PATHOLOGY STRUCTURED TRAINING PROGRAMME

Duration and scope of programme

Basic Specialist Training:

a) Entry Requirement:

Following qualification as a medical practitioner, trainees should have completed at least one year of post-Housemanship, with preferably six months in a surgical discipline prior to commencing specialist training. This period will include at least one year of pre-registration experience (Housemanship).

b) **Training Period:**

Recommended: 3 years,
Maximum: 3.5 years.

A maximum of 1 year pre-BST accreditation is allowed subject to Pathology (Main) Specialist Training Committee's review and approval.

c) **Postgraduate Qualification:**

FRCPA (Part 1) or
FRCPath (Part 1) or its equivalent

d) **Postings:**

Pathology Training Units accredited for training

e) Training Contents:

The medical trainee should have a sound knowledge of the mechanism of diseases and pathophysiological concepts. He/She should also have participated in regular clinicopathological meetings. He/She is expected to have attained a certain expertise in his/her chosen specialty before proceeding to the Part 2 examination. Knowledge of laboratory safety precautions and quality assurance is expected. He/She should satisfy all the requirements of the relevant examining bodies.

2. Advanced Specialist Training

a) Training Period:

Recommended: 2 years,
Minimum: 1.5 years

A maximum of 1 year pre-AST accreditation is allowed subject to Pathology (Main) Specialist Training Committee's review and approval.

Non-Traditional Source (NTS) trainees are required to complete 2 full years of training. No pre-AST accreditation will be considered. .

b) Exit Qualification:

FRCPA (Part 2) or
FRCPath (Part 2) or its equivalent

c) Postings:

Pathology Training Units accredited for training

d) Training Contents

Subspecialty - Histopathology
Chemical Pathology
Microbiology
Forensic Pathology

PATHOLOGICAL SCIENCES EXAMINATION (RCPA)

All trainees aiming to take the examination of the Fellowship of the Royal College of Pathologists of Australasia must sit for the Pathological Sciences Examination as the first part of the overall examination process. The examination consists of a single written paper. A pass or exemption must be achieved before proceeding to any Part 2 paper.

The examination may be taken within the first 3 years of training and must be re-taken if the candidate fails.

The purpose is to:

1. test the trainee's knowledge and understanding of the scientific and technological underpinning of pathological practice

2. encourage a lifelong professional interest in keeping abreast of new advances

3. encourage a critical assessment of new knowledge as applied to practice.

Trainees should have an understanding of the scientific basis of pathological practice and advancing knowledge. They will need to have a much deeper understanding of basic disease mechanisms than would be expected of a graduating medical student and a thorough knowledge of evolving concepts in classical areas of General Pathology.

HISTOPATHOLOGY

A. Structure of training programme

Year 1:

1. Demonstration of methods of gross description and cut-ups in surgical pathology by trained staff.
2. Performance of above duties on roster basis under supervision.
3. Assignment of simple cases of diagnostic pathology and sign-out with a supervisor who should be a trained staff.
4. Weekly attendance of slide sessions of difficult and problem cases.
5. Didactic microscopic sessions once weekly on the approach to diagnostic pathology of various systems conducted by senior staff.
6. Introduction to diagnostic cytology with cervical smears and non-gynaecological cytology.
7. Attendance of clinicopathological conferences of various tumour boards and hospital case conferences.
8. Observation of post-mortem of coronial and perinatal cases and assistance and supervised performance of the trainee in these areas.

Year 2: All of the above

1. Increase the number of cases assigned to individual for diagnostic pathology. Continue supervised sign-out.
2. Six-month rotation to perform autopsies under the supervision of forensic pathologists and others.*
3. Continue with supervised reporting of Cervical Pap Smears and non-gynaecological cytology.

*This may commence in the first year of training depending on the ability of trainee and roster for the year.

Year 3 to 3.5: As above programme for Year 1 and Year 2

1. More active participation in the weekly slide conference with testing by senior staff.
2. Autopsy pathology – rostered duty for perinatal and coronial cases.
3. 3-month posting to diagnostic cytology.
4. Rotation to another hospital with specialized areas, e.g. Kandang Kerbau Women's and Children's Hospital for 3 months for gynaecological pathology and paediatric pathology.
5. Attendance at Frozen Section Laboratory and training in frozen section interpretation.

End of Year 3 to 3.5: Expect to prepare for the examinations of FRCPA Part 1 and FRCPath Primary.

Year 3.5 to 4: Continue with above programme

Year 5:

1. Full load of surgical pathology/cytology slides as trained pathologists. Still continue sign-out with trained pathologist.

2. Do a project with senior staff.

3. Expected to participate in the Pathological Annual Scientific Meetings with presentation of project paper, OR

4. Publish findings of project.

5. Rotation to peripheral hospitals for wider exposure of variety of cases
   - Kandang Kerbau Women's & Children's Hospital
   - Changi General Hospital

6. Immunohistochemistry indications, techniques and interpretation.

7. Electron Microscopy and interpretation.

8. To be familiar with health and safety regulations relating to laboratory practice and to know and participate in laboratories management, quality assurance and quality control.

9. Preparation for examinations of Finals FRCPath/FRCPA Part 2.

B. Training for examinations

1. Fulfilment of all requirements set by the Royal College of Pathologist of Australasia (see attached checklist) and Royal College of Pathologists, U.K.

