KERALA UNIVERSITY OF HEALTH SCIENCES

SYLLABUS for DM ONCOPATHOLOGY

Course Code: 527

(2023-24 Academic year onwards)

Title of the Course: D.M. Oncopathology

Aims

The practice of pathology had its humble beginning with autopsy and gross examination of specimens. The field has witnessed tremendous growth from these origins, entering an era of advanced molecular diagnosis for every disease. Every new edition of the WHO Classification of Tumours bears witness to the overwhelming dynamics of tumour biology, which has a direct impact on oncological diagnostic modalities and therapeutics.

In keeping with the growing need for advanced training in oncopathology, the Kerala University of Health Sciences (KUHS) offers a three-year super-specialty training program for candidates already specialized in Pathology. The course has been conceptualized to impart advanced and focused training in tumour diagnosis to deliver consistent, high-quality cancer care to patients.

Objectives of Laboratory Training

The course is a three-year training program. At the end of the program, the candidate should possess the following competencies:

- **Basic Sciences & Biology:** Develop a strong foundation in the basics of tumour biology.
- **Systemic Pathology:** Gain a comprehensive understanding of the pathology of neoplastic diseases pertaining to every organ in the body.
- **Diagnostic & Surgical Pathology:** Complete training in grossing, histopathology, and frozen section reporting of oncology resection specimens according to standard operating protocols.
- **Advanced Diagnostics:**
  - Master knowledge of tumour proteomics with implications in cancer diagnosis (Immunohistochemistry, immunofluorescence, flow cytometry) and treatment.
  - Understand concepts of biomarkers used for diagnosing and prognosticating different types of tumours.
  - Gain knowledge of the molecular and cytogenetic underpinnings of neoplasms, detection methods, and their prognostic and diagnostic implications.

- Develop knowledge of tumour immunology and related diagnostic tests to guide cancer therapy.

■ **Multidisciplinary & Clinical Integration:**

- Acquire effective communication skills to participate in multidisciplinary tumour board meetings.
- Gain a basic introduction to the principles of radiotherapy, tumour imaging modalities (including nuclear medicine), medical oncology, hemato-oncology, and surgical oncology.
- **Research & Ethics:** Build skills to undertake research with a foundation in scientific research methodologies, biostatistics, and bioethics.

■ **Teaching & Administration:**

- Master effective teaching skills for training junior doctors, laboratory staff, and other personnel.
- Develop the capacity to supervise and work with subordinates and colleagues in a laboratory setting.

Overview

1. General Pathology & Tumour Biology

■ **Cellular & Molecular Basics:** Cellular organization, cell cycle, cellular housekeeping, signal transduction, human genome project, structure and function of genes, basics of immunology, and HLA systems.

■ **Carcinogenesis & Tumour Biology:** Genetic and epigenetic alterations in carcinogenesis; molecular hallmarks of cancer (self-sufficiency of growth signals, oncogenes, tumour suppressor genes, apoptosis, stem cell-like properties, angiogenesis, Warburg effect, invasion and metastasis, antitumour immunity, genomic instability, cancer-enabling inflammation, chromosomal changes, noncoding RNAs in cancer).

■ **Carcinogenesis Kinetics:** Molecular basis of multi-step carcinogenesis, tumour cell kinetics, and proliferation interactions with chemotherapy.

■ **Aetiology & Aetiopathogenesis :** Physical, chemical, and microbial carcinogens.

- **Inheritance & Immunity:** Cancer syndromes and their inheritances; cancer immunology.

2. Basic Principles of Clinical Oncology

- **Epidemiology:** Epidemiologic methods, descriptive epidemiology, and analytical epidemiology.
- **Staging & Therapeutics:** Cancer staging, oncological imaging, and nuclear medicine.
- **Management Principles:** Principles of surgical oncology, medical oncology, radiation oncology, biologic therapy, cancer chemotherapy, cancer screening, endoscopy, bone marrow stem cell transplants, and investigation of graft-versus-host disease (GVHD).

