

**THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY  
CHENNAI - 600 032.**



**M.D.S. - Branch IV  
ORAL PATHOLOGY**

## **M.D.S. BRANCH IV - ORAL PATHOLOGY**

### **Objectives:**

- A post graduate dental surgeon in oral pathology is to be trained in both general and special pathology dealing with the nature of oral diseases, their causes, processes and effects.
- An oral pathologist is expected to perform routine histopathological evaluation of specimens relating to oral and perioral tissues, to carry out routine diagnostic procedures including hematological, cytological, microbiological and immunological investigation and a brief orientation to ultra microscopy and molecular biological techniques.
- He/she is expected to have an understanding of current research methodology, collection and interpretation of data, ability to carry out research projects on clinical and/ or epidemiological aspects, a working knowledge on current databases, automated data retrieval systems, referencing and skill in writing scientific papers.
- He/she is expected to present scientific data pertaining to the field, in conferences both as poster and verbal presentations and to take part in-group discussions.

### **Broad outline of theoretical, clinical and practical courses:**

1. Study of principles of routine and special techniques used for histopathology including principles of histochemistry, immunochemistry, applied and theoretical biochemical basis of histochemistry as related to oral pathology
2. Advanced histological and histopathological study of dental and oral tissues including embryonic considerations, clinical considerations, biology, histology, cytology, pathology, prognosis and management of oral oncology, concepts of oral premalignancy.
3. Study of special and applied pathology of oral tissues as well as relations of local pathologic and clinical findings to systemic conditions.
4. Oral microbiology and its relationship to various branches of dentistry.
5. Oral microbiology affecting hard and soft tissues. Study of clinical changes and their significance to dental and oral diseases as related to oral pathology.
6. Forensic odontology.
7. Inter institutional postings such as cancer hospital, dermatology clinics, forensic labs, regional HIV detection centers, sophisticated instrumentation centers for electron microscopy and other techniques.
8. Maintenance of records of all postgraduate activities.
9. Library assignment.
10. University Dissertation.

## **Course Contents**

### **FIRST YEAR**

P.G. orientation course including general approach to PG curriculum, library and main dissertation, journal club topic selection, presentation, seminars, clinico-pathological needs, teaching methodology and use of audio visual aids.

Orientation on Biostatistics and discussions on research methodology by eminent researchers.

### **APPLIED ANATOMY AND GENERAL HISTOLOGY**

Confined to those aspects of Anatomy which demonstrate the fundamental principles and processes with clinical application.

General knowledge of regional, applied, radiological and histological anatomy of the human body.

Knowledge of the composition-gross and minute structures, development and function of dental and related tissues and such aspects of embryology as have special dental significance. Recent advances in relation to these matters.

Anatomy of head, neck, face, brain and spinal cord including histology and embryology.

Light and electron microscopic features of epithelial tissues and glands, bone, hematopoietic system, lymphatic system, muscle, neural tissues, endocrinal system.

### **ORAL, DENTAL ANATOMY AND HISTOLOGY**

Cell structure and function (Ultra –structural and molecular aspects), intercellular junction, cell cycle and division, cell cycle regulators, cell to cell and cell to extra cellular matrix interactions.

Detail molecular aspects of DNA, RNA and intracellular organelles, transcription and translation and molecular biology techniques.

1. Development and growth of the face, teeth and jaws.
2. Form and relations of human teeth -
  - a) The form and relations of permanent teeth.
  - b) Tooth sockets.
  - c) Deciduous teeth.
  - d) Dental arches.
  - e) Occlusion.
  - f) Supporting structures of teeth.

3. Early development of the teeth -
  - a) Early development of the tooth germs.
  - b) Function of the enamel organ.
  - c) Tooth eruption.
  
4. Establishment of the deciduous and permanent dentition -
  - a) Shedding deciduous teeth.
  - b) Chronology of eruption of teeth.
  
5. Developmental, macroscopic and microscopic appearance of dental tissue.
  - a) Development of face and oral cavity.
  - b) Development and growth of teeth.
  - c) Enamel.
  - d) Dentin.
  - e) Pulp.
  - f) Cementum.
  - g) Periodontal ligament.
  - h) Maxilla and mandible (Alveolar Process).
  - i) Oral mucous membrane.
  - j) Salivary glands.
  - k) Tooth eruption.
  - l) Shedding of deciduous teeth.
  - m) Temporomandibular joint.
  - n) Maxillary sinus.
  - o) Histochemistry of oral tissues.
  - p) Preparation of specimens for histologic study.
  
