MGM INSTITUTE OF HEALTH SCIENCES
(Deemed University u/s 3 of UGC Act, 1956)
Grade 'A' Accredited by NAAC
Sector-01, Kamothe, Navi Mumbai - 410 209
Tel 022-27432471, 022-27432994, Fax 022 - 27431094
E-mail : registrar@mgmuhs.com | Website : www.mgmuhs.com

MGM 03 MD Physiology

Program Outcomes:

A post graduate student having qualified the MD (Physiology) examination should be able to:

PO1. Understand and deal with all aspects of general, systemic and applied Physiology.

PO2. Teach effectively the basic physiological mechanisms of human body with reference to their implications in the pathogenesis of diseases (pathophysiology) affecting various organ systems and the physiological basis of their management to undergraduate medical, paramedical and all other basic science students.

PO3. Understand general principles of medical education (use of appropriate teaching techniques and resources).

PO4. Explain how the knowledge of physiology can be effectively used in a various clinical setting to solve diagnostic and therapeutic problems.

PO5. Interpret and evaluate research publications critically.

PO6. Use the library facilities (Literature database using computer, CD ROM, internet search and any other available newer techniques).

PO7. Conduct relevant clinical/experimental research which may have significant bearing on human health and patient care.

PO8. Interpret the research findings in the light of its basic and applied significance.

PO9. Acquire skills in conducting collaborative research in the field of physiology with allied sciences, clinical sciences and biomedical engineering.

PO10. Interact with the allied departments and render services in advanced laboratory investigations.

PO11. Serve as interface with society at large.

PO12. Acquire administrative skills to set up concerned department / laboratories and initiate purchase procedure and procure necessary items for running such laboratories.

PO13. Function as a member of a teaching or research team.

SUBJECT SPECIFIC COMPETENCIES

A. Cognitive Domain

1. Able to teach the basic physiological mechanisms of human body with reference to their implications in the pathogenesis of diseases (pathophysiology) and their management to undergraduate medical and paramedical students.
2. Conduct such clinical and experimental research, as would have a significant bearing on human health and patient care.

3. Interact with other departments by rendering services in advanced laboratory investigations and relevant expert opinion.
4. Participate actively in various workshops/seminars/journal clubs/demonstration in the allied departments, to acquire various skills for collaborative research.
5. Contribute to society by imparting physiological understanding of health problems.
6. Plan a research study and conduct basic and clinical systemic investigations.

B Affective domain

1. Demonstrate self-awareness and personal development in routine conduct. (*Self-awareness*)
2. Communicate effectively with peers, students and teachers in various teaching-learning activities. (*Communication*)
3. Demonstrate
    a. Due respect in handling human body parts & cadavers during dissection (*Ethics & Professionalism*)
    b. Humane touch while demonstrating living surface marking in subject/patient (*Ethics & Professionalism*)
4. Acquire capacity of not letting his/her personal beliefs, prejudices and limitations come in the way of duty.
5. Appreciate the issues of equity and social accountability while exposing students to early clinical exposure (*Equity and social accountability*)

C. Psychomotor Domain

The student should acquire competencies in the following tasks:

I. Hematology Experiments

1. Estimation of hemoglobin
2. Determination of Total Erythrocyte (RBC) Count and RBC Indices (Blood Standards)
3. Determination of Total Leucocytes (WBC) Count : TLC
4. Preparation of a peripheral Blood Smear and Determination of Differential Leucocyte Count: DLC
5. Determination of Arneth Count
6. Determination of Bleeding Time (BT) and Clotting Time (CT)
7. Determination of Blood groups (A,B,O and Rh system)
8. Determination of Erythrocyte Sedimentation Rate (ESR) and Packed cell volume (PCV)
9. Determination of Osmotic Fragility of Red Blood Cells
10. Determination of Platelet Count
11. Determination of Reticulocyte Count
12. Determination of Absolute Eosinophil Count
13. Study of Haemopoietic Cells Present in the Bone Marrow

II. Animal Experiments (All animal experiments must be compliant with Govt. of India Regulations, notified from time to time). Experiments in

Amphibian/Dog/Cat should be conducted by computer assisted simulation models/ facilities. Other experiments should be performed as permissible by CPCSEA guidelines.