2. Supervised teaching in specialty diagnostic pathology with pathologists who have specialized training in the following areas:

    Gastrointestinal Pathology and Hepatobiliary Pathology
    Renal and Uropathology
    Cytopathology
    Skin Pathology
    Haematopathology
    Gynaecological Pathology
    Paediatric Pathology
    Musculoskeletal Pathology
    Breast Pathology
    Neuropathology

    These are the commonest areas of surgical pathology practice.

3. Trainees are required to keep a casebook of the 10 cases as a submission for Part 2 examination of FRCPA.

4. Mock examinations and vivas by the senior staff should be held to help trainees prepare for their examinations.

5. Trainees may attend courses in Australia or U.K. organised for examination preparation:
    - Basic Science Courses
    - Histopathology Courses

6. Trainees should attend all seminars and lectures of HMDP visiting experts.

C. Log Book/Daily Record of reporting

The daily workload, types and complexity of cases reported by trainees are captured on the computer. Trainees keep their own record of Continuing Medical Education activities and these are submitted to Singapore Medical Council for accreditation.

CHEMICAL PATHOLOGY

In lieu of a Singapore-based exit examination in Chemical Pathology, the proposed training programme is based on the training requirements for preparing the medical trainee to attempt either i) the Fellowship examinations, FRCPA (Pathological Sciences, Part 1 and Part 2) of the Royal College of Pathologists of Australasia, or ii) Fellowship of the Royal College of Pathologists, UK (Chemical Pathology, Part 1 and Part2). For either scheme, the training will generally be over a period of 5 years.

A. Objective of Training

The objective is to train chemical pathologists to effectively contribute to the investigation and management of patients and have the appropriate management skills to lead a department, if required.

B. Expected Results

Trainees will be expected to have a comprehensive knowledge of and skills in:

a) Specialised factual knowledge of:
1. biochemistry, physiology & general pathology
2. the biochemical basis of disease
3. the application of results of laboratory tests to the investigation and management of patients, particularly those with biochemical problems,
4. analytical techniques,
5. efficient laboratory administration and management,
6. the investigation of clinical and laboratory problems.

b) Interpretative skills so that a clinically useful opinion can be derived from laboratory data.

c) Technical knowledge, gained from close acquaintance with laboratory technology, so that methodology appropriate to a clinical problem can be chosen, and so that quality control and quality assurance procedures can be implemented.

d) Research and development experience Original thought and critical assessment of published work are important to allow the trainee to contribute in a team, and individually, to the development of the service.

e) Data management skills to evaluate information derived from the population served and from the technical procedures applied in the laboratory. These skills should include familiarity with IT and the use of spreadsheets, databases and statistical packages etc.

f) Management and communication skills. The trainee must gain experience, under supervision, in planning departmental policies and develop the leadership skills necessary to implement them.

g) Familiarity with all aspects of health and safety requirements for laboratories.

C. Examinations to be taken

FRCPA training and examination track

1. FRCPA Pathological Sciences

   This is to be taken by end of second year of training. The trainee should have a deep understanding of the scientific basis of pathological practice and basic mechanism of disease processes. He must also be familiar with the areas of advancing knowledge in the practice of pathology.

2. FRCPA Part 1 Examination

The trainee is expected to take this examination at the end of the third year of training. By then he should have a sound understanding of and practical familiarity with:

a) the analytical procedures being performed in an approved laboratory

b) the interpretation of laboratory results with respect to both the patient's disease and test reliability.

c) The management and organisation of a laboratory.

He must be familiar with the use, method of analysis, analytical procedure and interpretation of all tests commonly performed in the clinical chemistry laboratory. In addition he must be aware of the commonly performed tests and developments in this area, relating to alternative methods of analysis, new instrumentation and new tests.

d) Clinical Biochemistry and Interpretation of Results

The trainee must be skilled at interpreting laboratory data, particularly as they contribute to the solving of clinical problems. These skills can only be gained through involvement at the laboratory – clinical interface, with experience in co-operating with clinical staff in the investigation and management of patients. He should know when it is appropriate to initiate clinical contact on the basis of abnormal laboratory results as well as being receptive to enquiries from the clinical staff.

e) Instruments, Techniques and Methods of Analysis

The trainee's technical knowledge and practical competence should be of a standard such that the non-medical laboratory staff will both seek and value their advice on technical matters. He should not only be familiar with the equipment within theirown laboratory, but also be aware of recent advances in laboratory instrumentation.

f) Laboratory Management

Knowledge of the administration of the laboratory so that it can operate efficiently and effectively will be expected. Topics such as staff relationships, motivation and training, laboratory safety, equipment and chemical purchasing, budgets, allocation of resources, and forward planning should be covered.

g) Research

It is expected that he will be have undertaken some original investigative work during this period of training, and have been peripherally involved in a number of other research projects. He is encouraged to present formal papers at recognised conferences and to publish his original research work.

h) Miscellaneous

As a component of the FRCPA Part 2 examination, the College requires the trainee to submit five separate case commentaries at the time of the written examinations. Guidelines on the preparation of case commentaries are obtainable from the Australasian College office.

