. BLO 1
- Explain the given clinical conditions related to ascending and descending tracts of spinal cord.  BLO 1
- Trace pathways of superficial and deep sensations, indicating the location of first, second and third order neurons. BLO 1
  - ❖ Pain and temperature pathways
  - ❖ Light touch and pressure pathways
  - ❖ Discriminative touch, vibratory sense, and conscious muscle joint sense.
  - ❖ Muscle joint sense pathways to the cerebellum
  - ❖ Posterior spinocerebellar tract
  - ❖ Anterior spinocerebellar tract
  - ❖ Cuneocerebellar
  - ❖ Spinotectal tract
  - ❖ Spinoreticular tract
  - ❖ Spino-olivary tract
  - ❖ Visceral sensory tracts
- Trace following pathways of voluntary movements indicating the location of first, second and third order neurons. BLO 1
  - ❖ Cortico spinal tracts
  - ❖ Reticulospinal tract
  - ❖ Tectospinal tract
  - ❖ Rubrospinal
  - ❖ Vestibulospinal
  - ❖ Olivospianl
  - ❖ Descending autonomic fibers
- Intersegmental tract

| 4. | Gross Anatomy of Brain stem | SGD SDL | Dr Fauzia Dr Bushra Dr Maryam | Must know |
|----|------------------------------|---------|-------------------------------|-----------|

**Learning Outcomes:**

- Describe gross appearance and internal structure of the medulla oblongata and analyze medulla oblongata at different levels. BLO 1
- Justify the significance of raised pressure in posterior cranial fossa to its effects on medulla oblongata. BLO 1
- Apply the knowledge of neuroanatomy to explain the following clinical scenarios: BLO 1
  - ❖ Arnold-Chiari malformation
  - ❖ Medial medullary syndrome

lateral medullary syndrome of Wallenberg
- Describe the gross features, internal structure of pons and illustrate cross section of pons at different levels (facial colliculus and trigeminal nuclei) showing major structures at each level. BLO 1
- Analyze the anatomical structures involved in Pontine hemorrhage and infarction of pons. BLO 1
- Describe the gross appearance, internal structure of mid brain and compare its cross sections at the level of superior colliculus and inferior colliculus showing major structures at each level. BLO 1
- Justify, how the blockage of cerebral aqueduct will produce lesions of midbrain structures?
- Identify the gross features of medulla, mid brain and pons on a given model. BLO 1,2

| 5. | Gross anatomy of Cerebellum & its connections | SGD | Dr Fauzia Dr Bushra Dr Maryam | Must Know |
|---|---|---|---|---|

**Learning Outcomes:**
- Describe the gross features of cerebellum. BLO 1
- Enumerate afferent and efferent fibers of superior, middle, and inferior cerebellar peduncles. BLO 1
- Enlist intracerebellar nuclei and types of fibers constituting white matter of cerebellum and explain their routes of entry and exit. BLO 1
- Summarize and demonstrate the pathways carrying afferent and efferent fibers to and from the cerebellum. BLO 1,2
- Enlist disturbances of voluntary movements, reflexes, ocular movements, speech, posture, and gait resulting due to lesions of cerebellum. BLO 1
- Demonstrate different parts of cerebellum on given model. BLO 1,2
- Illustrate flattened view of cerebellar cortex showing the main cerebellar lobes. BLO 1

| 6. | Gross anatomy of Cerebrum | LGIS | Dr Fauzia Dr Bushra | Must know |
|---|---|---|---|---|

**Learning Outcomes:**
- Describe the topographic anatomy of diencephalon and demonstrate the gross features of diencephalon on a given model. BLO 1
- Enlist the main sulci and gyri of cerebral hemispheres and describe the extent of each of them. BLO 1
- Explain the divisions of cerebral lobes on superolateral, medial and inferior surfaces of cerebral hemispheres. BLO 1
- Explain the effects of lesions of different parts of internal capsule. BLO 1
- Describe the cause, signs and symptoms and formation of senile plaques in Alzheimer disease. BLO 1

- Mark main sulci and gyri on lobes of cerebral hemispheres. BLO 1,2
- Demonstrate commissure, projection, and association fibers on brain prosected specimen BLO 1,2
- Describe and demonstrate the motor and sensory cortical areas in all lobes of cerebral hemispheres. BLO 1,2
- Describe the effects of lesions in the motor cortex on voluntary movements and speech. BLO 1
- Describe the changes in personality due to lesions in the frontal eye field of cerebral hemisphere. BLO 1
- Enumerate types of aphasia and describe the lesions of speech areas responsible for producing aphasia. BLO 1
- Summarize the signs and symptoms due to lesions of sensory cortex, prefrontal cortex and somesthetic association areas. BLO 1
- Explain the effects of lesion in the primary and secondary visual cortex. BLO 1.
- Illustrate the probable pathways involved in reading a sentence and replicating it out loud. BLO 1
- Illustrate the probable pathways involved in hearing a question and answering it. BLO 1
- Illustrate and demonstrate the lateral and medial views of cerebral hemispheres showing motor and sensory areas. BLO 1,2

| 7. | Gross anatomy of Reticular formation & Limbic system | SGD | Dr Fauzia Dr Bushra Dr Maryam | Must know |
|---|---|---|---|---|

**Learning Outcomes: All BLO 1**
- Describe the general arrangement and functions of reticular formation.
- Enlist afferent and efferent projections of reticular formation.
- Enumerate components of limbic system and explain hippocampal formation with reference to its afferent and efferent connections.
- Compile the effects of destruction of amygdaloid complex on behavior.
- Demonstrate different components of limbic system on given model BLO 1,2

| 8. | Gross anatomy of Basal nuclei & their connections | SGD | Dr Fauzia Dr Bushra Dr Maryam | Must know |
|---|---|---|---|---|

**Learning Outcomes: <u>All BLO 1</u>**
- Enlist terminology commonly used to describe the basal nuclei.
- Describe different nuclei, connections and functions of nuclei constituting basal ganglia.
- Enlist hyper kinetic disorders related with basal nuclei like chorea, hemiballismus and athetosis.
- Describe Parkinson disease regarding etiology, characteristics signs and symptoms, types, and treatment.
- Identify different components of basal ganglia on given model/specimen BLO 1,2

| 9. | Gross anatomy of Cranial nerves | LGIS SGD | Dr Uzma Dr Fauzia Dr Maryam | Must know |
|---|---|---|---|---|

**Learning Outcomes:**
- Enumerate the cranial nerves and classify them into sensory, motor, and mixed nerves. BLO 1
- Describe the nuclei, connection, and intracranial course of all cranial nerves. BLO 1

| | ● Demonstrate different cranial nerves on given model/specimen BLO 1,2 <br> ● Apply the knowledge of neuroanatomy to explain the clinical conditions regarding lesions of cranial nerves. BLO 1 | | | |
|---|---|---|---|---|
| **10.** | Gross anatomy of thalamus, hypothalamus and their connections | SDL | Dr Fauzia <br> Dr Bushra <br> Dr Maryam | Must know |

**Learning Outcomes: All BLO 1**
- Describe the general appearance, divisions, nuclei and connections of thalamus and hypothalamus.
- Summarize the connections of hypothalamus with the pituitary gland.
- Explain the following clinical disorders associated with Thalamic and hypothalamic lesions. § Obesity and wasting
  - ❖ Sexual disorders
  - ❖ Hyper and hypothermia § Diabetes insipidus § Emotional disorders.
  - ❖ Thalamic pain
  - ❖ Thalamic hand

| **11.** | Gross anatomy of meninges and Dural venous sinuses of brain & spinal cord | LGIS | Dr Bushra | Must know |
|---|---|---|---|---|

**Learning Outcomes:**
- Define meninges of brain and describe the Dural reflections in brain. BLO 1
- Explain the meninges of spinal cord BLO 1
- Enumerate the nerves and blood vessels supplying the meninges. BLO
- Differentiate among different varieties of intracranial hemorrhages. BLO 1
- Demonstrate the supratentorial and infratentorial compartments of tentorium cerebelli in a prosected specimen. BLO 1,2
- Define and enumerate paired and unpaired Dural venous sinuses along with their attachments. BLO 1
- Describe the location, important relations, communications of cavernous sinus and enumerate structures passing through walls and through the cavernous sinus. BLO 1

| **12.** | Gross anatomy of Ventricular System & Cerebrospinal Fluid | SGD <br> SDL | Dr Bushra <br> Dr Maryam | Must know |
|---|---|---|---|---|

**Learning Outcomes:**
- Enumerate ventricles and explain the boundaries of each ventricle of brain along with their choroid plexus. BLO 1
- Explain formation, circulation, and absorption of CSF. BLO 1
- Define arachnoid villous and explain the role of arachnoid villi in absorption of CSF. BLO 1
- Summarize the formation of different barriers of brain. BLO 1
- Demonstrate queckenstedt sign in localizing blockage of subarachnoid space in vertebral canal. BLO 1,2
- Illustrate the floor of fourth ventricle. BLO 1

| **13.** | Blood supply of the Brain & Spinal cord | LGIS | Dr Bushra | Must know |
|---|---|---|---|---|

**Learning Outcomes: <u>All BLO 1</u>**
- Describe the blood supply of different parts of the brain and spinal cord.

- Explain the formation and importance of veins of brain.
- Enumerate the vessels taking part in the formation of the circle of Willis and summarize its importance.
- Relate the interruption of cerebral circulation to cerebral artery syndromes due to anterior, middle, and posterior cerebral artery occlusion.
- Illustrate circle of Willis.