3. System Oncopathology

Principles of grossing of specimens, frozen section reporting, and histopathology of neoplasms involving:

- Head and neck
- Central nervous system
- Lung
- Mediastinum and heart
- Gastrointestinal tract
- Genitourinary tract
- Gynaecologic tract
- Breast
- Endocrine system
- Musculoskeletal system
- Peritoneal, pleural, and pericardial cavities
- Skin
- Hemato-lymphoid system (bone marrow, lymph nodes, spleen)
- Diagnostic approach to paediatric neoplasms and Carcinoma of Unknown Primary (CUPs)

4. Cytopathology & Haematopathology

- **Cytopathology:** Fine Needle Aspiration Cytology (FNAC) procedures, Rapid On-Site Evaluation (ROSE) / guided FNA, exfoliative cytology, cell block examination, intraoperative cytology, and liquid-based cytology.
- **Haematopathology:** Bone marrow aspirate staining (including iron staining), blood smears (thick and thin), and cytochemical and flow cytometric characterization of leukaemia.

5. Bioethics

- Respect human life and the dignity of every individual.
- Refrain from supporting or committing crimes against humanity and condemn all such acts.
- Treat the sick and injured with competence and compassion without prejudice.
- Protect privacy and confidentiality, breaching confidence only when keeping it would seriously threaten health.
- Work freely with colleagues to discover, develop, and promote advances in medicine and public health.
- Educate the public about present and future threats to human health.
- Advocate for social, economic, educational, and political changes that ameliorate suffering.
- Teach and mentor future medical professionals.

Training & Postings Schedule

- Histopathology - 18 months
- Haemato pathology including flow cytometry - 6 months
- Cytopathology - 6 months
- Molecular pathology - 4 months
- OP/ward/other departmental postings - 2 months

Skill Training & Laboratory Techniques

Candidates must demonstrate knowledge of principles, techniques, interpretation of results, and limitations for the following techniques:

- Histochemistry and Immunohistochemistry
- Electron microscopy
- ELISA techniques and Radioimmunoassay
- Immunofluorescence
- HLA typing
- Cytogenetics and FISH techniques (Karyotyping of leukaemia; translocation testing of solid tumours and hemato-lymphoid malignancies)
- Flow cytometry
- Polymerase Chain Reaction (PCR) and its variants
- Blotting and hybridization procedures
- Next-Generation Sequencing (NGS) and bioinformatics pipelines
- Tissue culture methods
- Artificial intelligence and image analysis

Teaching Methodology & Research

Teaching Methodology

The program enables candidates to investigate aspects of oncopathology via interactive discussions, clinic pathological conferences (CPCs), multidisciplinary tumour board meetings, seminars, slide sessions, laboratory bench work, and basic research. Annual academic activities include:

- Interesting slide discussions
- Tumour board discussions

- Journal clubs
- Weekly evaluations with theory tests
- Department CMEs and CPCs

Theory Examination Structure

The theory examination consists of four papers (Paper I, Paper II, Paper III, Paper IV) (3 hours duration each). 100 marks per paper.

- **Paper I:** Basic Sciences and General Surgical Pathology (Cellular structure/organization, Genetics, Tumour Biology, Biochemistry, Immunology)
- **Paper II:** Systemic Oncopathology
- **Paper III:** Oncologic Haematopathology and Laboratory Techniques (including molecular techniques and data interpretation)
- **Paper IV:** Recent Advances in Oncopathology and Miscellaneous Topics (Epidemiology, cancer registries, research methodology, bioethics, quality control, AI in Oncopathology, pathology informatics)