FRCPath (Chemical Pathology) training and examination track

The aim of this training programme is to enable successful trainees to practise chemical pathology at consultant or consultant-equivalent level and to acquire management skills sufficient to lead a department, thereby ensuring that they are able to provide a competent, effective service so that maximum benefit may be gained for patient care.

The training programme for chemical pathology should be regarded as a general outline of the areas to be covered for the College's examinations without being restrictive or unduly prescriptive. After registration there will be a period of General Specialist Training (GST) before entering Higher Specialist Training (HST), of not less than one year and not more than three years. The Part 1 FRCPath should be taken after a minimum of three years' training of which two years should be in HST. The Part 2 is taken after a minimum of five years recognised training including four years of HST. The Certificate of Completion of Specialist Training (CCST) will be awarded on the recommendation of the College, normally following the attainment of the College's fellowship and satisfactory completion of training.

Trainees are required to keep a training record detailing their training experience. This will be inspected on a regular basis by an appointed Educational Supervisor i.e. the consultant in charge of training. The trainee should have supportive appraisal twice a year:

FRCPath PART 1
(Years 1-3)

a. Theoretical Knowledge
The list of topics below is an indication of the areas of scientific training which the trainees, with the help of their supervisor, must address in detail. It should not be regarded as a finite description of the work to be undertaken for the Part 1 examination but as a general indication of the areas to be covered:

a.1 Biochemical Aspects of Disease
- biological variability
- diseases of the gastrointestinal tract and pancreas
- liver disease
- protein structure, metabolism and disorders
- basic immunology
- kidney and urinary tract disease
- pulmonary function
- disturbances of oxygen/CO_2 transport and H^+ metabolism
- disturbances of water and electrolyte metabolism
- disturbances of lipid and carbohydrate metabolism
- disturbances of calcium, phosphate and magnesium metabolism
- other disorders of bone and connective tissue
- clinical enzymology
- disease based on nutritional disturbances
- mechanisms of inheritance
- basic molecular biology
- inherited metabolic disorders (including molecular genetics)
- principles of screening
- disorders of haemoglobin and porphyrin synthesis
- nervous system disorders
- cardiovascular system disorders
- disorders of the endocrine system
- toxicology, drugs and therapeutic drug monitoring (to include alcohol and other drugs of abuse)
- paediatric biochemistry
- metabolic effects of trauma

- biochemical aspects of malignancy
- interferences and effects of drugs on laboratory investigations

a.2 Analytical Techniques
Trainees should be familiar with the theoretical basis of the techniques listed under b.1.5. below.

a.3 Data Management

a.3.1 The trainee should acquire skills in the statistical interpretation of laboratory and population data.

a.3.2 The trainee should be able to apply computers within the laboratory and be familiar with the use of spreadsheets, databases and statistical packages; be aware of basic Information Technology and medical informatics.

b <u>Laboratory Training</u>

b.1 Analytical and General Laboratory Procedures
The trainee should aim to become a competent analyst with a good understanding of method development, performance and application. Trainees are not expected to have extensive practical experience in all the areas listed in this section; wide experience should be combined with an in-depth experience of a limited range which should include the most commonly measured analytes. They should have direct experience of all areas marked as essential (e) and have some knowledge of the others (i.e. at least demonstration of techniques). All trainees should have practical experience of some techniques, the selection depending on their background, interests and the local circumstances.

b.1.1 Basic Laboratory Techniques (e)
- specimen collection, handling and storage
- methods of standardisation and calibration
- preparation and storage of reagents
- centrifugation

b.1.2 Quality Control and Quality Assurance (e)
- internal quality control
- external quality assessment
- interpretation of QC/QA and subsequent course of action
- near-patient testing

b.1.3 Basic Investigation of an Analytical Method (e)
- practicability
- optimisation
- robustness
- inaccuracy, imprecision, sensitivity, specificity, range, detection limit
- criteria for acceptability
- problem solving

b.1.4 Health and Safety
- regulatory and other aspects of health and safety

b.1.5 Analytical Methods
- spectrophotometric methods (e)
- flame emission photometry (e)
- automated instrumentation (e)
- electrochemical methods (e)
- osmometry (e)
- enzymology (e)
- radioisotope counting (e)

- immunochemical methods (e)
- immunoassay (e)
- electrophoretic methods (e)
- chromatography (e)
- drug analysis (e)
- solid/dry phase chemistry (e)
- atomic absorption spectroscopy/metal analyses
- mass spectrometry
- DNA/RNA analyses (e)
- cell culture techniques
- bioassay
- miscellaneous analyses (occult blood, calculi, urinary pigments, faecal fat)(e)

b.2 Laboratory Management and Communication Skills

Trainees need to have experience under supervision in formulating departmental policies and clinical guidelines, and applying the leadership and team-work skills that are necessary to implement them. They should understand how a modern laboratory service is organised, how different staff groups contribute to the pre-, intra- and post-analytical processes and how the service operates within the hospital and the NHS. Communication skills should be developed by report writing, presentation of data at meetings, through contributions to group discussions and attendance at departmental business meetings.