## EMBRYOLOGY

| 1. | Development of Skull | LGIS | Dr Nomana Mahmood | Must know |
|----|----------------------|------|-------------------|-----------|

**Learning Outcomes: <u>All BLO 1,4</u>**
- Explain development of viscerocranium
- Describe the stages of differentiation of neurocranium into membranous neurocranium and chondrocranium.
- Describe the importance of fontanelle of skull in newborn with reference to:
  - ❖ Normal ossification of the skull
  - ❖ Changes in intracranial pressure
  - ❖ Newborn Cranium.
  - ❖ Closure of different fontanelle
- Describe the clinical abnormalities caused by premature closure of one or more sutures.
- Explain the clinical condition caused by failure of the cranial neuropore to close.
- Enlist different types of skeletal dysplasia's and explain achondroplasia and hypochondroplasia.

| 2. | Development of Central nervous system | LGIS | Prof. Dr Zubia Athar | Must know |
|----|---------------------------------------|------|----------------------|-----------|

**Learning Objective: All BLO 1,4**
- Describe the development of neural tube with reference to neurulation, vesicles, brain flexures and ventricles.
- Describe the development and positional changes of spinal cord.
- Describe the formation and developmental changes in alar and basal plates.
- Comprehend the embryological basis of various types of Spinae bifida.
- Enumerate the derivatives of rhombencephalon, mesencephalon and prosencephalon.
- Compile the organization of Alar and Basal plate neurons in brain stem with reference to their type, type of innervation, cranial nerve, and location.
- Describe the development of the following.
  - ❖ Medulla oblongata
  - ❖ Midbrain
  - ❖ Pons
  - ❖ Cerebellum
  - ❖ Pituitary gland
  - ❖ Supra renal gland
- Apply the knowledge of embryology to explain the clinical scenarios regarding:
  - ❖ Holoprosencephaly
  - ❖ Schizencephaly
  - ❖ Exencephaly
  - ❖ Hydrocephalus

- ❖ Exencephaly
- ❖ Hydrocephaly
- ❖ Microcephaly
- Enumerate the cranial nerves with their composition (brain region, type, and innervation).
- Summarize in a tabulated form the contribution of neural crest cells and placodes to ganglia of the cranial nerves.
- Demonstrate different parts of brain and spinal cord on the given model. BLOs 1,2,4

## HISTOLOGY

| 1. | Histology of nervous tissue | LGIS | Dr Nomana Mahmood | Must know |
|---|---|---|---|---|

**Learning Outcomes: All BLO6**
- Enlist the components of nervous tissue.
- Summarize the histological features and functions of neurons and neuroglia.
- Classify neurons according to their morphology and functions with one example of each.
- Define neuroglia and enlist its main types.
- Explain the myelinated and unmyelinated nerve fibers of central and peripheral nervous system.
- Explain the Histomorphological composition of peripheral nerve.
- Define ganglia and differentiate between sensory and autonomic ganglia in tabulated form.
- Apply knowledge of histology to explain the clinical scenarios related to multiple sclerosis, Alzheimer disease, Parkinson disease and neuron injuries.
- Describe the histological features of white and grey matter of spinal cord.
- Enumerate layers of cerebral and cerebellar cortices and enlist different cell types of these layers.

## LIST OF PRACTICALS

**Learning outcomes:**
- Identify H&E-stained slides of different components of nervous system and appreciate their characteristic histological features to distinguish them from common pathological conditions in future.
- Differentiate between H&E-stained slides of different components of male and female reproductive system and appreciate their characteristic histological features to predict functional outcomes that result from their altered structure and function.

| Sr. No. | Topics | Educational Strategies | Name of instructor | Importance (Must Know Should Know Could Know) |
|---|---|---|---|---|
| 1. | Nervous system | Practical | Dr Maryam | Must know |

**Learning outcomes: All BLO6,8**
- Recognize the slide of nerve fiber and ganglia by focusing it under the light microscope and illustrate it highlighting its point of identification.
- Recognize the slide of Spinal Cord by focusing it under the light microscope and illustrate it highlighting its point of identification.

- Recognize the slide of Cerebrum by focusing it under the light microscope and illustrate it highlighting its point of identification.
- Recognize the slide of Cerebellum by focusing it under the light microscope and illustrate it highlighting its point of identification

# ANATOMY CBL's
## CBL 1: A CASE OF SPINAL SHOCK

An 18-year-old boy, reports to emergency with complaints of severe backache and inability to move his both legs after falling from electric pole. During the neurological evaluation, he has paralysis of both lower limbs, loss of sensation below the umbilicus and absent bowel and bladder control. X-ray shows fracture of T12 vertebra. Neurosurgeon diagnosis him as a case of Spinal Shock.

**Learning outcomes:**
- ✓ Explain the cause of permanent paralysis and loss of urinary/bowel control in this patient.
- ✓ Compare the clinical presentation of patient in initial phase of spinal shock with recovery phase after 2 days.
- ✓ Describe the neurological deficits after injury at T-12 level in this case.
- ✓ Enumerate the signs and symptoms of spinal shock.
- ✓ Illustrate cross sections of spinal cord at various vertebral levels and justify the variable amount of grey and white matter at different levels.
- ✓ Describe the relation between spinal cord and vertebral level.
- ✓ Differentiate between Upper & Lower motor neuron lesions.
  References:
    - ❖ Snell's Clinical Neuroanatomy,8th Edition,2019, page 167-170
    - ❖ https://www.ncbi.nlm.nih.gov/books/NBK448163/#:~:text=Spinal%20shock%20is%20the%20altered,and%20loss%20of%20reflex%20activity.

## CBL 2 STROKE

A 67-year-old man comes to a physician with his wife, who gives history that recently her husband is little disoriented and is unable to respond to her questions properly making no sense while he speaks. On examination, the physician notices a decreased awareness of stimuli to one of his visual fields. The physician noted no obvious motor or somatic sensory deficits. After thorough investigations, the physician confirms stroke in a specific region of one of his cerebral hemispheres.

**Learning Outcomes:**
- ✓ State the functional losses associated with the lesions of fibre bundles in cerebrum in this case.
- ✓ Correlate the effects of cerebral vascular occlusion to clinical presentation in this case.
- ✓ Demonstrate the areas of cerebral cortex affected by occlusion of middle anterior and posterior cerebral artery?
- ✓ Enlist and explain various varieties of aphasia and describe the production of meaningful speech by cerebral hemisphere.
- ✓ Identify the visual field affected by the stroke.
- ✓ Illustrate the superolateral surface of cerebral hemisphere.
 **References:**

❖ Snell's Clinical Neuroanatomy,8th Edition,2019, page
❖ https://www.nhlbi.nih.gov/health/stroke

## CBL 3: PARKINSONISM

A 65-year-old male comes to his physician with a 3-year history of tremors in his hands while sitting or watching TV. The tremors started in the left hand initially but progressively involved the right hand. His wife says that he is shuffling his feet and walking more slowly, and his handwriting has become smaller. The physician diagnosed him as a case of progressive Parkinsonism.

**Neurologic Examination Revealed:**

- Mental Status: Slow to answer with hypo phonic voice.
- Cranial nerves: Masked face.
- Motor Function: Resting, pill-rolling tremors and cogwheel rigidity.
- Sensory function: NAD (No abnormality detected)
- Reflexes: NAD
- Cerebellum: NAD
- Gait: Slightly slow gait with reduced arm swing, multi-step turn, and obvious tremor while walking.

**Learning outcomes**

- ✓ Explain the anatomical reasoning of clinical findings in this case.
- ✓ Enumerate the afferent and efferent connection of basal ganglia.
- ✓ Correlate the disturbed functions in this patient with connections of basal nuclei.
- ✓ Describe the synthesis, functions and degradation of various neurotransmitters involved in functioning of basal nuclei.

**References:**

❖ Snell's Clinical Neuroanatomy,8th Edition,2019, page
❖ https://www.physio-pedia.com/Parkinson%27s_Disease:_A_Case_Study

**Teaching faculty**

| Name | Email address |
|------|---------------|
| HOD. Prof. Dr Zubia Athar | zubiaathar@hotmail.com |
| Prof Dr Uzma Shahid | ua7567@gmail.com |
| Dr Kaukab Anjum | kanjumq@gmail.com |
| Dr Nomana Mahmood | mahmoodnomana@gmail.com |
| Dr Fauzia Siraj | drsirajahmad.786@gmail.com |
| Dr Bushra Mohsin | bushramohsinbukhari@gmail.com |
| Dr Maryam Saleem | maryums.ms@gmail.com |

**Assessment formats**

| Assessment Strategies (Formative) | Assessment Strategies (Summative) |
|-----------------------------------|-----------------------------------|
| CBL (Case Discussion, quiz, professionalism, communication, and leadership skills) Class Discussion Flipped Class Format Quiz ,Assignments | Logbooks CBL End-Block-Exam Pre-annual examination Final professional examination |

# Physiology

**Departmental/Subject learning Outcomes:**

1. Explain various physiological processes involved in the normal functioning of the body. (PLOs 1,6,8)
2. Relate the interconnections of various organ systems in maintenance of homeostasis. (PLOs 1,6,8)
3. Interpret the effects of alternations in Physiological mechanism in common clinical disorders. (PLOs 1,2,6,8)
4. Demonstrate common clinical and laboratory procedures to interpret their results. (PLOs 1,2,8)

