



# MASTER OF PATHOLOGY (ANATOMIC PATHOLOGY)

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TRAINING CURRICULUM FOR TRAINEES AND SUPERVISORS  
UNIVERSITI SAINS MALAYSIA

## MASTER OF PATHOLOGY (ANATOMIC PATHOLOGY)

### 1. Aim

A four year post-graduate training program in Anatomic Pathology.

### 2. Background

The School of Medical Sciences, USM, was established in 1979 to train undergraduate medical doctors. This evolved into developing post-graduate training in Medicine, which began in 1987. Presently there are more than fifteen specialty post graduate training programmes being conducted by the School of Medical Sciences, USM.

Post graduate training in Anatomic Pathology commenced in 1992 with the degree of 'Master of Medicine (Pathology)'. 6 years later, in 1998, the degree was changed into 'Master of Pathology (Anatomic Pathology)' and it is still being used until today. In 2004, this training programme has joined the national conjoint programme with UKM and UM, later followed by other 2 universities, UPM and UiTM. More than 50 pathologists had graduated since the programme began.

### 3. Structure of course (Appendix I)

The training is divided into 2 phases.

Stage 1 (year 1) : Students will undergo rotations in all medical-lab based departments such as Chemical Pathology, Haematology, Microbiology & Parasitology with minor postings in Clinical Immunology and Medical Genetics

Stage 2 (year 2-4) : The first 2 years are held in teaching and / or public hospitals, while the final year is in-campus. The focus is on advanced understanding and application of general and systemic pathology in greater detail.

### 3.1 Curriculum structure phase I (basic training in pathology) (Appendix II)

Stage	Year	Curriculum and Training Place	Assessment
I	1	<p>The candidate shall undergo a rotation posting in the 4 major disciplines of 10 weeks duration each.</p> <p>An intensive course during the academic year.</p> <p>During the postings, the candidate shall maintain a log book and perform to the supervisor's satisfaction a list of procedures.</p>	<ul style="list-style-type: none"> <li>• End of posting examination</li> <li>• Conjoint Examination Stage I</li> </ul>

### 3.2 Curriculum structure stage II (specialty trainee in anatomic pathology) (Appendix III)

Stage	Year	Curriculum and Training Place	Assessment

II	2-4	<u>Year 2</u>	<u>Year 2 &amp; 3</u> Continuous supervisor assessment  <u>Year 4</u> i. Continuous supervisor assessment ii. Dissertation submission 6 months before the exit examination iii. Conjoint Examination Stage 2
		i. Orientation	
		ii. Performing technical procedures in histopathology lab*	
		iii. Laboratory postings with rostered call duties	
		iv. Forensic posting (4 to 8 weeks)	
v. Research Project with submission of proposal *Assessed via log books			
		<u>Year 3</u>	
		i. Laboratory postings with rostered call duties	
		ii. Elective / specialty training	
		iii. Forensic posting (4 to 8 weeks)	
		iv. Research Project	
		<u>Year 4</u>	
		i. Laboratory postings with rostered call duties	
		ii. Forensic posting (4 to 8 weeks)	

#### 4. Mode of Teaching and Learning

Various modes will be used to achieve effective learning objectives.

- Notes, articles, references and audiovisual material will be prepared together with candidates.
- Lectures and seminar will be given in packages to cover the whole syllabus of anatomic pathology.
- Candidate will be actively involved in clinical activities including the histopathology (macroscopic and microscopic assessment), cytopathology, frozen sections, specialised pathology (e.g. renal, neuromuscular, rectal suction), clinical and medico-legal autopsy, and anatomic pathology laboratory quality assurance program
- Actively participating in academic and research activities.
- Writing up of dissertation. The title must be specific. The length is about 15,000 words.

## 5. Supervision and progress reports

The medical school will appoint a qualified anatomic pathologist to be a supervisor for each candidate. The supervisor is responsible for the progress report of the candidate.