Knowledge/experience is required of:

- fundamental principles of successful management
- laboratory organisation and policies
- personnel management
- financial control, costing, pricing, contracting and purchasing
- inspection and accreditation
- legal requirements: health and safety, data protection
- staff training, motivation, continuing education
- clinical audit

c. <u>Clinical training</u>

c.1 Clinical Interpretation of Laboratory data and Clinical Liaison

All trainees should be involved in regular discussions within the department and with clinicians concerning clinical problem-solving, the use of laboratory procedures and protocols and the regular audit of the use of laboratory resources. Trainees should attend or participate in appropriate ward rounds, out-patient clinics, clinico-pathological conferences, on-call work, etc.

All trainees must participate, under appropriate supervision, in:

- laboratory reporting rotas
- follow-up of abnormal investigations by ward/out-patient visits
- case presentations
- near-patient testing programmes.

Trainees can be expected to undertake training in the direct clinical care of patients with metabolic and other relevant disorders.

c.2 Dynamic and Other Function Tests

All trainees should be familiar with protocols for common dynamic function tests and other timed investigation procedures, and should gain experience in their interpretation. Medical trainees must gain sufficient first-hand experience to enable them to take clinical responsibility for such procedures.

c.3 Direct Patient Care

Trainees should spend sufficient time in direct patient care to obtain the experience required to take responsibility for the clinical care of patients at consultant level. How this is achieved will depend on local circumstances and individual interests but trainees should assist in out-patient clinics for at least one of the following:

- lipid disorders
- diabetes mellitus
- endocrinology (including gynaecological endocrinology)
- metabolic disorders
- osteoporosis and other bone/connective tissue disorders
- renal calculi.

Experience should be obtained in the management of nutritional support, electrolyte disorders and metabolic aspects of intensive care. Training in direct patient care must be supervised by a consultant chemical pathologist or physician who is directly responsible for this activity.

d. Research and Development

Experience in research and development is important for developing skills in independent and team-driven problem-solving and the critical assessment of published work and for gaining analytical expertise.

All trainees should undertake at least one research project during their first three years of training. The project should be consistent with the research/development programme of the laboratory or hospital and should be sufficiently novel and timely to be suitable for presentation at a scientific meeting or publication in a peer-reviewed journal. Research for a higher degree, or for a dissertation for the Part 2 examination, may be initiated during this period.

e. Clinical Audit

All trainees must be familiar with audit procedures and participate in regular clinical audit. This should include projects that cover problems locally within and between departments at the interface with primary care and at regional level.

f. Continuing Study

The trainee should acquire the life-long habits of reading, using literature and other information database searches, consultation with colleagues, attendance at scientific meetings, and the presentation of scientific work as part of continuing education.

FRCPath PART 2
(Years 4 and 5)

During this period, trainees will:
- complete the research required for the Part 2 examination;
- strengthen their knowledge and experience of chemical pathology; this stage of training provides an opportunity to develop scientific and/or clinical expertise in a subspecialty (e.g. endocrinology, paediatric biochemistry, nutrition, inherited metabolic disorders);
- develop the management skills required for a post at consultant level; both the direct management responsibilities of trainees and their involvement in departmental and extra-departmental management processes should increase with seniority.

MICROBIOLOGY

The training is for 5 years and consists of Part 1 or Basic Training and Part 2 or Advanced Training.

The trainee:

1. Should understand the principles and practices of the various types of tests as well as the epidemiology, infectivity, transmission and clinical diseases of the different types of pathogenic microorganisms.

2. Should know about specimen collection and the transportation requirements for the different types of tests.

3. Rotates through the various sections in microbiology for on-the-job training by qualified microbiologists and do practicals and interpretive work where applicable.

A. PART 1

1. Safety and Decontamination Procedures

a) Appreciate the biohazards in microbiological work and their control in order to ensure a safe working environment.

b) Be familiar with the methods involving decontamination and sterilisation of equipment/apparatus and the environment for the different types of infectious microorganisms.

c) Learn and practise the safe disposal of infectious waste.

d) Have knowledge of regulations for the international transport of specimens.

2. Staining and Microscopy

a) Set up and use a microscope for bright field, darkground and fluorescence microscopy.

b) Prepare and examine various stains e.g. Gram, acid fast, india ink, silver, etc of the appropriate clinical specimens.

c) Examine blood films for bloodborne parasites.

d) Examine fungal elements in skin scrapings.

3. Bacteriology

a) Prepare different types of media.

b) Plate clinical specimens to obtain growth of isolated colonies on the appropriate types of media.

c) Set up anaerobic cultures.

d) Recognize the colonial and microscopic morphology of medically important bacteria including mycobacteria.

e) Read and interpret plated specimens.

f) Set up and read conventional biochemical tests as well as tests from commercial identification kits.

g) Perform and read antibiotic susceptibility test using disk diffusion, MIC (E-test) and automated methods.

h) Learn to perform MICs for *Neisseria gonorrhoea* by agar dilution method.

i) Perform tests to determine whether combinations of antibiotics are synergistic.

j) Do antigen detection tests using latex or co-agglutination kits.

k) Do slide agglutination test using specific antisera e.g. *Salmonella*.

l) Know the different methods of obtaining viable counts.

m) Know serum bactericidal test and MBC test.

n) Use automated equipment to detect bacteraemia (e.g. Bactec) and for the identification and antimicrobial susceptibility tests of bacteria (eg. Vitek).

o) Know and perform molecular methods i.e. pulsed field gel electrophoresis, PCR.

p) Set up, read and interpret Widal Weil-Felix tests using tube agglutination.