**Block learning Outcomes:**

1. Interpret the physiological mechanisms controlling the neuronal signals transmitting through synapse.(SLO1,SLO2)
2. Interpret the physiological mechanisms controlling the functions of sensory system. (SLO1,SLO2)
3. Explain the dorsal column medial leminiscal system and anterolateral pathways. (SLO1,SLO2)
4. Correlate the pathophysiological basis of pain pathways to their clinical significance. (SLO3)
5. Interpret the physiological mechanisms controlling the functions of motor system and higher mental functions. (SLO1,SLO2)
6. Correlate the clinical presentations resulting from damage to different areas of cerebral cortex to their anatomical and functional cortical areas. (SLO3)
7. Differentiate between the Pyramidal and extrapyramidal system for voluntary motor control. (SLO1,SLO2)
8. Identify the role of the brain stem in controlling motor function and role in posture of the body against gravity. (SLO1,SLO2)
9. Explain the vestibular system. (SLO1,SLO2)
10. Correlate the mechanism of normal coherent speech with speech disorders. (SLO1,SLO3)
11. Analyze the role of the cerebellum in executing motor movements. (SLO1,SLO2)
12. Explain the function of the basal ganglia in Executing patterns of motor activity. (SLO1,SLO2)
13. Correlate the presentation of CVA with the concerned affected area. (SLO3)
14. Distinguish memory types. (SLO1,SLO2)
15. Explain mechanism of sleep. (SLO1,SLO2)
16. Differentiate between various types of epilepsy in detail. (SLO3)
17. Explain the functions of thalamus and hypothalamus in detail with specific emphasis on temperature control and limbic system. (SLO1,SLO2)
18. Associate functions of prefrontal and other cortical association areas to various psychiatric and organic illnesses. (SLO1,SLO2,SLO3)

| Sr. No. | Topics | Educational Strategies | Name of instructor | Importance (Must Know Should Know Could Know) |
|---|---|---|---|---|
| 1. | Processing of information in neuronal pool | LGIS CBL SDL | Dr. Sumaira Iqbal | Must Know |

**Class Learning Outcomes:**
- Differentiate between various types of synapses. (BLO1)
- Identify the physiologic anatomy of the synapse. (BLO1)
- Elucidate the electrical events during neuronal excitation and inhibition (EPSPs& IPSPs). (BLO1)
- Summarize the transmission and processing of signals in neuronal pools (summation, facilitation, convergence divergence, after discharge, synaptic delay, and fatigue). (BLO1)

| Sr. No. | Topics | Educational Strategies | Name of instructor | Importance |
|---|---|---|---|---|
| 5. | Sensory receptors & receptor Potential | LGIS CBL SDL | Dr. Sumaira Iqbal | Must Know |

**Class Learning Outcomes:**
- Classify the various types of sensory receptors. (BLO2)
- Explain the sensory stimuli and differential sensitivity of receptors. (BLO2)
- Explain the sensory transduction into nerve impulses. (BLO2)
- Describe the local electrical currents at nerve endings— receptor potentials, adaptation of receptors. (BLO2)
  Classify the nerve fibers that transmit different types of signals on a physiological basis. (BLO2)

| Sr. No. | Topics | Educational Strategies | Name of instructor | Importance |
|---|---|---|---|---|
| 6. | Sensory tracts and cortex | LGIS CBL SDL | Dr. Sumaira Iqbal | Must Know |

**Class Learning Outcomes:**
- Identify the sensations carried by different sensory tracts. (BLO3)
- Differentiate between different sensory tracts. (BLO3)
- Describe the somatosensory cortex and somatosensory association areas. (BLO3)
- Explain the various thermal sensations, thermal receptors and their excitation and transmission of thermal signals in the nervous system. (BLO3)
- Discuss the pathophysiology and features of Brown Sequard syndrome. (BLO3)
- Explain clinical features of spinal shock and recovery of spinal functions after spinal shock. (BLO3)

| Sr. No. | Topics | Educational Strategies | Name of instructor | Importance |
|---|---|---|---|---|
| 4. | Brain analgesia system | LGIS CBL SDL | Dr. Sumaira Iqbal | Must Know |

**Class Learning Outcomes:**
- Classify the different types of pain. (BLO4)
- Compare and contrast the perception and transmission of the different types of pain. (BLO4)

- Explain the pain suppression system in the brain and spinal cord. (BLO4)
- Describe the brain's opiate system. endorphins and enkephalins. (BLO4)
- Describe the clinical abnormalities of pain and other somatic sensations. (BLO4)

| 5. | Motor system / Spindle / stretch reflex | LGIS CBL SDL | Dr. Somia Iqbal | Must Know |
|---|---|---|---|---|

**Class Learning Outcomes:**
- Relate the organization of grey and white matter in spinal cord to the pathophysiology of various spinal cord injuries. (BLO5)
- Explain the role of proprioceptors (muscle spindles and Golgi tendon organs) in motor movements. (BLO5)
- Explain dynamic and static stretch reflex. (BLO5)
- Describe the flexor reflex and the crossed extensor reflex. (BLO5)
- Explain the reciprocal inhibition and reciprocal innervation. (BLO5)
- Identify the reflexes of posture and locomotion in the spinal cord. (BLO5)

| 6. | Cerebral Cortex | LGIS CBL SDL | Dr. Somia Iqbal | Must Know |
|---|---|---|---|---|

**Class Learning Outcomes:**
- Identify the various Brodmann's areas of cerebral cortex. (BLO6)
- Explain the functions of the various areas of the cerebral cortex. (BLO6)
- Explain the role of primary motor cortex, premotor area, and supplementary motor area in control of voluntary motor movements. (BLO6)

| 7. | Pyramidal tract/ extra pyramidal tract | LGIS CBL SDL | Dr. Somia Iqbal | Must Know |
|---|---|---|---|---|

**Class Learning Outcomes:**
- Identify the various pathways for transmission of signals for voluntary motor control from the motor cortex to the muscles. (BLO7)
- Explain the significance of anterior motor neurons as the lower motor neurons. (BLO7)
- Compare and contrast the upper and lower motor neurons and their lesions. (BLO7)

| 8. | Brain stem | LGIS CBL SDL | Dr. Hina Umair | Must Know |
|---|---|---|---|---|

**Class Learning Outcomes:**
- Identify the role of the brain stem in controlling motor function and role in posture of the body against gravity. (BLO8)

| 9. | Vestibular system | LGIS CBL SDL | Dr. Hina Umair | Must Know |
|---|---|---|---|---|

**Class Learning Outcomes:**
- Explain the vestibular apparatus and function of the utricle and saccule in the maintenance of static equilibrium. (BLO9)
- Describe the detection of head rotation by the semicircular ducts. (BLO9)

| | | | | |
|---|---|---|---|---|
| | • Explain the vestibular mechanisms for stabilizing the eyes. (BLO9) | | | |
| 10. | Physiology of Speech | LGIS CBL SDL | Dr. Somia Iqbal | Must Know |

**Class Learning Outcomes:**
- Explain the functions of specific cortical areas and association areas in the physiology of speech. (BLO10)
- Identify the function of the Wernicke's and Broca's Area. (BLO10)
- Explain the pathophysiological disorders related to speech. (BLO10)

| | | | | |
|---|---|---|---|---|
| 11. | Cerebellum | LGIS CBL SDL | Dr. Sumaira Iqbal | Must Know |

**Class Learning Outcomes:**
- Explain the functional anatomy of cerebellum and basal ganglia. (BLO11)
- Describe the neuronal circuits of the cerebellum. (BLO11)
- Describe the pathophysiological basis of the clinical abnormalities of the cerebellum and basal ganglia. (BLO11)
- Justify the clinical presentation with reasoning of cerebellar diseases. (BLO11)

| | | | | |
|---|---|---|---|---|
| 12. | Basal ganglia | LGIS CBL SDL | Dr. Sumaira Iqbal | Must Know |

- Identify the role of the basal ganglia for cognitive control of sequences of motor patterns. (BLO12)
- Explain the direct and indirect circuits of basal ganglia. (BLO12)
- Explain the role of various specific neurotransmitter substances in the basal ganglia and the pathophysiological disorders related to their deficiency. (BLO12)
- Describe the pathophysiology, clinical features, and treatment of Parkinsonism. (BLO12)
- Justify the clinical presentation of Parkinsonism with underlying pathophysiology. (BLO12)

| | | | | |
|---|---|---|---|---|
| 13. | Cerebrovascular Accidents | LGIS CBL SDL | Dr. Hina Umair | Must Know |

**Class Learning Outcomes:**
- Explain the causes of CVAs. (BLO13)
- Correlate the clinical presentation of stroke with the sites of lesion. (BLO13)

| | | | | |
|---|---|---|---|---|
| 14. | Memory | LGIS CBL SDL | Dr. Somia Iqbal | Must Know |

**Class Learning Outcomes:**
- Classify memories based on: (BLO14)
- I. Type of sensory experience
- II. Time of retention
- III. Synaptic facilitation and habituation

- Explain the process of consolidation and chemical and anatomical changes occurring at the synapse leading to it. (BLO14)
- Compare various types of amnesia including retrograde, anterograde amnesia, Alzheimer's, and dementia. (BLO14)

| 15. | Sleep | LGIS CBL SDL | Dr. Hina Umair | Must Know |
|---|---|---|---|---|

**Class Learning Outcomes:**
- Define Sleep. (BLO15)
- Differentiate between slow-wave sleep and REM Sleep. (BLO15)
- Describe the basic theories of sleep and physiologic effects of sleep. Identify the different types of brain waves and their origin. (BLO15)
- Explain the changes in EEG at different stages of wakefulness and sleep. (BLO15)

| 16. | EEG/epilepsy | LGIS CBL SDL | Dr. Hina Umair | Must Know |
|---|---|---|---|---|

**Class Learning Outcomes:**
- Explain the effect of varying levels of cerebral activity on the frequency of the EEG. (BLO16)
- Define Epilepsy. (BLO16)
- Differentiate between Grand mal, petit mal epilepsy and focal epilepsy. (BLO16)

| 17. | Functions of thalamus and hypothalamus | LGIS CBL SDL | Dr. Hina Umair | Must Know |
|---|---|---|---|---|