## 6. Examination and Assessment

Assessment during the course is divided into 2 parts

- Continuous assessment by supervisor
- Examination (end-stage conjoint examinations)

### 6.1 Stage I assessment

Theory	50% (MCQ 70% and Essay 30%)
Practical	50%

#### 6.1.1 Conjoint Examination Stage I

- Anatomic Pathology (Theory: 20 MCQ and 1 essay; Practical: 10 stations)
- Medical Microbiology (Theory: 20 MCQ and 1 essay; Practical: 10 stations)
- Haematology (Theory: 20 MCQ and 1 essay; Practical: 10 stations)
- Chemical Pathology (Theory: 20 MCQ and 1 essay; Practical: 10 stations)

### 6.2 Phase II (year 2 -4)

#### 6.2.1 Continuous Assessment (Year 2 &3)

- log book
- supervisor report

#### 6.2.2 Year 4

Continuous assessment by supervisor  
Completed logbook with  
100 histopathology reports  
20 frozen section reports  
20 autopsy reports  
100 cytology reports  
20 FNA reports

Submission of research dissertation 6 months before final year

Satisfactory supervisor's assessment and submission of dissertation will allow students to sit for the Stage 2 Conjoint Examination

#### Stage II Conjoint Examination (end of year 4)

1. Theory (essay) 45%
  - a. Paper I (50%)
  - b. Paper II (50%)
2. Practical 45%
  - a. Autopsy (20%)
  - b. Practical I (Surgical pathology) (40%)
  - c. Practical II (Cytopathology and Special Cases) (30%)
  - d. Practical III (Grossing) (10%)
3. Viva voce 10%

#### 6.2.3 Repeat examination

Failing the Conjoint Examination, the candidate may appear in the examination after 6 months or 1 year upon approval of the University senate.

## 7. Entrance Criteria

- 7.1 Candidate must hold a medical degree recognized by Malaysian Medical Council (MMC)
- 7.2 Candidate must be registered with the MMC.
- 7.3 Candidate must have completed at least 3 years of medical service.
- 7.4 Candidates must have passed the entrance examination and/or pass an interview
- 7.5 Additional criteria for Oversea candidates are
  - i. Have a temporary practicing certificate by MMC before commencing practice
  - ii. Undergone laboratory attachment for a minimum of 3 months before joining the programme with satisfactory supervisor report
  - iii. Proof of proficiency in English language, by obtaining a minimum score of 6.0 in IELTS or 550 in TOEFL (obtained within 2 years prior

to date of enrolment)

## **8. Duration of Training**

The minimum duration of training is four (4) years with a maximum of seven (7) years.

The maximum duration permitted to complete the Stage 1 course is two years.

The maximum duration permitted to complete the Stage 2 course is five years.

## **9. Curriculum and syllabus**

Syllabus that will be used is attached (appendix II & III). However, the syllabus will be updated from time to time in view of the progress in this field of specialty.

## **10. Academic and Teaching Staffs**

10.1 All academic staffs at the School of Medical Sciences will be involved in teaching activities in common teaching sessions for Stage 1 of all clinical Master programmes.

10.2 All academic and non-academic staffs of the medical-lab based departments will be involved in teaching activities according to the postings in Stage 1

10.3 Designated lecturers from one of the conjoint universities will be organising and teaching during the intensive course

10.4 Phase II will be particularly involved anatomic pathology lab staffs and anatomic pathologists.

10.5 Research and statistic courses will be given by lecturers from the Biostatistic Unit

**11. Administrative committee**

The Department of Pathology will be responsible in organizing and monitoring the program, preparing teaching schedule and organizing seminars pertaining to the program.

**12. Administration of Examination**

The Medical School will coordinate and execute all examination. The result will be discussed at the Examination Board before approval by the Medical School Board and the Post-graduate University Board.



## Appendix I

### Programme Structure

<b>Stage</b>	<b>Year</b>	<b>Curriculum</b>
I	1	* Basic Pathology * Logbook
<b>Stage I Conjoint Examination</b>		
II	2 -4	* Clinical Duties: Oncall histopathology, cytopathology, autopsy * Case Presentation Conferences/Multidisciplinary Meetings * Log book * Dissertation * Elective posting * Continuous supervisor assesment
<b>Stage II Conjoint Examination</b>		

## Appendix II

### STAGE 1 CURRICULUM

#### 1. COURSE STRUCTURE

The candidate shall undergo a rotation posting in the 4 major disciplines of 10 weeks duration each. An orientation course will be held at the beginning of the academic year and an intensive course during the academic year. Both these courses will be conducted in the universities.

During the postings, the candidate shall maintain a log book and perform to the supervisor's satisfaction a list of procedures.