4. TB Bacteriology

a) Perform, read and interpret acid fast smears.

b) Perform digestion-decontamination on specimens.

c) Learn culture methods: liquid and broth based; manual, semi-automated, automated methods, specimen type.

d) Learn culture examination and confirmation for TB: probes, Bactec NAP test.

e) Learn evaluation of negative and positive cultures.

f) Do identification of non-tuberculous mycobacteria (NTM): Growth and pigment tests, conventional biochemicals, probes, introduction to HPLC and molecular based methods.

g) Learn molecular diagnosis of TB: direct detection methods and their clinical relevance.

h) Do susceptibility testing for *M. tuberculosis*: solid, liquid-based methods, semi-automated and introduction to automated methods.

i) Learn notification and reporting of positive TB results.

j) Know methods of measuring immune response: tuberculin skin-testing, serological methods.

k) Learn biosafety and containment in the lab performing Mycobacteriology work i.e. using and maintaining biosafety cabinets, centrifuges, respiratory protection and lab safety procedures for TB.

l) Know about the immune responses to TB, vaccines e.g. BCG.

5. Mycology

a) Choose appropriate media for the culture of the different types of specimens.

b) Prepare mycological slide cultures.

c) Identify medically important fungi.

d) Perform antigen latex agglutination test to detect *Cryptococcus neoformans*.

e) Perform *Histoplasma capsulatum* antibody detection test by micro-immunodiffusion method.

6. Parasitology

a) Prepare and examine faeces after concentration for ova, cysts, trophozoites, and parasites using saline, wet mount, permanent trichome, iron haematoxylin, acid fast and fluorescent stains where applicable.

b) Identify important parasites.

7. Serology

a) Set up, read and interpret particle agglutination, haemagglutination, enzyme-linked immunosorbent (ELISA) assay indirect immunofluorescence antibody tests, direct immunofluorescence antibody test and immunodiffusion test.

b) Learn diagnosis of sexually transmitted diseases i.e. *syphilis, Chlamydia trachomatis, Haemophilus ducreyi*.

c) Learn diagnosis of *Mycoplasma hominis, Ureaplasma urealyticum* and *Mycoplasma pneumoniae*.

d) Learn diagnosis of serology of infectious diseases e.g. *Legionella, Toxoplasma, Amoeba*.

8. Virology

a) Maintain tissue cultures.

b) Recognise cytopathic effects in tissue culture.

c) Identify viruses in tissue culture by immunofluorescence, haemadsorption, haemagglutination-inhibition, acid and neutralisation tests.

d) Perform rapid diagnosis of viruses by immunofluorescence, enzyme-linked immunosorbent assay and latex agglutination.

e) Set up, read and interpret serological tests: complement-fixation, ELISA, haemagglutination-inhibition, particle agglutination, immunofluorescence antibody test.

f) Learn PCR method for hepatitis C and HIV diagnosis etc.

g) Learn DNA hybridisation method for HBV.

h) Learn how the National Proficiency panels for HIV are selected and prepared.

i) Learn Western blot and immunoblot methods for supplementary testing for HIV and HCV.

9. Hospital Infection

a) Participate in hospital infection control.

b) Know about the different types of precautions and when to apply them.

c) Learn about the criteria for isolation including TB isolation.

10. Others

a) Participate in collaborative projects in microbiology.

b) Plan and perform a microbiology project to show evidence of technical and scientific investigation ability.

c) Participate in Quality Assurance programmes.

d) Attend clinical ward rounds with infectious disease physicians and other doctors.

e) Liaise with clinicians on important microbiology results.

f) Attend and participate in conferences, workshops, talks and tutorials in microbiology and related topics.

g) Participate in teaching technicians and other healthcare workers on microbiology and related topics.

B. PART 2

Training as for Part 1 but:

1. with a thorough grasp of microbiology as applied to clinical problems and the interpretation and reporting of the different types of results.

2. operation of a Biosafety 3 laboratory.

3. be familiar with various aspect of laboratory administration and quality assurance.

4. know the role of the laboratory in providing cost effective tests for the rapid diagnosis and assessment of disease activity.

5. submit the microbiology project to the Australian College.

FORENSIC PATHOLOGY - *PROPOSED MASTER OF MEDICINE IN PATHOLOGY (MMED (PATH)*)

TRAINING PROGRAMME FOR THE FORENSIC PATHOLOGY TRACK

BACKGROUND

The following is the basis of a structured, post-graduate training programme for the forensic pathology track of the proposed MMed (Path) degree in anatomical pathology. It sets forth the requirements of the basic and advanced phases of specialist training leading to the acquisition of an entry qualification in forensic pathology, by way of the conferment of the MMed(Path) and, subsequently, a consultancy ("exit") qualification recognised for specialist accreditation in that discipline, by the Specialist Accreditation Board (SAB).

It is intended to complement, but not replace, the existing post-graduate training programme in forensic pathology based on the acquisition of the DMJ(Path), and the FRCPath or FRCPA, as entry and consultancy qualifications, respectively, as constituted under the auspices of the Specialist Training Committee in Pathology (STC (Path)).

This programme will be reviewed, periodically, to meet the increasing and changing demands of forensic medical practice and advances in forensic medicine.