**Class Learning Outcomes:**
- Explain the functional anatomy of the Thalamus. (BLO17)
- Describe the functions of thalamus. Identify the role of limbic system. Describe the functional anatomy and functions of hypothalamus. (BLO17)
- Identify the normal body temperatures. (BLO17)
- Explain the mechanisms of heat production and heat loss. (BLO17)
- Describe the regulation of body temperature and role of the hypothalamus. (BLO17)
- Explain the mechanisms that decrease or increase body temperature. (BLO17)
- Appreciate the concept of a "setpoint" for temperature control. Appraise the behavioral control of body temperature. (BLO17)
- Interpret the various abnormalities of body temperature regulation with special focus on fever. (BLO17)

| 18. | Higher Mental Functions | LGIS CBL SDL | Dr. Hina Umair | Must Know |
|---|---|---|---|---|

**Class Learning Outcomes:**
- Discuss the higher intellectual functions of the prefrontal areas and the various cortical association areas. (BLO18)
- Describe the functions of corpus callosum. (BLO18)
- Discuss pathophysiology and clinical presentations of depression, bipolar disorders, schizophrenia. (BLO18)

| Sr. No. | | Educational Strategies | Name of instructor | Importance (Must Know Should Know Could Know) |
|---|---|---|---|---|
| | • Demonstrate understanding of basic concepts of Alzheimer's disease. (BLO18)<br>• Justify the clinical presentation with underlying pathophysiology of Alzheimer's disease. (BLO18) | | | |
| 19. | CSF and blood brain barrier | LGIS<br>CBL<br>SDL | Dr. Hina Umair | Must Know |

**Class Learning Outcomes:**
- Discuss the synthesis and trace the pathway of CSF circulation.
- Explain the physiological significance of blood brain barrier.
- Discuss hydrocephalus.

| 20. | Autonomic nervous system | LGIS<br>CBL<br>SDL | Dr. Hina Umair | Must Know |

**Class Learning Outcomes:**
- Discuss the autonomic nervous system in detail.

# LIST OF PRACTICALS

| Sr. No. | Topics | Educational Strategies | Name of instructor | Importance (Must Know Should Know Could Know) |
|---|---|---|---|---|
| 1 | Examination of Cranial Nerves | SGD | Dr. Rabia and Dr. Samia | Must Know |

**Learning Outcomes:**
- Demonstrate the examination of cranial nerves.

| 2 | Examination of Motor System | SGD | Dr. Attayab | Must Know |

**Learning Outcomes:**
- Demonstrate the examination of motor system.

| 3 | Examination of Sensory System | SGD | Dr. Attayab | Must Know |

**Learning Outcomes:**
- Demonstrate the examination of sensory system.

| 4 | Examination of Cerebellar Functions | SGD | Dr. Hira | Must Know |

**Learning Outcomes:**
- Demonstrate the examination of cerebellar functions.

| 5 | Examination of Superficial Reflexes | SGD | Dr. Khalid | Must Know |

**Learning Outcomes:**
- **Enlist the superficial reflexes along with their root value.**
- Demonstrate superficial reflexes.

| 4 | Examination of Deep Tendon Reflexes | SGD | Dr. Samia | Must Know |

**Learning Outcomes:**

- **Enlist deep tendon reflex.**
- Describe the root value of deep tendon reflex.
- Demonstrate the deep tendon reflex.

# CBLs

## CBL-1 Multiple Sclerosis

Sughra Bibi is a 32-year-old assistant at a buffalo farm in a village near Narowal. She feeds and takes care of buffalo and cows. At age 27 she had first episode of blurred vision. She was having difficulty in sewing and knitting. She had made an appointment with an ophthalmologist, but when her vision cleared on its own , she was relieved and cancelled her appointment. Ten months later, the blurred vision returned. She also had double vision and a "pins and needles" feeling and severe weakness in her legs. She was even too weak to walk the cattle to grass. The ophthalmologist referred Sughra Bibi to a neurologist who ordered a series of tests. Magnetic resonance imaging (MRI) showed typical lesions of Multiple Sclerosis. Nerve conduction studies showed prolonged latent period that was consistent with decreased and poor nerve conduction.

Learning Outcomes:

By the end of session, student should be able to:
1. Explain the given case scenario.
2. Comprehend the functional unit of nervous system (the neuron), its types, functions, and properties.
3. Explain the morphology and types of synapses, their role in processing of information by the nervous system.
4. Explain the role of second messenger system in post synaptic neuron in synaptic transmission.
5. Describe the structure and function of various chemical substances that function as synaptic transmitters.
6. Explain electrical events involved in excitation and inhibition of synapse including pre and postsynaptic inhibition.
7. Describe the special characteristics of synaptic transmission.

## CBL-2 Gunshot Wound

A 35-year-old female presented in the hospital after a gunshot wound in her abdomen. The doctor performed laparotomy with the midline incision, removed the bullet, and repaired the involved organs. After 3 days of removal of stitches, the patient observed numbness and lack of thermal sensation in her scar. The doctor reassured her for complete recovery in a few days. After one month she reported back with hyperesthesia in the same area. On examination, the doctor observed the loss of pressure, two-point discrimination and vibration sensation in the same area. He reassured the patient that her sensations would very likely come back after some time. After 6 months, she had partially recovered from most of the lost sensations.

Learning Objectives:

By the end of session, student should be able to:

1Explain the given case scenario.

2. Outline general and sensory classification of nerve fiber and their functional significance.

3. Comprehend the concept of sensory receptors, their types, characteristics distribution in the body.

4. Describe the mechanism of generation of receptor potential and transduction of sensory stimuli into nerve impulses.

5. Discuss the concept of receptor adaptation, labeled line coding and detection of intensity, location and specificity of stimuli.
6. Explain DCML.

## CBL-3 Injured Sole

A 45-year-old laborer, while working at a construction site, accidentally stepped on a nail. He withdrew his foot immediately shifting the entire weight of body on the other leg. On close inspection he saw his sole bleeding profusely. Initially he felt sharp cutting pain. A few minutes later all he felt was throbbing pain.

Learning Objectives

By the end of the session, student should be able to:
1. Explain the given case scenario.
2. Explain various types of pain.
3. Differentiate between neospinothalamic and paleospinothalamic tract.
4. Understand anterolateral system.
5. Elaborate the significance of stretch reflex.
6. Explain the structure and function of muscle spindle.
7. Explain the structure and function of Golgi tendon.
8. Describe the withdrawal reflex and crossed extensor reflex.

## CBL-4: I Can't Speak

A 58-year-old female presented in emergency department with h/o sudden loss of consciousness which was persistent. The attending physician noted hypertonia on Rt half of body & amp; and exaggerated reflexes. Urgent CT scan brain showed hemorrhage in Lt internal capsule of brain. There has been h/o uncontrolled hypertension for the last 15 years. He gave her supportive treatment and after regaining conscience after 10 days, she had difficulty in speech. She was able to understand written and spoken words but was unable to utter even simple words. There was spastic paralysis of Rt half of the body; ankle clonus was demonstrable, and Babinski's sign was present. The sensory system was intact. The doctors made diagnosis of hemorrhagic CVA (Lt).

Learning Objectives:

At the end of the session, the student should be able to:
1. Explain the given case scenario.
2. Summarize functional anatomy of motor cortex.
3. Discuss the pathophysiology of cerebrovascular accident.
4. Explain the pathophysiological basis of signs &amp, symptoms of the patient.
5. Appreciate the different speech areas and physiological role of each.
6. Differentiate between types of aphasia &amps; compare these with dysarthria.
7. Compare the upper motor &amp, lower motor neuron lesions.
8. Explain the physiological basis of Babinski's sign.
9. Develop a brief narrative of the patients medical history.

## CBL-5: 4: Clumsy Movements

A 48-year-old male presents with complaints of clumsy movements and an inability to coordinate his hand movements while eating, writing and other daily activities. He has had repeated episodes of fall due to difficulty in balance (ataxia).The physician noticed failure of progression in talking (dysarthria) while taking history. There was no significant history of trauma to the head and other medical history was not significant. After a thorough examination, the physician found hypotonia and exaggerated deep reflexes. He also observed past pointing (dysmetria), intention tremors, inability to perform repetitive alternating movements (dysdiadochokinesia) and synergistic movements. Romberg's sign was negative. Brain scan revealed atrophy of cerebellum.

Learning Objectives:

At the end of the session, the student should be able to:

1. Explain the given case scenario.
2. Discuss the anatomical and functional divisions of cerebellum.
3. Enlist the afferent and efferent pathways of the cerebellum and their significance.
4. Critically reflect on the integrative motor control of spinal cord, cerebellum, basal ganglia, and cerebral cortex.
5. Describe the tests to evaluate cerebellar dysfunction and distinguish it from sensory ataxia.
6. Gain insight into the pathophysiology of hypotonia, exaggerated deep reflexes, intention tremors, asynergistic movements, dysdiadochokinesia, dysmetria, ataxia and dysarthria in cerebellar disorders.
7. Differentiate intention tremors from resting tremors.