6. Age changes in teeth and jaws.

### **PHYSIOLOGY (General and Oral)**

Sound knowledge of the body, the general principles of nutrition and metabolism. The mechanism whereby normal growth structure of the skeleton and the composition of the body fluids are regulated. Candidate should be familiar with those techniques, which are commonly employed in clinical investigations.

Food and nutrition, digestion, proteins, fats and carbohydrates, vitamins and minerals, water, fluid and electrolyte balance. Blood composition, functions, blood volume, coagulation, hamorrhage, blood groups and transfusion. Circulation, heart sounds, pulse and blood pressure. Capillary circulation, shock lymph, and lymphatics. Formation of urine, abnormal constituents, glycosuria and ketonuria. Control of respiration, asphyxia, hypoxia, artificial respiration. General principles of endocrine functions, hypophysis, thyroid, adrenals, regulation of blood sugar. Reproduction, pregnancy and lactation. Physiology of pain, neuro-hormones, certain cranial nerves and autonomous nervous system.

Saliva, Mastication, deglutition, salivary apparatus, pain, taste, wound healing. Calcium metabolism. Theories of mineralization. Metals and trace elements. Effect of hormones and vitamins (Influence on growth, development and structure of oral soft and hard tissues and para-oral tissues).

## **BIOCHEMISTRY**

Introduction: Physical chemistry as related to medicine, solutions and strength of solutions. Hydrogen ion concentration. Acids and bases-Buffers, colloidal state, Osmotic pressure, ion exchangers and thermodynamic considerations.

Carbohydrates : Mono-Saccharides, Di-Saccharides and Poly- Saccharides-their chemical nature and metabolism.

Lipids :Characters of simple and compound lipids. Their absorption and metabolism. Steroids.

Proteins : Characters of peptides and amino acids-metabolism- essential amino acids.

Enzymes : Properties and role of metabolism and factors that modify them.

Biological oxidation, reduction and other chemical degradation.

Water electrolyte balance- Energy exchange, Caloric values, B.M.R- caloric requirements of a man.

## **PATHOLOGY AND MICROBIOLOGY**

General knowledge of the causation, character and sequelae of inflammation, degeneration, regeneration and repair. Hypertrophy, atrophy and hyperplasia, thrombosis, embolism, infarction, ischemia, edema and neoplasia. Principles of blood transfusion and action of radiation on the body.

Familiarity with the general characteristics of bacteria, fungus, viruses and protozoa infections in general and detailed knowledge of those which are important in dental surgery. Routes and spread of wound infection and cross infection and uses of antibiotics. Sterilization, disinfection and antiseptics. Physiology and growth of micro-organisms. Basic principles of immunity, antigen and antibody reactions. Cell mediated immunity and humoral immunity. Immunology of hypersensitivity. Immunological basis of the autoimmune phenomena. Immunodeficiency with relevance to opportunistic infections. Basic principles of transplantation and tumor immunity.

## **PHARMACOLOGY**

### 1. Introduction :

Mechanism of drug action, absorption, distribution, fate and exertion of drugs. Factors modifying drug action, bio-assay of drugs.

### 2. Drugs :

- a. Anesthetics-History and theory of anesthesia. Stages of anesthesia. Pre-anesthetic medications. General anesthetics. Ether, chloroform, ethylchloride, trichloro-ethylene, nitrous oxide, ethylene and cyclopropane.

- b. Depressants-hypnotics and sedatives. Barbiturates-long acting, short acting and ultra short acting. Chloral hydrate, paraldehyde and bromides.
  - c. Analgesics-NSAID's, Morphine and opium alkaloids, salicylates, Acetanilide, Aminopyrine and antipyrine.
  - d. Stimulants-strychnine, picrotoxine, Metrazal, Coramine, Camphor, Xanthine, Caffiene, Theopyhlline and theobromine.
  - e. Local anesthetics-Structure, Mode of action, Dosage and toxicity of procaine, Chincocaine, Lignocaine (lidocaine).
3. Drugs acting on the autonomic nervous system. General considerations, parasympathomimetic drugs, sympathomimetic drugs and autonomic blocking agents.
  4. Cardiovascular drug-Digitalis, cardiac glycosides, Quinidine and nitrites.
  5. Drugs affecting urine formation: Diuretics and antidiuretics.
  6. Antiseptics and germicides, Antifungal, Antivirals and Anti helminthic drugs.
  7. Antimicrobial chemotherapy :  
 Antibiotics-Penicillins, Streptomycin, Chloramphenicol, Tetracyclines, Neomycin, Bacitracin, Erythromycin, Cephalosporins, Fluoroquinoles and sulfa drugs.
  8. Drugs of endocrine origin :  
 Thyroid, Parathyroid, Adrenal cortica hormones, Insulin, Sex hormones, Anterior pituitary hormones.
  9. Vitamins :  
 Water soluble and fat soluble.
  10. Drugs acting on blood and blood forming organs :  
 Iron and iron salts. Liver extracts, Hematinic principles, Coagulants and Anticoagulants and Fibrinolytics and Antifibrinolytics.
  11. Minerals :  
 Calcium, Iron, Phosphorus and trace elements-metabolism, Deficiency and therapeutic uses.
  12. Antihistamins and anti-allergic drugs.