PRELUDE TO BASIC SPECIALIST TRAINING (BST)

All training in forensic pathology, per se, will be conducted at, or under the auspices, of the Centre for Forensic Medicine (CFM), Health Sciences Authority (HSA). All prospective candidates for BST must first undergo a 6-month-long posting, as a medical officer, to CFM in order that their aptitude for forensic pathology may be assessed.

A critical requirement for formal admission to BST is the successful completion of a Basic Proficiency Test (comprising both written and practical components) conducted by CFM towards the end of that period (see ANNEX A).

Retrospective recognition of this probationary period as accrual to the requirements of BST will be considered by the STC (Path), upon the recommendation of CFM, on a case-by-case basis. As a rule, only candidates of exceptional quality will be eligible for this concession.

BASIC SPECIALIST TRAINING

The period of BST will consist of a minimum of 3 years (36 months) of intensive training in anatomical pathology, comprising the following components:

Initial Training in Forensic Pathology (12 months)

During this time, trainees will acquire the fundamental knowledge and skills related to the practice of forensic pathology. Guidelines for the first 6-months of their training are found in Annex B; the knowledge and skills initially acquired are to be consolidated over the remaining period, during which, trainees should also practise special dissection techniques, such as the removal of the spinal cord; anterior and posterior dissection of the neck; vertebral artery dissection; removal of the vertebrobasilar block; demonstration of the paranasal sinuses; pelvic en-bloc dissection; basic post-mortem radiological techniques (e.g. coronary and vertebral artery angiography), etc.

Trainees are expected to read widely, especially about topics listed in Annex C; these subjects are to be integrated into an in-house, continuing medical education programme (CME), as described in Annex D. In

addition, candidates are also expected to familiarise themselves with basic histopathology and general pathology, during this time. A basic reading list is found in Annex E.

Where possible, they should also accompany forensic pathologists to scenes of homicides and suspicious deaths, as well as observe (and, if feasible, assist in) the subsequent autopsies, from the fourth month of training onwards.

Trainees should also identify and document Coroner's cases suitable for inclusion in the requisite casebooks stipulated by the examination requirements of the MMed (Path) (see below).

Where possible, trainees should engage or assist in departmental research activities under the supervision of a senior pathologist.

A 1-2-week attachment to HSA's forensic science laboratories will to be arranged at an appropriate time, subject to exigencies of service.

Trainees will be required to complete an Intermediate Proficiency Test (ANNEX F) successfully, before advancing to the next phase of training.

Training in Histopathology (lasting a total of 18 months)

This component may be completed continuously, or as a series of 6-monthly postings to departments of pathology that are recognised by the STC (Path) as training centres. Optional, short postings in microbiology/virology, haematology, clinical biochemistry and molecular pathology (lasting 2 - 4 weeks, each) may be incorporated into this phase.

The objectives of this phase are to

(a) provide trainees with a firm grounding in histopathology, a prerequisite to the effective practice of forensic pathology; and
(b) enable them eventually to fulfil the requirements of consultancy accreditation.

During this phase, forensic trainees will be trained in all aspects of histopathology that are relevant to forensic practice. These include routine surgical pathology; the use of special stains; the application of immunohistochemistry; and exposure to cytopathology, frozen section examination and electron microscopy.

Consolidation (6 months)

During the final 6 months of BST, candidates will return to full-time practice in forensic pathology, in order to consolidate their training in their essential discipline and to complete their casebooks stipulated by the requirements of the forensic pathology track of the MMed (Path).

THE MMED (PATH) EXAMINATION (FORENSIC PATHOLOGY TRACK)

The examination, comprising both written and practical components, will be taken at the end of a minimum of 36 months of post-graduate training, in fulfilment of the requirements of the forensic pathology track described above. The standard of this examination is to be equivalent to that of the Primary or Part I examinations for the FRCPA or FRCPath, respectively. Accordingly, appropriate external examiners will be appointed to assist in the conduct of the entire examination. Candidates will be expected to achieve at least a pass (50% of the allocated marks) in every section.

Theory Papers

1. Basic pathological sciences: a 3-hour-long paper, comprising essay questions on various aspects of basic pathological processes, as a test of candidates' grasp of the scientific basis of pathology (100 marks).

2. General Histopathology: a 3-hour-long paper, comprising essay questions on general histopathology, with a slant to post-mortem histopathology (100 marks).

3. Forensic Pathology: a 3-hour-long paper, comprising essay questions on the theory and practice of forensic pathology, including pertinent medico-legal issues (100 marks).

Casebook

A casebook comprising comprehensive descriptions of 10 Coroner's autopsies, conducted or assisted by the candidate; each being accompanied by an appropriate discussion of the cause of death and the associated medico-legal issues, demonstrating a high level of competence in forensic casework. Each case should consist of approximately 5000 words and should, where appropriate, be illustrated by relevant photographs and/or photomicrographs. A special viva voce will be convened to scrutinise the quality of the casebook and the robustness of the arguments contained therein (casebook: 100 marks; special viva voce: 50 marks). Failure to satisfy the examiners in this area will result in outright failure of the entire examination.