**Teaching faculty contact:**

**Email address :** **physiologywmc@gmail.com**

1. **Learning Resources:**
   - Human Physiology 9th Edition by Sherwood
   - Ganong's Review of Medical Physiology, 25th Edition
   - BRS Physiology ,5th edition by Linda S. Costanzo
   - A textbook of practical physiology,8th edition by CL Ghai
   - Guyton and hall review ,3rd edition
2. **Online resources**
   - Google classroom
   - Understandingphysiology.wordpress.com
3. **Library resources:**
   - Guyton and Hall Textbook of Medical Physiology (14th Edition)
   - Human Physiology 9th Edition by Sherwood
   - Ganong's Review of Medical Physiology, 25th Edition
   - BRS Physiology ,5th edition by Linda S. Costanzo 50
   - A textbook of practical physiology,8th edition by CL Ghai
   - Guyton and hall review ,3rd edition

**Assessment formats:**

| Assessment Strategies (Formative) | Assessment Strategies (Summative) |
|---|---|
| <ul><li>CBL Case Discussion</li><li>CBL Quiz</li><li>Class Discussion</li><li>Flipped Class Format</li><li>Reflective writing</li></ul> | <ul><li>MCQs</li><li>SEQs</li><li>OSPE</li><li>VIVA</li></ul> |

# Biochemistry

**Subject Learning outcomes:**

1. Apply knowledge of Biochemistry regarding metabolic changes leading to common clinical diseases and disorders in the Human Body
2. Demonstrate Estimation of clinically important metabolites and enzymes in body fluids and co-relate their clinical importance in Diagnosis of Diseases, Disorders, Acid Base, Electrolyte and Hormonal Imbalance

**Block Learning outcomes:**

1. BLO-1: Relate the significance of different nucleotides in medicine (SLO-1 & SLO-2)
2. BLO-2: Apply the knowledge of nucleotide metabolism for understanding relevant metabolic disorders (SLO-1 & SLO-2)
3. BLO-3: Apply the knowledge of molecular medicine, genetics and biotechnology in health and disease (SLO-1 & SLO-2)
4. BLO-4: Relate the importance of various neurotransmitters to its clinical significance (SLO-1)
5. BLO-5: Perform and interpret the results of various examinations (SLO-2)

| S.# | Topic | Educational Strategies | Name of instructor | Importance (Must Know Should Know Could Know) |
|---|---|---|---|---|
| 1. | **Nucleotide Chemistry** | LGIS / CBL / SGD | Dr. Zahid Mehmood | Must Know |
| **Class Learning Outcomes:** | | | | |
| • Demonstrate the understanding of chemistry and structure of nucleotides and their biochemical role (BLO-1) <br> • Explain nucleotides, structure, their derivatives, and their biochemical role (BLO-1) <br> • Discuss the synthetic derivatives of purine and pyrimidines, their role in health and disease (BLO-1) <br> • Describe nucleic acids, their types, structure, and functions (BLO-1) | | | | |
| 2. | **Nucleotide Metabolism** | LGIS / CBL / SGD | Dr. Zahid Mehmood | Must Know |
| **Class Learning Outcomes:** | | | | |
| • Outline the synthesis of purine nucleotides and deoxyribonucleotides (BLO-2) <br> • Explain the salvage pathway of nucleotides (BLO-2) <br> • Describe the degradation of purines with related diseases and discuss the formation of uric acid & hyperuricemia (BLO-2) <br> • Explain synthesis & degradation of pyrimidines and state related diseases (BLO-2) | | | | |
| 3. | **Molecular Genetics** | LGIS / CBL / SGD | Dr. Rabbiah Manzoor | Must Know |
| **Class Learning Outcomes:** | | | | |

- Describe DNA structure & types (BLO-3)
- State organization of eukaryotic DNA (BLO-3)
- Explain replication of prokaryotic DNA & eukaryotic DNA (BLO-3)
- Explain super coiling of DNA (BLO-3)
- Describe DNA repair mechanisms (BLO-3)
- Explain Xeroderma Pigmentosum (BLO-3)
- Discuss various genetic diseases (BLO-3)
- Give structure of three types of RNA (BLO-3)
- Outline prokaryotic and eukaryotic transcription (BLO-3)
- Explain reverse transcription (BLO-3)
- Describe translation, post translational modification and translation of genetic code (BLO-3)
- Write a note on mutations (BLO-3)
- Outline regulation of gene expression (BLO-3)
- Write a note on PCR & Southern blotting techniques (BLO-3)
- Explain probes (BLO-3)
- Explain prenatal diagnosis (BLO-3)
- Discuss gene therapy and gene expression (BLO-3)
- Summarize DNA cloning (BLO-3)
- Explain restriction fragment length polymorphism (BLO-3)

| 4. | **Neurotransmitters** | LGIS/ CBL | Dr. Anas Khalil | Must Know |

**Class Learning Outcomes:**
- Write a note on catecholamines, their chemistry, synthesis and degradation (BLO-4)
- Explain synthesis and role of Acetylcholine, Dopamine, Serotonin and Histamine (BLO-4)
- Discuss the Dopaminergic neurotransmission (Including site of synthesis, stimulus for secretion, mechanism of action, receptors, intracellular effects, target cells, tissues, and biochemical role/functions) (BLO-4)
- Explain synthesis and biochemical role of Glutamate, GABA and NO (BLO-4)

## LIST OF PRACTICALS

| Sr. No. | Topics | Educational Strategies | Name of instructor | Importance (Must Know Should Know Could Know) |
|---------|--------|------------------------|--------------------|----------------------------------------------|
| 1 | Collection and preservation of clinical specimens | Demonstration / Practical | Dr. Kinza Talat | Must Know |
| **Learning Outcomes:** | | | | |
| • Comprehend the procedures involved in collection & preservation of clinical specimens | | | | |
| 2 | Estimation and clinical interpretation of Uric Acid in blood | Demonstration / Practical | Dr. Sehrish Baber | Must Know |
| **Learning Outcomes:** | | | | |

| 3 | DNA Extraction | Demonstration / Practical | Dr. Ahsan Ali | Must Know |
|---|---|---|---|---|

**Learning Outcomes:**
- Describe the detailed procedure for DNA extraction

| 4 | PCR | Demonstration / Practical | Dr. Ahsan Ali | Must Know |
|---|---|---|---|---|

**Learning Outcomes:**
- Comprehend principle, procedure, and application of PCR

# Biochemistry CBLs/SDLs

## CBL-1: Metabolism of Nucleic acids (Acute Gout)

A moderately obese 54-year-old male appeared at the emergency department complaining of severe pain of 10-hour duration in his left big toe. He stated that he was a regular consumer of meat and soda (alcohol and sea food consumption are also risk factors). He had no other significant medical history. On examination, his left big toe was red and markedly swollen around the metacarpophalangeal joint, and exquisitely sensitive. There was no evidence of arthritis elsewhere. Because of the history and location of the affected joint, the attending physician suspected that the patient was having an attack of acute gout. She ordered several lab tests, including a white cell count, determination of serum uric acid, and x-ray examination of the affected joint. The x-ray findings were non-specific; no indication of chronic arthritis was evident. We have tabulated the findings of other tests below. The doctor performed arthrocentesis under local anesthesia, on the affected joint and a small amount of synovial fluid withdrawn and sent to the laboratory for detection of cells and crystals. The histopathologist detected typical needle-shaped crystals of MSU showing negative birefringence in the synovial fluid.

### LAB INVESTIGATIONS:

| Test Name | Result | Normal Values | |
|---|---|---|---|
| Serum Uric acid | 680 µmol/L | Children | 120-330 µmol/L |
| | | Adult Male | 210-430 µmol/L |
| | | Adult Female | 150-360 µmol/L |
| ESR | 60 mm | 1 – 10 mm in 1st hour | |
| WBC Count | $11.0 \times 10^9 / L$ | $4.0 \times 11.0 \times 10^9 / L$ | |
| RA Factor | Negative | Negative | |

Gout is a disease caused by hyperuricemia mostly due to genetic factors while diet and lifestyle play a minor role in its causation. Uric acid is a product of purine metabolism and as it is already near its saturation limit in plasma, minor increase due to mostly under-excretion from kidney or overproduction leads to its deposition in crystal form mostly where the solvent is stagnant like synovial fluid of relatively immobile joints. This crystallization appears first at the most immobile and coldest fluid body, typically big toe joint space and typically at night because temperature is further lower at nighttime and due to sleep mobility is also less. Crystals in a

smooth lubricated environment play havoc and cause acute inflammatory response leading to severe pain, redness, warmth, and loss of function locally. Moreover, uric acid deposition in other soft tissues leads to formation of tophi.

**LEARNING OBJECTIVES:**

At the end of the block the students should be able to describe:

- Structure and chemistry of nucleosides and nucleotides.
- Functions of nucleotides.
- The biochemical basis of various clinical features

**REFERENCE BOOKS:**

- Harper's textbook of Biochemistry.
- Davidson's Practice of Medicine.
- Lippincott's textbook of Biochemistry

## CBL-2: Nucleic Acids (ADA Deficiency)

A little girl aged 11 months had several attacks of pneumonia and thrush (oral infection usually due to a fungus Candida albicans) since birth. The major findings of a thorough workup were very low levels of circulating lymphocytes (i.e., **severe lymphopenia**) and low levels of circulating **immunoglobulins**. The attending pediatrician suspected **SCID**. Analysis of a sample of red blood Cells revealed a low activity of **ADA** and very high level (about 50 times normal) of **dATP**. This confirmed the diagnosis of SCID due to deficiency of ADA, the enzyme that converts **adenosine** to **inosine.**

The deficiency of ADA is an autosomal recessive and accounts for almost 15% of cases of SCID. T lymphocytes express high activity of enzymes. Lack of ADA activity leads to accumulation of adenosine and dATP which is toxic to T cells. Secondly, it also affects B lymphocytes which lead to impaired **humoral immunity**. A defective immune system allows different **opportunistic infection** to occur and recur. An example of acquired immunodeficiency is AIDS. Doctors treat such conditions using antibiotics, fortifying the immune system by immunoglobulins, and treating the root cause.

**LEARNING OBJECTIVES:**

At the end of the block the students should be able to comprehend the following:

- Ingestion and fate of nucleotides in human body
- Role of Nucleotides in DNA synthesis
- The biochemical basis of various clinical features

**REFERENCE BOOKS:**

- Harper's textbook of Biochemistry. (Page 616)
- Davidson's Practice of Medicine.
- Lippincott's textbook of Biochemistry

## CBL-3: DNA Damage and Repair (Xeroderma Pigmentosum)

An 8-year-old boy, an only child, presented at a dermatology clinic with a skin tumor on his right cheek. He had always avoided exposure to sunlight because it made his skin blister. His

skin had scattered areas of hyperpigmentation and other areas where it looked mildly atrophied. There was no family history of a similar disorder. Because of the presence of a skin tumor at such a young age, the history of avoidance of sunlight, and the other milder skin lesions, the dermatologist made a provisional diagnosis of XP.