#### 2. FRAMEWORK OF STAGE 1 COURSE

Orientation	1 week
Rotational postings	40 weeks (10 weeks X 4)
Intensive course	3 weeks
Self-study	2 weeks
Examinations	2 weeks
Posting breaks	4 weeks
<b>TOTAL</b>	<b>52 weeks</b>

#### 3. ANATOMIC PATHOLOGY MODULE

To acquired knowledge on

- General pathology:
  - - Cell injury and necrosis.
  - - Inflammation and repair
  - - Cellular adaptive mechanisms
  - - Haemodynamic disorders
  - - Neoplasia
  - - Nutritional disorders
  - - Disorders related to environment.
  - - Inborn errors of metabolisms.
  - - Genetic disorders
  
- Systemic pathology:  
Congenital, inflammatory, degenerative, vascular, metabolic and neoplastic disorders of the organ systems: cardiovascular, respiratory, genitourinary, gastrointestinal, hepatobiliary, lympho-reticular, reproductive, musculoskeletal, nervous, dermatology, endocrine, ophthalmology and otorhinolaryngology systems

- Teaching methods: The trainees will be exposed to various teaching-learning
  - i. Methodologies Student centered learning e.g.; seminar, tutorials/slide sessions, journal club, CME/CPC, e- learning
  - ii. Apprenticeship training, lectures
  - iii. Preparation and reporting of stained tissue sections:  
Carry out (at least once) the complete process of making slides starting with an unfixated specimen to preparation of an H&E stained slide. (Manual tissue processing and H&E staining)
  - iv. Examine routine H&E stained sections of surgical specimens and submit 50 histopathological reports
  - v. Autopsy: Observe 10 autopsies. This requirement may be achieved over the first year of training rather than limited to anatomic pathology posting.

#### 4. HAEMATOLOGY MODULE

To acquire knowledge on

Haematology

- i. Haemopoiesis and normal haemostasis
- ii. Red cells disorders:
  - a. Anaemias: Nutritional anaemias, anaemia of chronic disease and aplastic anaemia
  - b. Haemolytic anaemias
  - c. Thalassaemia and common haemoglobinopathies.
- iii. White cell disorders:
  - a. Benign – Infections, leukaemoid reaction
  - b. Acute Leukaemias, chronic leukaemias, multiple myeloma, myeloproliferative neoplasms, myelodysplastic syndrome, and lymphoproliferative disorders.
- iv. Bleeding disorders caused by vascular, platelet abnormalities and coagulation disorders
- v. Thrombophilia
- vi. Basic genetic concept in haematology
- vii. Basic principles of quality assurance in haematology

Transfusion Medicine:

- i. ABO, Rh and other clinically important blood group systems
- ii. Compatibility testing
- iii. Haemolytic disease of the foetus and newborn
- iv. Preparation, storage and use of blood components

- v. Complications of blood transfusion
- vi. Donor management
- vii. Basic principles of quality assurance in transfusion medicine

## Teaching methods

Haematology (lectures, seminars, case

Transfusion medicine (lectures, seminars, presentations and practical/slide sessions) case presentations and practical sessions)

## 5. MEDICAL MICROBIOLOGY MODULE

To acquire knowledge on

### THEORETICAL ASPECTS

- i. Basic concepts on laboratory safety.
- ii. Bacteriology: morphology, cultural characteristics, aetiology, epidemiology, pathogenesis, clinical manifestation, laboratory diagnosis, principles of management, prevention and control of common bacterial infections.
- iii. Virology: morphology, transmission, replication, aetiology, epidemiology, pathogenesis, clinical manifestation, laboratory diagnosis, principles of management, prevention and control of common viral infections.
- iv. Mycology: morphology, cultural characteristics, aetiology, epidemiology, pathogenesis, clinical manifestation, laboratory diagnosis, principles of management, prevention and control of common fungal infections.
- v. Parasitology: morphology, lifecycle, aetiology, epidemiology, pathogenesis, clinical manifestation, laboratory diagnosis, principles of management, prevention and control of common parasitic infections.
- vi. Basic concept of emerging infectious diseases
- vii. Antimicrobial agents and multidrug-resistant organisms.
- viii. Basic principles of infection prevention and control.
- ix. Sterilization and disinfection.
- x. Basic principles of molecular techniques.
- xi. Immunology: The organization of immune system, innate and adaptive immunity and aberrations of immune responses (immunodeficiency, hypersensitivity and autoimmunity).