Practical Examination

1. The conduct of a full medico-legal autopsy, inclusive of appropriate histological and toxicological sampling, within the allotted time of 3 hours, followed by a presentation and interpretation of the autopsy findings to 2 examiners. The candidate is expected to be able to ascertain the cause of death, or if this is not immediately apparent, to explain why this is so and to indicate feasible avenues of resolving this difficulty. The candidate must also be able to suggest appropriate ancillary investigations which would assist in elucidating the underlying pathology and to discuss the medico-legal issues related to the case. At the end of the presentation, the candidate will be given one hour to complete a comprehensive autopsy report for the examiners' scrutiny (conduct of autopsy: 100 marks; presentation & discussion of autopsy findings: 50 marks; autopsy report: 100 marks).

2. Special post-mortem dissection techniques may be incorporated into the autopsy proper and/or the candidate may be required to perform the specified procedures, separately. These include (but are not limited to) the anterior dissection of the neck; dissection of the vertebral arteries; exposure and removal of the spinal cord; en bloc pelvic dissection; procedures for air embolism, and so on (100 marks).

3. Post-mortem general histopathology slanted to forensic practice. The candidate is required to read and interpret 20 histological slides, including special stains, and several cytological smears, providing a comprehensive and concise written report on each case, within the allotted time of 3 hours (100 marks).

Failure in any section of the practical examination will result in outright failure of the entire examination.

Oral Examination

There were will be a general viva voce (100 marks) on various aspects of forensic pathology and a special viva related to the casebook, as indicated above.

ADVANCED SPECIALIST TRAINING (AST)

Only candidates who have successfully completed their BST (i.e. attainment of the MMed (Path), or its equivalent) will be admitted to AST, lasting a minimum of 2 years (24 months).

The period of advanced training will comprise the following components (which may be fulfilled in any sequence):

1. Further exposure to histopathology for a minimum of 6 months.

2. Full-time practice in forensic pathology, for a minimum of 18 months during which the candidate is expected personally to undertake coronial casework of increasing complexity, under the supervision of senior forensic pathologists.

3. In general, the period of AST should comprise a HMDP overseas fellowship, or its equivalent, at a centre of excellence, for a duration of 1-2 years (12-24 months). The overseas attachment should incorporate an aggregate of 3-6 months' continuing exposure to each of neuropathology and paediatric pathology.

4. A qualifying consultancy ("exit") examination, taken after a minimum of 24 months of AST, consisting of the following requirements:
    a. A casebook of 20 Coroner's autopsies, comprising cases of considerable complexity and medico-legal significance, that will reflect the candidate's expertise, maturity and experience in forensic casework. Each case should consist of approximately 3000-5000 words and should, where appropriate, be illustrated by relevant photographs and/or photomicrographs.
    b. Interpretation and reporting of 20 histological slides on forensic histopathology and general histopathology relevant to autopsy practice.
    c. The provision of a second opinion or independent forensic assessment of a selected, anonymised medico-legal case, comprising a written review of the relevant medico-legal documents, including autopsy, post-mortem histopathology and toxicology reports.
    d. A general and a special viva voce on the theory and practice of forensic pathology (as well as related ethical and medico-legal issues), and to scrutinise the casebook, respectively.

    Each of the above sections will be graded as follows:
    A = meritorious pass
    B = pass
    C = fail

    Failure in any of these components will result in outright failure of the qualifying consultancy examination.

Candidates who are successful in the Final or Part II examinations for the FRCPA or FRCPath, respectively, after a minimum of 5 years' specialist training in pathology in recognised centres, will be considered to have completed their AST, without having to undergo the qualifying consultancy examination.

ANNEX A

C. GUIDELINES FOR MEDICAL OFFICERS/TRAINEES

1. The following guidelines apply to

   a) medical officers undergoing a 6-month-rotation in forensic medicine;

   b) trainees in histopathology, during their forensic attachment, and

   c) trainees in forensic pathology, during the first 6 months of their training.

2. Whilst attached to the Department of Forensic Medicine, all medical officers, irrespective of their status, should

   a) consider their exposure to forensic and Coroner's casework as an integral part of their post-graduate training;

   b) fully participate in the requisite professional work, in accordance with their level of competence;

   c) avail themselves of all related professional and academic activities and

   d) be prepared to undertake other tasks which may be assigned to them, such as assisting in research and simple administrative procedures.

3. Medical Officers are required to work under the supervision of forensic pathologists of the minimum grade of MSO II/Registrar.

4. All medical officers must ensure that their

   a) autopsy, histological and other findings, if any, and

   b) autopsy and histopathology reports and other official correspondence, arising from forensic casework,

   are endorsed and countersigned, respectively, by forensic pathologists of the minimum grade of MSO II/Registrar. This applies to trainees beyond the first 6-months of their training.

Outline of Work Structure/Training Milestones

Period	Cumulative Tasks/Skills
Week 1	1. Review police reports (NP303) and medical records pertaining to Coroner's cases, in order to assist Field Coroner in determining their proper disposition (i.e. whether an autopsy is required).* 2. Certify causes of death and perform external examinations of bodies in ("signed-up") cases where an autopsy is not required.* 3. Observe and learn evisceration and post-mortem techniques.
Weeks 2-4	4. Acquire autopsy skills, including basic evisceration techniques. Autopsies to be restricted to cases of death from natural causes. 5. Acquire basic skills in histological diagnosis.
2nd Month	6. Perform autopsies on straight-forward, unnatural deaths, such as simple falls, falls from a height and drowning.
3rd Month	7. Enlarge scope of autopsies to include simple road, industrial and domestic accidents; drug overdose/poisoning; uncomplicated perinatal, infant and paediatric deaths.
4th-6th Month	8. Progressively attempt autopsies on cases of suicidal hanging; uncomplicated perioperative, iatrogenic and maternal deaths; other unnatural deaths not included above. 9. Participate in moot court proceedings as an "expert witness". 10. Attend Coroner's and Subordinate Courts as forensic witness, if required.