The dermatologist exposed patient's fibroblasts and control fibroblasts to UV light and took cell samples at 8-hour intervals for a total of 32 h post irradiation. Extracts of DNA were prepared and the numbers of dimers remaining at each time point indicated were determined. He found that only 24% of the dimers formed persisted in DNA extracted from the normal cells at 32 h, whereas approximately 95% were in the extract from the patient's cells at 32 h. This showed irreparable UV-induced lesions, and thus confirmed the diagnosis of XP.

Exposure to unfiltered UV light causes formation of pyrimidine dimers in both prokaryotic and eukaryotic cells. This adducts formation prevents replication of DNA beyond this point. If these persist, it can lead to abnormal replication products, numerous mutations, and multiple skin cancers. There are specific proteins in humans called XP proteins (uvr ABC in prokaryotes) which are continuously correcting such adduct formations by excision repair of damaged DNA. If there is a defect in one of these proteins (genetic), it leads to abnormal repair mechanism and the resulting disease is Xeroderma pigmentosum. A physician must differentiate it from porphyria.

**LEARNING OBJECTIVES:**

At the end of the block the students should be able to describe and illustrate the :
- Structure of DNA and its replication.
- Causes of DNA damage and repair mechanism.
- Xeroderma pigmentosum and other related disorders

**REFERENCE BOOKS:**
- Harper's textbook of Biochemistry.
- Davidson's Practice of Medicine.
- Lippincott's textbook of Biochemistry

### CBL-4: Transcription (Tuberculosis and rifampin)

A 24-year-old girl presented with a 9-week history of cough, malaise, and breathlessness. She had lost 5Kg weight in the last two months but no history of night sweats or hemoptysis. She along with her 4 siblings and parents, lives in a house of only two rooms. On examination, she had mild pyrexia (38°C) but had no anemia or clubbing. Crepitation was audible over the lung apex on the right side. There were no other notable physical signs. Her lab investigations showed normal hemoglobin and WBC count but raised CRP (C reactive protein). The chest X-ray showed unilateral upper- and middle-lobe shadowing but no hilar enlargement. Sputum examination showed acid-fast bacilli and Mycobacterium tuberculosis was subsequently cultured. Mantoux test was strongly positive. The doctor made the diagnosis of pulmonary tuberculosis. He treated the patient with isoniazid and rifampin for 6 months, together with pyrazinamide and ethambutol

for the first 2 months. He allowed the patient to go home on medication when her sputum became negative on direct smear. After three months, the chest X-ray is now much improved.

**RELATED LAB INVESTIGATIONS:**

| Test Name | Result | Normal Values |
|---|---|---|
| **Hemoglobin** | 12.4 g/dL | Adult Male 13-18 g/dL<br>Adult Female 12-16 g/dL |
| **WBC Count** | $9.8 \times 10^9$ / L | $4.0 \times 11.0 \times 10^9$ / L |
| **CRP** | 23mg/dL | 5-10 mg/dL |
| **Mantoux test** (tuberculin skin test) (NOT SIGNIFICANT) "**QuantiFERON-TB Gold**" is a newer test which measures the response of immune system of body to MTB antigen in vitro | 12mm induration | Less than 10mm in vaccinated individuals |
| **Sputum for culture Sensitivity** | No growth | No growth |
| **Sputum for AFB** (smear test) | Positive only third time | Negative |
| **Culture of MTBC** (mycobacterium tuberculosis complex) 2-3 weeks Traditional solid media shows growth in 4-8 weeks | Positive | Negative |
| **Nucleic Acid Amplification Tests (NAAT)** | Detects genetic material of MTB | Not detected |
| **LAM (lipoarabinomannan)antigen test** in urine (mycobacterial cell wall component shed in plasma ) 30 Min | Positive | Negative |
| **Adenosine Deaminase Test ADA** | Increased | - |
| **HIV test** | Negative | Negative |

Pulmonary tuberculosis is an infection of the lungs by a special bacterium called mycobacterium tuberculosis. Vaccine against TB is a part of EPI (extended program of immunization) by WHO which imparts roughly 20% additional protection against the infection. BCG vaccine (Bacillus Calmette–Guérin) is the only vaccine available and given to all the children round the world (90%) against tuberculosis. Though the disease is not common in developed countries, but in developing countries including Pakistan and especially African countries TB is quite prevalent and a major public health problem. Multidrug therapy with good compliance for 6 months at least is usually the treatment of choice. One of the antibiotic drugs is rifampin. Rifampin inhibits bacterial cell growth by inhibiting RNA synthesis. It binds to beta subunit of bacterial (prokaryotic) RNA polymerase and interferes with the formation of the first phosphodiester bond.

This action prevents initiation of transcription in Acid fast bacilli (AFB) which slows the growth and replication of the bacteria, and the body washed away these bacteria in secretions. If there is resistance to this drug, the infection is MDR-TB (multi-drug resistant TB). MDR-TB and XDR-TB (extensive drug resistant TB) are serious public health problems and over 13 million die every year with TB worldwide. Dactinomycin (also called Actinomycin D) is an antibiotic and anticancer agent which binds DNA template and hinders the movement of RNA polymerase on it, blocking the transcription.

## LEARNING OBJECTIVES:

At the end of the block the students should be able to describe the:

- Structure and types of RNA
- Pro and Eukaryotic gene transcription
- Post transcriptional modification of RNA including splicing.

## REFERENCE BOOKS:

- Lippincott's textbook of Biochemistry
- Harper's textbook of Biochemistry
- Davidson's Practice of Medicine

## CBL-5: Biotechnology Techniques - PCR (HCV & Lymphoma)

A 54-year-old male presented with fever, night sweats and weight loss. He also complained of a non-tender, non-inflammatory mass on the left lateral side of his neck. The mass has grown to the size of a hazelnut since the parents noticed it 6 weeks ago. On examination submandibular and supraclavicular nodes were palpable. Blood complete picture was normal. The doctor diagnosed the patient as a case of B Cell Non-Hodgkin lymphoma with the help of tissue histology and bone marrow aspiration cytology. The laboratory investigation also tested positive for HCV infection.

In addition to commitment about the treatment and prognosis of the lymphoma, the attending physician was also concerned about the status of his HCV infection. He ordered abdominal ultrasound to check for liver cirrhosis and Quantitative PCR to check for HCV viral load.

## RELATED LAB INVESTIGATIONS:

| Test Name | Result | Normal Values |
|---|---|---|
| Hemoglobin | 14 g/dL | Adult Male   13-18 g/dL<br>Adult Female  12-16 g/dL |
| WBC Count | $11.5 \times 10^9$ / L | $4.0 \times 11.0 \times 10^9$ / L |
| (Tumor/mass )Lymph Node Biopsy | B Cell lymphoma cells seen | Normal cytology |
| Lymphoma cells in peripheral blood smear | Not seen | Not seen |
| Bone marrow biopsy for histological examination | Monoclonal lymphoid aggregates seen | No such aggregates |
| LDH | 630 U/L | 225-450 U/L |

| Anti HCV Antibody test | Positive | Negative |
|---|---|---|
| USG Abdomen | Nodular and shrunken appearance of liver but mild changes | Normal echotexture |
| **Quantitative PCR (for viral RNA)** | 700,000 IU/mL | Normally it is negative. Viral Load is expressed as copies/mL: **Low:** less than 2 M/mL • **High**: more than 2 M/mL. Or Expressed as International Units (IU/mL): • **Low:** less than 800,000 IU/mL • **High:** more than 800,000 IU/mL |
| **Cytogenetic testing in culture sample (2 -3 weeks)** | No abnormal chromosomal pairing or less or more chromosomes found | Normal chromosomal pairing and normal number |
| **Fluorescent in situ hybridization (FISH) for t(14;18) of c-myc** | No translocation found on microscopy | No translocation |
| **PCR for Immunoglobulin light chain gene rearrangements** | A nearby research center carried out the test and the outcome had a research benefit as well. For patient it was helpful in determining whether it was reactive or malignant | |

Though HCV and lymphoma are not a common combination in patients encountered in clinics, we need to emphasize the role of biotechnology techniques in diagnosis, management, and prognosis of both the diseases. PCR is a very basic technique of DNA selected portion amplification in vitro from even minute quantities of DNA. It makes DNA ample to carry out any genetic analysis. For HCV patients doctors usually advise quantitative PCR to see viral load. Doctors may check certain related immunoglobulin gene rearrangement in lymphoma to understand etiology of the disease better.