13. Psychosomatic drugs :

Tranquilizers, Anti-depressants and Anti-epileptics.

14. Drugs used in cancer (Antineoplastics) :

Adriamycin, Cytosan, Nitrogen mustard derivatives and Antimetabolites.

15. Diagnostic drugs :

Drugs used in diagnosis of diseases. Radio opaque dyes. Mode of administration, toxicity, excretion and clinical uses.

## **GENETICS, GROWTH AND DEVELOPEMENT**

### **Molecular genetics :**

- DNA, RNA structure and function, DNA replication, regulation of gene expression.
- Genes, genetic code, transcription, translation and assembly.
- Chromosomes, structure, cell division and karyotyping
- Mutations, mutagens and DNA repair mechanisms.
- Mode of inheritance, transmission, expression and penetrance.
- Polymerase chain reaction, blotting, hybridization, recombinant DNA technology, DNA sequencing and cloning.

### **Applied genetics:**

- Genes related to the development of teeth and oro-facial structures.
- Genetic factors in tumorigenesis.
- Genetic application in forensic science.
- Genotoxicity tests.
- Gene therapy.

## **ACADEMIC ACTIVITIES**

- Preparation of ground and decalcification sections of teeth and bone.
- Oral cytological smear preparation  
Microbial smear- Gram stain, AFB stain

- Blood investigations  
TC, DC, Hb%, bleeding time, clotting time and ESR.
- Urine analysis
- Oral histology records.
- Submission of title for dissertation at the end of three months.
- Submission of write-up : introduction, aims and objectives, review of literature and materials and methods within six months.
- Selection of topic and commencement of library dissertation.
- Postings in oral diagnosis, oral surgery department – to record and submit case histories with photographs and histopathology.
- Orientation to dermatological and malignant diseases in the concerned departments.
- Presentation of clinico-pathological cases, seminars, journal clubs.
- To attend dental camps.
- Submission of first year log-book.
- At the end of first year, examinations to be conducted by the department.

## **SECOND YEAR**

### **Oral and Dental Pathology:**

- Developmental disorders of Oral and Para-oral structures.
- Benign and Malignant Tumors of the Oral cavity.
- Odontogenic cysts and Tumor.
- Pathology of salivary gland.
- Regressive alteration of teeth.
- Bacterial, fungal, viral and protozoal infections of oral cavity.
- Dental caries.
- Diseases of pulp and periapical region.
- Spread of Oral infection.
- Healing of Oral wounds.
- Physical and chemical injuries of Oral cavity.
- Oral aspects of metabolic diseases.
- Diseases of Bones and Joints.
- Diseases of Skin and mucous membranes.



- Diseases of Periodontium.
- Diseases of Blood and Blood forming organs.
- Diseases of Nerves and muscles.
- Orofacial Pain.
- Immunological diseases of Oral cavity including Tumor immunology.
- Molecular Pathology.

### **Histological staining techniques:**

- Principles of staining.
- Various stains used in histopathology and their applications.
- Enzyme histochemistry.
- Principles, Techniques and applications of Immuno-fluorescence.
- Principles, technique and applications of Immunohistochemistry.
- Electron microscopy – Types, principles and uses.

### **Recent Molecular techniques:**

Basic Principle, Techniques and applications of

- Polymerase chain reaction.
- Blots.
- Hybridization.
- Recombinant DNA technology.
- Micro array.
- DNA sequencing and
- Cell culture and Cloning.

### **Laboratory Procedures**

#### **Stains:**

Microbial -

- Bacterial : Gram stain, AFB.
- Fungal : PAS, Gomory's Silver methenamine stain.

Tissue stains -

- H&E
- PAP
- PAS
- Alcian Blue
- Mucicarmine
- Masson Fontana
- Toluidene blue
- Van Gieson
- Masson's Trichrome

- Congo red

### **Academic activities:**

- Participation in Journal club, seminars, clinicopathological discussion.
- Following records to be submitted -
  - Second year log book.
  - Specimens grossed.
  - Histopathology of Oral lesions.
  - Slides reported.
  - Record of all laboratory procedures done.
- Library dissertation.
- Main dissertation.
- Lectures and Practical demonstrations for II year undergraduates in Oral and dental Anatomy, Oral Physiology, Histology and Embryology, under supervision.
- At the end of second year, examinations to be conducted by the department.