A. ***Amphibian (Frog) Experiments***

1. Effect of temperature on simple muscle twitch.
2. Effect of two successive stimuli (of same strength) on skeletal muscle.
3. Effect of increasing strength of stimuli on skeletal muscle.
4. Effect of increasing frequency of stimuli on skeletal muscle (genesis of tetanus).
5. Effect of free load and after load on skeletal muscle.
6. Effect of repeated stimuli on skeletal muscle (study of phenomenon of Fatigue).
7. Study of isometric contraction in skeletal muscle.
8. Determination of conduction velocity of sciatic nerve and effect of variables on it.
9. Properties of cardiac muscle – Refractory period, All-or-None Law, extra-systole and compensatory pause, beneficial effect.
10. Regulation of Heart, Vagus dissection and effect of Vagal and WCL stimulation.
11. Effect of physiological and pharmacological variables on intact frog's heart.
12. Perfusion of isolated frog's heart-role of sodium, potassium, calcium ions and drugs.
13. Perfusion of blood vessels in the frog.
14. Capillary circulation (Frog Web).

B. ***Mammalian Experiments (Dog/Rabbit/Guinea pig/Rat/Mice)***

1. General management of mammalian experiments.
2. Recording of heart rate, blood pressure and respiration and study the effects of various factors; drugs; asphyxia; occlusion of common carotid artery.
3. Effect of stimulation of central and peripheral end of vagus on arterial blood pressure and respiration after vagotomy.
4. Effect of stimulation and distension of carotid sinus on blood pressure and respiration.
5. Effect of stimulation of splanchnic nerve.
6. Effect of stimulation of peripheral somatic nerve (sciatic nerve).
7. Study of hypovolemic shock and its reversal.
8. Perfusion of isolated mammalian heart and study the effects of drugs and ions.
9. Recording of Isolated Intestinal movement and tone and studying the effect of drugs and ions.
10. Study of various stages of menstrual cycle, cervical smear and vaginal smear.

III. Human Physiology

Clinical Physiology

1. Physiological principles of clinical examination.

2. General Physical examination, physiological basis of some clinical symptoms and signs.
3. General principles of Inspection/Palpation/Percussion/Auscultation.

Nerve muscle physiology

1. Ergography and hand grip spring dynamography and study of human fatigue.
2. Recording of electromyography (EMG) and its application.
3. Recording of nerve conduction.

Cardiovascular system (CVS)

1. Clinical examination of CVS.
2. Examination of arterial & venous pulses.
3. Measurements of arterial blood pressure and effect of head-up/head-down tilt.
4. Recording of 12 lead Electrocardiography (ECG) and its interpretation.
5. Measurement of blood flow.

Respiratory system

1. Clinical examination of respiratory system.
2. Stethography – study of respiratory movements and effect of various factors.
3. Assessment of respiratory functions (spriometry, vitalography, and gas analysis).
5. Measurement of BMR.
6. Cardio pulmonary resuscitation (CPR) and Artificial respiration.

***Gastrointestinal system*:** Clinical examination of abdomen.

Integrative Physiology / Excretory system

1. Recording of body temperature/effect of exposure to cold and hot environment
2. Studies in stimulated environment - microgravity; high altitude; hot and cold environment.
3. Human studies involving sweat, salivation and urine.

Reproductive system

1. Determination of ovulation time by basal body temperature chart and pregnancy diagnostic test - Immunological Tests.
2. Semen analysis: sperm count and motility.

Nervous System including Special senses

1. Clinical examination of the nervous system and its physiological basis.
2. Examination of higher mental functions.
3. Examination of cranial nerves.

4. Examination of sensory system.
5. Examinatin of motor system including reflexes

6. Clinical examination of special senses:
   (i) Smell and Taste
   (ii) Test for hearing to deafness
   (iii) Physiology of eye:
      (a) Clinical examination of the eye and pupillary reflex
      (b) Visual acuity
      (c) Perimetery – mapping out of visual field and blind spot
      (d) Accommodation
      (e) Fundoscopy
      (f) Colour vision and colour blindness
7. Reaction (visual and auditory) and reflex time.
8. Electroencephalography (EEG) and Polysomnography
9. Autonomic Nervous System (ANS) Testing.
10. Neuro-electrodiagnostic techniques:
      (i) Nerve conduction study.
      (ii) Visual evoked potential (VEP).
      (iii) Brainstem auditory evoked potential (B.A.E.P).
      (iv) Somato-sensory evoked potential (SEP).
      (v) Motor evoked potential (MEP).