**LEARNING OBJECTIVES:**

At the end of the block the students should be able to describe the:

- Molecular Biology Techniques and their applications
- Procedure, principle, and uses of PCR
- Types of PCR

**REFERENCE BOOKS:**

**1.** Lippincott's textbook of Biochemistry

2. Harper's textbook of Biochemistry

**Learning Resources:**

1. **Reference Books**:

- Lippincott's Illustrated Reviews Biochemistry
- Harper's Illustrated Biochemistry
- Hashmi's Textbook of Medical Biochemistry
- Textbook Of Medical Biochemistry by Chatterjea
- Mushtaq's Essentials of Medical Biochemistry Volume I

2. **Online resources**
3. **Library resources:**
   - Marks' Basic Medical Biochemistry a Clinical Approach
   - Lehninger Principles of Biochemistry
   - Baynes - Medical Biochemistry
   - Stryer - Biochemistry

**Teaching faculty & Students hours**

| Name | Email address |
|---|---|
| Prof. Dr. Syed Touqeer Abbas | syedtouqeerabbas@gmail.com |
| Dr. Zahid Mehmood | Zm30017@gmail.com |
| Dr. Rabbiah Manzoor | rabbiahmanzoor@gmail.com |
| Dr. Anas Khalil | anaskhalil@hotmail.com |
| Dr. Sehrish Baber | Sehrishbaber1@gmail.com |
| Dr. Kinza Talat | kanzatallat@gmail.com |
| Dr. Ahsan Ali Syed | driftingcivic95@gmail.com |

**Assessment formats:**

| Assessment Strategies (Formative) | Assessment Strategies (Summative) |
|---|---|
| CBLs, SGDs, Quizzes, Vivas | Class Tests<br>End of Block Exams |

# Medicine

**Learning outcome:**

Correlate the relevant basic knowledge with clinical presentation of 7th cranial nerve palsy, Brown Sequard syndrome, Epilepsy, Parkinson disease and to perform basic neurological examination.

| S.No. | Topic/Theme | Educational Strategies | Name of instructor | Importance (Must know Should know. Could know) |
|---|---|---|---|---|
| 1. | **Cranial nerve examination and 7th cranial nerve palsy** | Flipped Classroom | Dr. Farhat Ul Ain / PGT Medicine | Should Know |
| **Learning Outcomes:** To perform cranial nerve examination' To diagnose a case of 7th cranial nerve palsy. | | | | |
| 2. | **Motor system examination** | Flipped Class (Video of clinical examination)/ Bedside Teaching | Dr. Ayesha Rani / PGT Medicine | Should Know |
| **Learning Outcomes:** To perform Motor system examination. | | | | |
| 3. | **Brown Sequard syndrome** | Video clips/ LGIS/ | Dr. Ayesha Rani | Nice to know. |
| **Learning Outcomes:** Demonstrate understanding of basic concepts of Braun Sequard Syndrome | | | | |
| 4. | **Upper and Lower motor neuron lesions** | LGIS | Dr. Ayesha Rani | Should Know |
| **Learning Outcomes:** ● Differentiate between clinical features of upper and Lower motor neuron lesions | | | | |
| 5. | **Epilepsy** | LGIS | Dr. Waleed Shehzad | Should Know |
| **Learning Outcomes:** ● To know clinical features of Epilepsy. | | | | |

| 6. | **Parkinson disease** | CBL | Dr. Ayesha Rani | Should Know |
|----|----|----|----|----|

**Learning Outcomes:**
- Demonstrate understanding of basic concepts of Parkinsonism

| 7. | **Ethics & Professionalism** | LGIS | Dr. Elein Pulus | Should Know |
|----|----|----|----|----|

**Learning Outcomes:**
- To understand basic concepts of Ethics & Professionalism in medicine.

**Learning Resources:**
- Davidson's Principles and Practice of Medicine 23rd Edition

**Assessment formats**

| Assessment Strategies (Formative) | Assessment Strategies (Summative) |
|----|----|
| Class Discussion<br>CBL Case Discussion<br>CBL Quiz | MCQs<br>SEQs |

# Paediatrics

**Learning outcome:**

1. List general rules of genetic counselling
2. Identify clinical manifestations of genetic diseases, chromosomal abnormalities, and inborn errors of metabolism.

| Gastro Rotation | | | | |
|---|---|---|---|---|
| **S.No.** | **Topic/Theme** | **Educational Strategies** | **Name of instructor** | **Importance (Must know Should know. Could know)** |
| 1. | **Genetic counselling** | LGIS/ | Dr. Sohail Ashraf | Should Know |
| 2 | **Genetic disorders** | LGIS (Video of clinical examination)/ SDL | Dr. Sohail Ashraf | Should Know |

**Learning Resources:**

**?**

**Assessment formats**

| Assessment Strategies (Formative) | Assessment Strategies (Summative) |
|---|---|
| Class Discussion<br>CBL Case Discussion<br>CBL Quiz | MCQs<br>SEQs |

# Surgery

**Learning Outcomes:**

- Correlate the relevant basic knowledge of neurosciences with clinical presentations of the following disorders/Diseases.

| S.No | Topics | Educational Strategies | Name of Instructor | Importance (Must Know Should Know Could Know) |
|------|--------|------------------------|--------------------|----------------------------------------------|
| 1. | Brain Stem Lesion | LGIS | Dr Sohail Ahmad | Nice to know |
| 2. | Neurological assessment of patients with brainstem and spinal cord lesions | LGIS | Dr. Mehboob Alam | Nice to know |
| 3. | Congenital anomalies of CNS | LGIS | Dr. Mehboob Alam | Nice to know |
| 4. | Cerebellar Lesions | LGIS | Dr Sohail Ahmad | Nice to know |
| 5. | Spinal Cord & Brainstem Lesions | LGIS | Dr. Mehboob Alam | Nice to know |

**Assessment formats**

| Assessment Strategies (Formative) | Assessment Strategies (Summative) |
|-----------------------------------|-----------------------------------|
| Integrated CBL | Same |

# Research Methodology

**Block Learning Outcomes:**

**By the end of 2nd Block the 2nd Year MBBS students will be able to:**

- Select appropriate study samples.
- Differentiate various types of data and its presentation.

| Sr no. | Topic | Educational Strategies' | Name of instructor | Importance |
|---|---|---|---|---|
| 1. | Test on Sampling | - | Dr. Robina | Must Know |
| Class Learning Outcomes: <br> ● Choose appropriate sampling technique in the given scenario | | | | |
| 2. | Sampling errors | LGIS | Dr. Robina | Must Know |
| Class Learning Outcomes: <br> ● Identify sampling errors. <br> ● Suggest the method to rectify identified error | | | | |
| 3. | Quantitative Data | LGIS | Dr. Saleh | Must Know |
| Class Learning Outcomes: <br> ● Identify the quantitative data in the given hypothetical situations | | | | |
| 4. | Quantitative Data presentation | LGIS | Dr. Saleh | Must Know |
| Class Learning Outcomes: <br> • Calculate class interval, relative and cumulative frequencies. <br> • Relate data types with appropriate graphs and figures. <br> • Create appropriate graph/table for the given set of data | | | | |
| 5. | Qualitative Data | LGIS | Dr. Sadia | Must Know |
| Class Learning Outcomes: <br> • Differentiate between different types of qualitative data | | | | |
| 6. | Qualitative Data presentation | LGIS | Dr. Sadia | Must Know |
| Class Learning Outcomes: <br> • Relate data types with appropriate graphs and figures. <br> • Create appropriate graph/table for the given set of data | | | | |

**Learning Resources:**

1. **Textbooks**
   - Park's Textbook of Preventive and Social Medicine
   - Public Health and Community Medicine (Shah, Ilyas, Ansari, Irfan's)
2. **Reference Books/ Library resources**
   - Basic Statistics for the Health Sciences (Jan W. Kuzma)
   - Basic Methods of Medical Research (Indrayan)
   - New qualitative Methodologies in Health and Social Care Research (Frances Rapport)
   - Handouts/SDL prepared by faculty.
3. **Online resources**
   Data 1

**Teaching faculty & contact address**

| Name | Email address |
|------|---------------|
| Prof. Dr. S. Sabah Imran | sabahimran@wahmedicalcollege.edu.pk |
| Dr. Robina Mushtaq | robinamushtaq@wahmedicalcollege.edu.pk |
| Dr. Ambreen  Ansar | ansarambreen@wahmedicalcollege.edu.pk |
| Dr. Khola Waheed Khan | kholawaheed@wahmedicalcollege.edu.pk |

**Assessment formats**

| Assessment Strategies (Formative) | Assessment Strategies (Summative) |
|-----------------------------------|-----------------------------------|
| MCQs, SEQs, Group Activity and Assignments | MCQs and SEQs |

# Behavioral Sciences

**Subject Class Learning Outcomes:**

1. Develop an understanding of influence and potential implications of culture and community on health behaviors, perceptions, and beliefs.
2. A physician will be able to integrate this knowledge into patient care.
3. Take detailed, accurate and relevant patient history by considering self-awareness and reflective writing using social and behavioral sciences approach.
4. Provide patient centered behavioral guidance and interventions.
5. Comprehend how social determinants of health influence health outcomes and how physician can use this knowledge in patient care.
6. Practice professionalism and leadership qualities
7. Integrate their knowledge and skills gained throughout five years into clinical practice.

**Learning outcomes:**

1. Familiarize doctors with alternative medicine and ethical concerns of its practices in medical setup. (SLO 1)
2. Discuss Rights and Responsibilities of Patients (SLO 4)
3. Critique the ethical boundaries of conduct in doctor patient relationship ( SLO 4, 6)
4. Demonstrate professional excellence of a doctor to maintain healthy doctor patient relationship (SLO 4, 6)
5. Demonstrate effective communication skills in clinical practice, assimilate and handle patient information in different clinical scenarios. Handling uncertain situations in clinical practice. (SLO 3, 6, 7)

| Sr. No. | Topics | Educational Strategies | Name of instructor | Importance (Must Know Should Know Could Know) |
|---|---|---|---|---|
| 1 | Psycho-social Aspects of Alternative Medicine in Clinical Practice | LGIS | Sara Rubab | Could know |
| **Learning Outcomes:**<br>• Familiarize doctors with alternative medicine and ethical concerns of its practices in medical setup. | | | | |
| 2 | Mental Health Acts | LGIS | All Faculty | Should know |
| **Learning Outcomes:**<br>• History of Mental Health Acts in Pakistan Recent Psychiatric health laws in Pakistan | | | | |
| 3 | Rights & Responsibilities of the Patients | LGIS/ Presentations | Hassan Ali | Must Know |
| **Learning Outcomes:**<br>Discuss Rights and Responsibilities of Patients | | | | |
| 4 | Rights & Responsibilities of the Doctors | LGIS/ Presentation | Hassan Ali | Must Know |
| **Learning Outcomes:**<br>Discuss Rights and Responsibilities of the doctors | | | | |
| 5. | Understand Psychological Reactions in Doctor- | LGIS, Storytelling by | Zunaira Naveed | Must Know |

| | | Patient Relationship | students, Presentations | | |
|---|---|---|---|---|---|