Recommended Resources

Reference Books

- **General & Surgical Pathology:**
  - *Histology for Pathologists* – Stephen S. Sternberg
  - *General Pathology* – J.B. Walter, M.S. Israel
  - *Robbins Pathologic Basis of Disease* – Ramzi S. Cotran, Vinay Kumar, Stanley L. Robbins
  - *Pathology* – Emanuel Rubin, John L. Farber
  - *Anderson's Pathology* – John M. Kissane
  - *Ackerman's Surgical Pathology* – Juan Rosai
  - *Diagnostic Surgical Pathology* – Stephen S. Sternberg
  - *Diagnostic Histopathology of Tumours* – Christopher D.M. Fletcher
- **Systemic & Subspecialty Oncopathology:**
  - *Cancer: Principles and Practice of Oncology – Vincent T. DeVita*
  - *AFIP Fascicles on Various Tumours*
  - *WHO Classification of Tumours Series*
  - *Biopsy Interpretation Series*
  - *Enzinger and Weiss's Soft Tissue Tumours – Franz M. Enzinger, Sharon W. Weiss*
  - *Cardiovascular Pathology – Malcolm D. Silver*
  - *Pathology of Pulmonary Diseases – Mario J. Saldanha*
  - *Spencer's Pathology of the Lung – P.S. Hasleton*
  - *Dahlin's Bone Tumours – K. Krishnan Unni*
  - *Bone Tumours – Andrew G. Huvos*
  - *Greenfield's Neuropathology – J. Hume Adams*
  - *Russell & Rubinstein's Pathology of Tumours of the Nervous System – Darrell D. Bigner, Roger E. McLendon, Janet M. Bruner*
  - *Rosen's Breast Pathology – Paul Peter Rosen*

- *Odze and Goldblum Surgical Pathology of the GI Tract, Liver, Biliary Tract and Pancreas – Robert D. Odze*
- *Urologic Surgical Pathology – Liang Cheng, Greg MacLennan, David Bostwick*
- *Diagnostic Gynecologic and Obstetric Pathology – Christopher Crum, Kenneth Lee, Marisa Nucci*
- *Blaustein's Pathology of the Female Genital Tract – Robert J. Kurman*
- *Stocker and Dehner's Pediatric Pathology – J. Thomas Stocker, Louis P. Dehner*

■ **Haematopathology:**

- *Williams Postgraduate Haematology – A.V. Hoffbrand, S.M. Lewis, E.G.D. Tuddenham*
- *Wintrobe's Clinical Haematology – G. Richard Lee, John Foerster, John Lukens, F. Paraskevas, J.P. Greer, G.M. Rodgers*
- *Knowles Neoplastic Haematopathology – Attilio Orazi, Kathy Foucar, Daniel Knowles*
- *Haematopathology – Elaine Sarkin Jaffe*
- *Leukemia Diagnosis: A Guide to the FAB Classification – Barbara J. Bain*

■ **Laboratory Techniques & Cytology:**

- *Henry's Clinical Diagnosis and Management by Laboratory Methods – John Bernard Henry*
- *Theory and Practice of Histological Techniques – John D. Bancroft, Alan Stevens, David R. Turner*
- *Histotechnology: A Self-Instructional Text – Freida L. Carson*
- *Histochemistry: Theoretical and Applied – A.G. Everson Pearse*
- *Manual & Atlas of Fine Needle Aspiration Cytology – Svante R. Orell, Gregory F. Sterrett, Max N.I. Walters, Darrel Whitaker*
- *Koss' Diagnostic Cytology and Its Histopathologic Bases – Leopold G. Koss*
- *Comprehensive Cytopathology – Marluce Bibbo*

Academic Journals

■ *Cancer*

- *British Journal of Cancer*
- *International Journal of Cancer*
- *Cancer Research*
- *Journal of the National Cancer Institute*
- *Journal of Surgical Oncology*
- *Journal of Clinical Oncology*
- *Seminars in Oncology*
- *Hematology/Oncology Clinics of North America*
- *Medical and Paediatric Clinics of North America*
- *Current Opinion in Oncology*
- *The Indian Journal of Cancer*
- *Acta Cytologica*
- *The American Journal of Pathology*
- *The American Journal of Surgical Pathology*
- *The American Journal of Hematology*
- *The American Journal of Clinical Pathology*
- *Archives of Pathology & Laboratory Medicine*
- *British Journal of Haematology*
- *Blood*
- *Bone Marrow Transplantation*
- *Diagnostic Cytopathology*
- *Histopathology*
- *Human Pathology*
- *Indian Journal of Cytology*
- *Indian Journal of Pathology and Microbiology*
- *Journal of Pathology*
- *Journal of Clinical Pathology*

- *Laboratory Investigation*
- *Modern Pathology*
- *Pathology*
- *Seminars in Hematology*
- *Seminars in Diagnostic Pathology*
- *The Lancet*
- *The New England Journal of Medicine (NEJM)*