Others

1. Construction of dietary chart for growing children, pregnant woman, elderly individuals, hypertensive patients, & diabetes mellitus patients.
2. Tests for physical fitness: Cardio – respiratory responses to steady state exercise using
      (i) Harvard step test
      (ii) Bicycle Ergometry
      (iii) Treadmill test for determination of VO_2 max

Syllabus

Course contents:

Paper-I: ***General and Cellular Physiology including Genetic Basis and Historical perspectives:***

1. Physiology of cell, various cellular mechanisms and genetic control mechanisms.
2. Various principles of Physics and Physical Chemistry involved in physiological phenomenon e.g. haemo-dynamics, bio-electrical potentials, body fluids, methods of measurements.
3. History of Physiology.
4. Biostatistics, Biophysics, Biochemistry, Micro-anatomy.
5. Growth and Development including aging.

6. Excretion, pH, water and Electrolyte balance.

Paper-II: ***Systemic Physiology (system providing transport, nutrition and energy) including comparative Physiology.***

1. Blood and Immunity.
2. Cardiovascular System.
3. Respiratory System.
4. Gastro- Intestinal Tract (GIT) and dietary requirements.

Paper-III: ***Systemic Physiology (system concerned with procreation, regulation and neural control)***

1. Nerve-Muscle Physiology including muscle mechanics
2. Endocrine Physiology
3. Nervous System (Central, peripheral and autonomic)
4. Special Senses
5. Reproduction & family planning/foetal & neonatal Physiology

Paper-IV: ***Applied Physiology including recent advances***

1. Patho-physiology pertaining to systemic Physiology
2. Physiological basis of various clinical investigation tests
3. Interaction of human body in ambient environment- high altitude, space and deep sea
4. Sports physiology
5. Yoga and Meditation
6. Recent advances relevant to Physiology
7. Social responsibilities of physiologists

Departmental resources

It is to be mandatory for the department to establish and develop the following laboratories. In addition to teaching, these laboratories should be involved in active research and in patient care services in one or more well defined fields.

1. Clinical Neurophysiology Laboratory

The department should generate liaison with clinical department and provide routine services for health monitoring and diagnostics (disease).

(i) Electroencephalography

(ii) Evoked potential recording
(iii) Electromyography
(iv) Nerve conduction studies
(v) Autonomic nervous system (ANS) testing
(vi) Any other newer technology

2. Cardio-Respiratory Laboratory

The department should generate liaison with clinical department and provide routine services for health monitoring and diagnostics (disease).

(i) Electrocardiography
(ii) Blood-gas Analysis
(iii) Computerized multifunctional spirometery
(iv) Laboratory for measuring pulmonary diffusion capacity and functional residual capacity (FRC)
(v) Whole-body plethysmography
(vi) Laboratory for Blood flow measurements (Impedence plethysmograph/Laser flow meter/ Doppler flow meter)

3. Exercise Physiology Laboratory

The department should generate liaison with ports authorities and clinical departments to provide services for testing and grading exercise and physical efficiency for health monitoring and diagnostics (disease). This should be done by using the following techniques:

(i) Two step test exerciser
(ii) Bicycle Ergometery
(iii) Tread mill
(iv) Respiratory gas analysis and measurement of basal metabolic rate (BMR)

4. Metabolic/Endocrinology/Reproductive Bio-medicine laboratory

This laboratory should perform various tests pertaining to gastrointestinal, renal, metabolic, endocrinal and reproductive bio-medicine. The department should generate liaison with clinical departments and provide routine services for health monitoring and diagnostics (disease).

(i) Spectrophotometer
(ii) pH meter
(iii) Elisa Reader/Washer
(iv) Luminometer

(v) Semi-autoanalyser

Post graduate students should be posted in the above laboratories and extend the required services on routine basis.

The Department should be equipped with general facilities like PG resource room with internet access and a departmental library with books especially those related to pertinent higher studies in Physiology and field of research. The college/department should make important journals available (at least four Indian journals and two international journals).

Dr. Rajesh B. Goel
Registrar
MGM INSTITUTE OF HELATH SCIENCES
(DEEMED UNIVERSITY u/s 3 of UGC Act,1956)
NAVI MUMBAI- 410 209