**Learning Outcomes:**
- Critique the ethical boundaries of conduct in doctor patient relationship

| 6. | Transference, Counter transference, Resistance, | LGIS, Storytelling by students, Presentations | Zunaira Naveed | Must Know |
|---|---|---|---|---|

**Learning Outcomes:**
- Critique the ethical boundaries of conduct in doctor patient relationship

| 7. | Professionalism in Health Care, Knowledge, Skills, Attitudes | Lectures/ Presentations, (LGIS) | Hassan Ali | Should Know |
|---|---|---|---|---|

**Learning Outcomes:**
- Demonstrate professional excellence of a doctor to maintain healthy doctor patient relationship

| 8. | Demonstrate Non-Pharmacological Interventions (NPIs) in Clinical Practice | Lectures/ Presentations, (LGIS) | Hassan Ali | Should Know |
|---|---|---|---|---|

**Learning Outcomes:**
- Demonstrate effective communication skills in clinical practice, assimilate and handle patient information in different clinical scenarios. Handling uncertain situations in clinical practice.

| 9. | Handling Difficult Patients and their Families | Lectures/ Presentations, (LGIS) | Zunaira Naveed | Should Know |
|---|---|---|---|---|

**Learning Outcomes:**
- Demonstrate effective communication skills in clinical practice, assimilate and handle patient information in different clinical scenarios. Handling uncertain situations in clinical practice.

| 10. | Breaking Bad News | Lectures/ Presentations, (LGIS) | Zunaira Naveed | Must Know |
|---|---|---|---|---|

**Learning Outcomes:**
- Demonstrate effective communication skills in clinical practice, assimilate and handle patient information in different clinical scenarios. Handling uncertain situations in clinical practice.

| 11. | Breaking Bad News | Role Play | All Faculty | Must Know |
|---|---|---|---|---|

**Learning Outcomes:**
- Demonstrate effective communication skills in clinical practice, assimilate and handle patient information in different clinical scenarios. Handling uncertain situations in clinical practice

| 12. | Crisis Intervention and Disaster Management | Lectures/ Presentations, (LGIS) | Sara Rubab | Should Know |
|---|---|---|---|---|

**Learning Outcomes:**
- Demonstrate effective communication skills in clinical practice, assimilate and handle patient information in different clinical scenarios. Handling uncertain situations in clinical practice

| 13. | Class Test | Quiz | All Faculty | Must Know |
|---|---|---|---|---|
| 14. | Empathy | LGIS | Zunaira Naveed | Should Know |

**Learning Outcomes:**
- Demonstrate effective communication skills in clinical practice, assimilate and handle patient information in different clinical scenarios. Handling uncertain situations in clinical practice

| 15. | Conflict Resolution | LGIS | Zunaira Naveed | Should Know |
|---|---|---|---|---|

**Learning Outcomes:**
- Demonstrate effective communication skills in clinical practice, assimilate and handle patient information in different clinical scenarios. Handling uncertain situations in clinical practice

| 16. | Conflict Resolution | Role Play | All Faculty | Should Know |
|---|---|---|---|---|

**Learning Outcomes:**
- Demonstrate effective communication skills in clinical practice, assimilate and handle patient information in different clinical scenarios. Handling uncertain situations in clinical practice

| 17. | Understand human behaviour through Principles of Psychology (Attention and Perception) | LGIS | Zunaira Naveed | Must Know |
|---|---|---|---|---|

**Learning Outcomes:**
- Analyze human behaviour and other factors affecting health and disease by Enhancing doctor's own learning and clinical skill.

| 18. | Understand individual human Differences (EQ and IQ) | LGIS | Zunaira Naveed | Must Know |
|---|---|---|---|---|

**Learning Outcomes:**
- Understand and assess types of human personality and phases of personality development along with intelligence.

| 19. | Describe Neurobiological and Psychological Basis of Behaviour | LGIS | Zunaira Naveed | Must Know |
|---|---|---|---|---|

**Learning Outcomes:**
- Understand the complex interplay of Brain and Behaviour.

| 20. | Common Ethical Issues in Medical Practice | Presentations | All Faculty | Should know |
|---|---|---|---|---|

**Learning Outcomes:**
- Integrate significance of medical ethics in medical practice

**Learning Resources:**
- Handouts prepared by faculty.
- Online resources
- Lecture notes
- Reference Books

**Teaching Faculty:**

| Name | Email address |
|------|---------------|
| Zunaira Naveed | naveedzunie@gmail.com |
| Hassan Ali | Ha55an.qau5@gmail.com |
| Sara Rubab | sararubab753@gmail.com |

**Assessment formats:**

| Assessment Strategies (Formative) | Assessment Strategies (Summative) |
|-----------------------------------|-----------------------------------|
| <ul><li>Directly observed behaviors,</li><li>Small group discussions,</li><li>Reflective writing</li><li>Portfolios</li></ul> | <ul><li>Assignments,</li><li>Case studies,</li><li>Quiz, Presentations</li></ul> |

# 8. Rules & regulations:

## i. Student's code of conduct

The Student Code of Conduct sets out the standards of conduct expected of students. It holds individuals and groups responsible for the consequences of their actions. Failure to fulfill these responsibilities may result in the withdrawal of privileges or the imposition of sanctions.

Wah Medical College is a community of students, faculty and staff involved in learning, teaching, research, and other activities. All members of the WMC community must conduct themselves in a manner that contributes positively to an environment in which they value respect, civility, diversity, opportunity, and inclusiveness, to assure the success of both the individual and the community. The Student Code of Conduct reflects a concern for these values and tries to ensure that members of the WMC can make use of and enjoy the activities, facilities, and benefits of WMC without undue interference from others.

**WMC STUDENT CODE OF CONDUCT**

- Discipline
- Decent dress
- Good Manners
- Smart Turn Out
- Healthy Activities
- No smoking
- No Abusive Language
- Cooperative Attitude
- Respect for All

## ii. **Attendance policy**

a. Students must mark attendance for every class.

b. The respective departments must compile the attendance, highlighting students having attendance less than 75% and submit it to student affairs by :

  a. The 10$^{th}$ of each month

  b. Quarterly basis

  c. At the end of the academic year

c. The Students Affair Department will compile the absence report and will impose a fine of Rs. 500/- for a lecture or for the whole day on absent students. It is pertinent to mention here that the college imposes fines on students to compel them to attend classes regularly and not to generate the funds.

d. Departments will submit the list of those students having attendance less than 75% at the end of academic year.

e. The College will NOT submit the admission forms to NUMS, of students having attendance less than 75%, for appearing in Annual University Exams.

# 9. Study Tips

Dear Students,

Becoming a doctor is a tough job, but you can make it easier for yourself by adopting some time-tested techniques or habits. It's never too early – or too late – to develop good study habits. The sooner you get into a good self-study pattern, the easier everything will be and the more your chances of getting good marks will improve. Here are our top tips for getting the most out of your self-directed study time. And remember **Perseverance is the Key to Success!**

Review the material regularly, create a study schedule.

Write it down.

Test yourself.

Find an effective learning environment with limited distractions and some fresh

Improve memorization with Mnemonics.

Incorporate auditory methods; use online podcasts.

Use visuals, images, concept maps & illustration charts.

Consider forming a study group or find an accountability buddy.

Take strategic breaks.

# 10. Feedback on the study guide

We value your feedback and will use it for the improvement of this Study guide. Kindly provide feedback for this study guide. At the email:

dme@wahmedicalcollege.edu.pk

dmewahmedicalcollege@gmail.com

# 11. References:

HARDEN, J.M. LAIDLAW, E.A. HESKETH, R. M. (1999). AMEE Medical Education Guide No 16: Study guides-their use and preparation. *Medical Teacher*, *21*(3), 248–265. https://doi.org/10.1080/01421599979491

Wah Medical College
Batch -19th
2nd Year MBBS 2023
Time Table From

| Day, Date & | Monday | | Tuesday | | Wednesday | Thursday | | Friday | |
|---|---|---|---|---|---|---|---|---|---|
| 8:00-8:55 | Anatomy LGIS | | Anatomy LGIS | | Physiology | Physiology | | Physiology/ Anatomy / Biochemistry | 8:00- 8:50 |
| 8:55-9:50 | Anatomy LGIS | | Anatomy | | Physiology LGIS | Flipped classroom | | | 8:50-9:40 |
| 9:50-10:40 | | | Physiology LGIS | | Anatomy CBL | Anatomy SDL | | Integrated Session | 9:40-10:25 |
| Break 10:40 - 11:00 | | | | | | | | | |
| 11:00-12:00 | Biochemistry LGIS | | Physiology LGIS | | Anatomy SDL | Anatomy SDL | | | Break 10:25-10:35 |
| 12:00-01:00 | Biochemistry LGIS | Physiology SDL | Biochemistry LGIS | | | Research | | BSP LGIS | 10:35-11:20 |
| Prayer Break 01:00-01:20 | | | | | | | | | |
| 01:20-02:10 | Practical | Practical | Practical | Practical | Clinical Rotation / Ward Visit | As Per Rotation Map | | BSP LGIS | 11:20-12:10 |
| 02:10-03:00 | | | | | Clinical Rotation | | | Physiology / SDL | 12:10-01:00 |
| | | | | | Ward Visit | | | Pak. Studies LGIS | 02:00-03:00 |

Juma Break 01:00-02:00

Dr. Nosana Mahmood
Block Incharge YI94
Anatomy Department

Prof. Dr. Samara Gul
Coordinator 2nd Year
Wah Medical College

Professor Dr. Munarni Ramzan
Dean
Wah Medical College