* **All decisions must be endorsed by a senior pathologist and ratified by the Field Coroner**

D. PRINCIPAL SUBJECTS/TOPICS FOR DEPARTMENTAL TUTORIALS

- Methods to determine time of death
- Sudden cardiac death
- Sudden natural (non-cardiogenic) deaths
- Sudden unexpected nocturnal death in adults
- Asphyxia and compressive neck injury
- Perioperative and iatrogenic deaths
- Maternal deaths
- Forensic paediatric pathology:
- sudden infant death syndrome/sudden unexpected deaths
- non-accidental injury, child sexual abuse
- Forensic neuropathology
- Fire deaths
- Death from firearms and explosive injuries
- Deaths from electrical and lightning injuries
- Sexually-related deaths
- Forensic histopathology
- Forensic toxicology
- Forensic biochemistry
- Forensic radiology
- Forensic odontology
- Forensic anthropology/identification of skeletal remains
- Facial reconstruction/comparison
- Estimation of the age of wounds/lesions
- Clinical forensic examination
- Forensic serology/haemogenetics/DNA profiling
- Mass disaster management
- Medical negligence and medical ethics

ANNEX C

E. DEPARTMENTAL CONTINUING EDUCATION PROGRAMME

This would consist of 3 weekly teaching sessions per month, that will mainly be conducted or co-ordinated by senior forensic pathologists, from March to November, subject to exigencies of service.

The outline of these sessions is as follows:

Week 1: Topical presentation by trainees/medical officers

Week 2: Journal review of a maximum of 2-3 articles)

Week 3: Case discussion (of interesting, unusual or significant cases, encountered over the past months)

Week 4: Gross anatomical/histological demonstrations

The actual structure and content of the CME may be varied, as circumstances require. For instance, a teaching session may be replaced by moot court proceedings.

F. READING LIST

Essential Reading (particularly during the first phase of training)

1) The latest editions of the following **major texts**:

Legal Aspects of Medical Practice (Bernard Knight; Churchill Livingstone)

Simpson's Forensic Medicine (B Knight; Edward-Arnold)

Forensic Pathology (B Knight; Edward-Arnold)

Pathology of Trauma (JK Mason, BN Purdue (eds); Edward-Arnold)

The Essentials of Forensic Medicine (previously by CJ Polson, DJ Gee, B Knight (eds); Pergamon Press)

Clinical Forensic Medicine (WDS McLay; Churchill Livingstone)

Pathologic Basis of Disease (RS Cotran, V Kumar, SL Robbins (eds); WB Saunders Company)

Oxford Textbook of Pathology (3 volumes) (JO McGee, PG Isaacson, NA Wright (eds); Oxford University Press)

Muir's Textbook of Pathology (RMN MacSween, K Whaley (eds); ELBS/Edward-Arnold)

2) The following **periodicals** (after the first 6 months of training):

Medicine, Science and the Law

American Journal of Forensic Pathology and Medicine

Forensic Science International

Journal of Clinical Forensic Medicine

Suggested Reading

1) Selective reading of the following **major texts**:

Gradwohl's Legal Medicine (FE Camps et al (eds); Bristol: John Wright and Son Ltd.)

Forensic Pathology (DJ DeMaio, VJM DeMaio; Elsevier)

Forensic Medicine: A Study in Trauma and Environmental Hazards (CG Tedeschi, WG Eckert, LG Tedeschi; WB Saunders Company)

Medical Toxicology: Diagnosis and Treatment of Human Poisoning (MJ Ellenhorn, DG Barceloux; Elsevier)

Gunshot Wounds: Practical Aspects of Firearms, Ballistics and Forensic Techniques (VJM DeMaio; Elsevier)

Cardiovascular Pathology (2 volumes) (MD Silver; Churchill Livingstone)

Pathology of the Lung (2 volumes) (H Spencer; Pergamon Press)

Textbook of Fetal and Perinatal Pathology (2 volumes) (JS Wigglesworth, DR Singer; Blackwell Scientific Publications)

Greenfield's Neuropathology (J Hume Adams, LW Duchen; Edward Arnold)

Forensic Neuropathology (JE Leestma; Raven Press)

Closed Head Injury: Its Pathology and Legal Medicine (R Crompton; Edward Arnold)

Law and Medical Ethics (JK Mason, RA McCall Smith; Butterworths)

Medical Negligence (MA Jones; Sweet & Maxwell)

2) The following **periodicals**:

Science and Justice (previously Journal of the Forensic Science Society

Journal of Forensic Sciences

International Journal of Legal Medicine

The British Medical Journal

The Lancet

Journal of Clinical Pathology

Histopathology

Annals of the Academy of Medicine, Singapore

Journal of the American Medical Association

New England Journal of Medicine