## PRACTICAL SKILLS TO BE ACQUIRED

- i. Perform and read Gram stain, acid fast stain and India ink stain
- ii. Culture, isolation, identification and antimicrobial sensitivity test for common bacterial pathogens
- iii. Rapid serological test and their interpretation (E.g. dipstick/ICT/LA/RPR/TPPA)
- iv. Enzyme/chemiluminescence immunoassay and their interpretation
- v. Immunofluorescence tests and their interpretation
- vi. Immunoblot tests and their interpretation
- vii. Molecular method and their interpretation
- viii. Viral isolation and identification
- ix. Culture and identification of fungi
- x. Identification of common parasites in clinical specimens
- xi. Laboratory automation and information system

## Teaching Method

- i. Learning and teaching activities 3-4 sessions per week (each session 1-2 hours).
- ii. Candidate competency is monitored via logbook assessment and verification by lecturer and/or technical personnel.

## 6. CHEMICAL PATHOLOGY MODULE

To acquire knowledge on

### CLINICAL ASPECTS

Competencies in the chemical pathology of diseases

- i. Generic aspects
- ii. Biological variability
- iii. Gastrointestinal tract
- iv. Hepatobiliary system
- v. Renal System
- vi. Acid Base Imbalance
- vii. Water and Electrolytes
- viii. Proteins
- ix. Cardiovascular System
- x. Metabolic and endocrine
- xi. Endocrinology – Pituitary, thyroid, adrenal, reproductive system
- xii. Calcium, magnesium, phosphate and metabolic bone disorders
  
- xiii. Clinical Enzymology
- xiv. Biochemical genetic

- xv. Toxicology
- xvi. Cancer

#### LABORATORY TECHNICAL COMPETENCIES

- i. Basic laboratory techniques
- ii. Factors influencing laboratory results
- iii. Laboratory instrumentation
- iv. Laboratory automation
- v. Spectrometric methods
- vi. Osmometry
- vii. Electrometric methods
- viii. Electrophoresis
- ix. Chromatography
- x. POCT

#### LABORATORY MANAGEMENT COMPETENCIES

- i. General
- ii. Total Quality Management (QA/QC/QMS)
- iii. Laboratory Safety

Teaching methods will be student-centered and teacher-centered consisting of:

- i. Lectures
- ii. Seminar
- iii. Clinical cases studies
- iv. Journal club
- v. CME sessions
- vi. Submission of a satisfactorily completed log book
- vii. Practical will be acquired through attachment during laboratory rotations

### **7. MEDICAL IMMUNOLOGY MODULE**

To acquire knowledge on

#### THEORETICAL ASPECTS

- i. Organization of the immune system

- ii. Antigen and antibody reactions
- iii. Complement & Cytokines  
Major Histocompatibility Complex Immune Response
- iv. Hypersensitivity  
Immunodeficiency  
Autoimmunity and autoimmune disease
- v. Tumour immunology  
Transplantation immunology

## Practical

- i. Agglutination:  
- Rheumatoid Factor/ C-Reactive Protein/RPR
- ii. Immunofluorescence:  
- Anti-Nuclear Antibody/Anti-dsDNA /
- iii. Anti-Smooth Muscle Antibody /Anti- Mitochondrial Antibody / Anti- Neutrophil  
Cytoplasmic Antibody
- iv. Turbidometry/nephelometry:  
- C-Reactive Protein  
- Immunoglobulin G, ImmunoglobulinA,
- v. Immunoglobulin IgM, Complement3, Complement 4
- vi. Immunoassay :  
ELISA/EIA/FEIA fluoroenzyme immunoassay (FEIA)/
- vii. Immunoblot - Anti-Cardiolipin Antibody  
- Extractable Nuclear Antigen - Alpha-FetoProtein  
- Allergen Specific IgE Test
- viii. Immunophenotyping  
- Lymphocyte subsets

It is student-centered and teacher-centered consisting of

1. Lectures for the theoretical 10 topics
2. Seminars which involve case presentation, theoretical aspect of the disease and immune-diagnosis and principle of management
  - Seminar 1 – Autoimmunity
  - Seminar 2 – Immunodeficiency
  - Seminar 3 – Hypersensitivity
3. Laboratory attachment