### **THIRD YEAR**

- Forensic Odontology.
- Giant cell lesions.
- Clear cell lesions.
- Round cell lesions.
- Spindle cell lesions.
- Pigmented lesions.
- Fibro-osseous lesion.
- Mechanism of formation and expansion of cysts of orofacial region.
- Mechanism of growth and metastasis of tumors.
- Lab diagnosis of
  - Bacterial infection.
  - Viral infection.
  - Fungal infection.
- Hamartias/ Hamartomas.
- Phakomatoses.
- Vascular tumors of orofacial regions.
- Genodermatoses.
- Tumor markers.
- Histogenesis of salivary gland tumors.
- Tumor angiogenesis.
- Molecular basics of oral squamous cell carcinoma.
- Concept of premalignancy.
- Matrix remodeling in pathological condition.
- Etiopathogenesis of developmental defects of teeth.
- Viral oncogenesis.
- Lesions associated with impacted and missing tooth.

- Syndrome affecting orofacial regions.
- Hereditary oral defects.
- Techniques to assess the prognosis of neoplastic lesions.
- Vesiculobullous lesions.
- Lymphoreticular malignancy.
- Haemopoietic malignancy.
- Micronutrients.
- Oral aspects of metabolic disorders.
- Hormones and Oromaxillofacial lesions.
- Matrix metalloproteinases.
- Current concepts in
  - HIV related Oral Diseases.
  - OSF.
- Epithelium – Connective tissue interaction.
- Dental Caries.
- Stem cell research.

#### **Academic Activities:**

- Receiving and Grossing Biopsy Specimens.
- Reading and reporting of current (running cases) histopathology slides.
- Reading and reporting of teaching histopathology slides.
- Lectures and Practical demonstrations for III year undergraduates, under supervision.
- Presenting Seminars.
- Discussion of peer reviewed articles from Oral Pathology related International journals in the journal club.
- Write up of scientific articles for journals. Submission of one manuscript to reputed journal is mandatory.
- Submission of following records :-
  - Third year log book.
  - Specimens grossed.
  - Slides reported.
  - Articles reviewed in journal club during the entire course.

At the end of the third year, the student should have actively participated in the Oral Pathology national conferences and national PG conventions. They are also encouraged to attend CME/ CDE programs and workshops and State / National conferences and meetings of allied specialties.

#### **Monitoring Learning Progress:**

It is essential to monitor the learning progress of each candidate through continuous appraisal and regular assessment. Periodical assessment once in six months of the postgraduate student's – conduct and academic; submission of internal assessment to the university at the end of each academic year.

At the end of third year, examination will be conducted by the University.

**SCHEME OF EXAMINATION:**

**A. Theory - 100 Marks.**

**B. Practical/Clinical - 200 Marks.**

First Day:

1. Case Presentation

a. Long case – 20 marks.

b. Short case – 10 marks.

2. Clinical Hematology (Any two investigations) – 20 marks.

Hb%, bleeding time, clotting time, Total WBC count, Differential WBC count.

3. Smear preparation – 20 marks.

Cytology or microbial smear and staining.

4. Paraffin sectioning and H & E Staining – 30 marks.

Second day :

Histopathology slide discussion – 100 marks.

**C. Viva Voice - 100 marks.**

All examiners will conduct viva-voice conjointly on candidate's comprehension, analytical approach, expression, interpretation of data and communication skills. It includes all components of course contents. It includes presentation and discussion on dissertation also.

## **SYLLABUS**

### **BRANCH IV – MDS ORAL PATHOLOGY**

#### **OPTIONAL SUBJECT - GENETICS, GROWTH AND DEVELOPEMENT**

##### **Molecular genetics :**

- DNA, RNA structure and function, DNA replication, regulation of gene expression.
- Genes, genetic code, transcription, translation and assembly.
- Chromosomes, structure, cell division and karyotyping.
- Mutations, mutagens and DNA repair mechanisms.
- Mode of inheritance, transmission, expression and penetrance.
- Polymerase chain reaction, blotting, hybridization, recombinant DNA technology, DNA sequencing and cloning.

##### **Applied genetics :**

- Genes related to the development of teeth and oro-facial structures.
- Genetic factors in tumorigenesis.
- Genetic application in forensic science.
- Genotoxicity tests.
- Gene therapy.

Note: - Included in the syllabus (First year).