## 8. MEDICAL GENETICS MODULE

To acquire knowledge on

- i. Introduction to Medical Genetics
- ii. Introduction to Molecular Genetics
- iii. Introduction to Human Cytogenetics
- iv. Cytogenetic analysis - Methods and Applications
- v. Principles of inheritance in genetics disorders
- vi. Introduction to Genetics Counselling
- vii. Overview of DNA technology applications in medicine
- viii. Cancer genetics (molecular and cytogenetics techniques)
- ix. Genetics Basis of Human Cancer

### Practical

- i. PCR
- ii. Karyotyping
- iii. DNA extraction
- iv. FISH analysis
- v. Pedigree drawing and analysis

### Teaching Method

1. Various lectures as well as laboratory practical sessions for cytogenetic and molecular techniques.
2. During the postings, the candidate shall maintain a log book and performance to the supervisor's satisfaction a list of procedures.



## APPENDIX III

### Stage 2 Curriculum

This is a 3-year training programme. The first 2 years are held in teaching and / or public hospitals, while the final year is in-campus. The focus is on advanced understanding and application of general and systemic pathology in greater detail.

### THEORY

#### Pre-requisite knowledge

- Anatomy & histology of human body
- Applied physiology of all systems
- Basic clinical & radiological knowledge

#### Knowledge to be acquired

- Applying theoretical knowledge into the clinical practice (including surgical pathology, cytopathology, autopsy and laboratory management)
- Ability to discuss differential diagnoses of the disease
- Keep up-to-date with theoretical knowledge and ancillary studies of diseases
- Understand the basic research project (proposal, literature review, methodology and statistical analysis)
- Understand medico-legal issues related to anatomic pathology services

### PRACTICAL

#### Perform:

Grossing surgical specimens

Fine needle aspiration cytology (FNAC) Autopsy

#### Interpretation:

Routine surgical pathology including renal, liver, muscle biopsies & rectal suction

Ancillary studies

Recognise common ultrastructural changes of diagnostic significance

Frozen sections

Cytopathology - FNA, Gynae and non-gynae cases

Record keeping and disease indexing (eg SNOMED)

Laboratory management skills including Quality Assurance programme

Provide active consultancy services in regular patient care discussion

Participate in CME/CPC

Ability to carry out basic research project (proposal, literature review, methodology, laboratory work and statistical analysis)

## COURSE STRUCTURE

### YEAR 2

#### Orientation

Performing technical procedures in histopathology lab\*

Laboratory postings with rostered call duties

Forensic posting (4 to 8 weeks)

Research Project including attending of research methodology workshop, Good Clinical Practice (GCP) and submission of proposal

\*Assessed via log books

### YEAR 3

Laboratory postings with rostered call duties

Elective / specialty training

Forensic posting (4 to 8 weeks)

Research Project including attending of research methodology workshop

### YEAR 4

Laboratory postings with rostered call duties Forensic posting (4 to 8 weeks)

Submission and assessment of dissertation Examination (refer to examination chapter)

## TEACHING PROGRAMME

1. The teacher: student ratio is 1: 2
2. The student shall learn primarily through in-service training in an independent and self-directed manner.
3. The formal teaching programme is individualized according to the on call schedule and comprise of discussion sessions, written assignments, slide interpretation and other practical skills.
4. Continuous assessment comprises of attendance, performance during on call, supervisor's and research progress reports.
5. The student shall plan, undertake and write up a research project, which is to be submitted by the end of the first semester of final year.
6. The student is expected to attend and participate actively in all regular CPCs, cytology CME, forensic CME and journal club presentations of the department.
7. The student is encouraged to attend and present at relevant scientific meetings conducted by professional bodies/universities.
8. The students are expected to gain knowledge and experience from the elective/specialty posting

## RESEARCH PROJECT

1. The students shall engage in research activities where they will be exposed to research proposal, methodology and statistical data analysis to produce a dissertation.
2. A supervisor will be appointed to oversee and advise the research projects conducted.
3. The proposal shall be delivered within the time frame set and must be approved by the Department.
4. Data collection shall be commenced after the ethical approval by the ethics committee.
5. Supervision reports must be provided by the supervisor every six months.
6. A dissertation can be written and organized according to the instructions given by the post-graduate office.
7. The students must submit a complete dissertation six (6) months prior the phase II final assessment.
8. For the final submission, the students must submit two (2) copies of the dissertation in hard binding.
9. Satisfactory of the assessment dissertation is a pre-requisite to sit for the Part II Examination.

## References

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Department of Pathology website