Fellowship of the European Board of Medical Biopathology

UNION EUROPÉENNE DES MÉDECINS SPÉCIALISTES
EUROPÄISCHE VEREINIGUNG DER FACHÄRZTE
UNIONE EUROPEA DEI MEDICI SPECIALISTI
EUROPESE SPECIALISTEN VERENIGING
EUROPEAN UNION OF MEDICAL SPECIALISTS
UNION EUROPÉENNE DES MÉDECINS SPÉCIALISTES
EUROOPAN ERIKOISLÄÄKÄRILIITTO
DEN EUROPAEISKE FORENING AF SPECIALLAEGER
ΕΥΡΩΠΑΙΚΗ ΕΝΩΣΗ ΕΙΔΙΚΕΥΜΕΝΩΝ ΓΙΑΤΡΩΝ
UNION EUROPEA DE MEDICOS ESPECIALISTAS
UNIÃO EUROPEIA DOS MÉDICOS ESPECIALISTAS
DEN EUROPEISKE FORENING FOR LEGESPESIALISTER
EUROPEISKA SPECIALISTLÄKARORGANISATIONEN

Fellowship of the European Board of Medical Biopathology

UNION EUROPÉENNE DES MÉDECINS SPÉCIALISTES

U.E.M.S. Section of Medical Biopathology
http://e.lio.se/uems/

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Introduction

Chemical Biopathology,
Haematology,
Microbiology,
Polyvalent Medical Biopathology.

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FELLOWSHIP OF THE EUROPEAN BOARD OF MEDICAL BIOPATHOLOGY

A. INTRODUCTION AND HISTORY

In 1962 the National Medical Specialist Organisation of the European Union formed the Union of European Medical Specialists (U.E.M.S.) Individual sections to represent the various medical specialties were formed under the umbrella of the U.E.M.S. These sections included a specialist section devoted to Laboratory Medicine.

In 1988 Anatomo-Pathology was split off and formed its own Specialist Section. The remaining Specialist Section was renamed Medical Biopathology. At a meeting in Brussels in 1992 it was recognised that Medical Biopathology consisted of five specialties: Medical Microbiology; Clinical Chemistry; Haematology; Immunology; and Polyvalent Medical Biopathology. At the request of the U.E.M.S. organisation the U.E.M.S. Specialist Section of Medical Biopathology has formed the European Board of Medical Biopathology. Both the Specialist Section of Medical Biopathology and the European Board of Medical Biopathology consist of representatives from all the E.U. countries and from some other European countries outside the E.U. The representatives are nominated by National Medical Organisations. Both the European Board of Medical Biopathology and the European Specialist Section of Medical Biopathology have a President and a Secretary.

B. AIMS OF THE EUROPEAN BOARD OF MEDICAL BIOPATHOLOGY

The aims of the European Board of Medical Biopathology are defined in the Statutes of the European Board of Medical Biopathology (Document MIB/9405 Art. 2.0). They are that the Board should:

1.Recommend the standards required for training specialists in Medical Biopathology.

2. Make proposals in relation to the quality and content of training programmes.

3. Recommend procedures to facilitate the free movement of Biopathologists throughout the European Union.

4. Recommend the criteria to which Training Centres should conform.

5. Examine the content and quality of the training programmes in various countries of the European Union.

6. Facilitate the exchange of specialist trainees between training centres in various countries of the European Union to ensure a better quality of training.

7. Institute a recognition of quality and competence by establishing the Fellowship of the European Board of Medical Biopathology (F.E.B.M.B.).

FELLOWSHIP OF THE EUROPEAN BOARD OF MEDICAL BIOPATHOLOGY

Medical Biopathologists who fulfil the criteria for the recognition of quality and competence will be conferred with the Fellowship of the European Board of Medical Biopathology. Individuals who are already registered medical specialists in one E.U. country have an automatic right to practice in another E.U. country. The Fellowship of the European Board of Medical Biopathology confers no additional rights and is not a mandatory qualification. However, it is hoped that it will facilitate travel and movement within Europe for those individuals from countries who are full or associate members of U.E.M.S. It is also felt that Fellowship of the European Board of Medical Biopathology will help in aligning the practice of Medical Biopathology in the various E.U. countries and in providing a more uniform standard for training in Medical Biopathology.

This document describes procedures for awarding the Fellowship of the European Board of Medical Biopathology, the contents of the training programmes of the various specialties of Medical Biopathology and outlines the qualities required of training centres.

C. CONDITIONS FOR AWARDING THE FELLOWSHIP OF THE EUROPEAN BOARD OF MEDICAL BIOPATHOLOGY

The conditions for awarding the Fellowship of the European Board of Medical Biopathology are defined in Article 7.0 of the Statutes of the European Board of Medical Biopathology (Doc. MB9405). This document states:

1. The candidate must be a recognised specialist in Medical Biopathology for at least three years.
2. It should be demonstrated that he or she will have appropriate expertise in the field of Medical Biopathology.
3. It should be proved that he or she has shown continuing scientific interest in the speciality.

4. The candidate will be asked to take an examination, which will consist of an assessment of his training, and competence by an Examining Board appointed by the European Board of Medical Biopathology. The candidate will be required to demonstrate that he/she satisfies the criteria for awarding the FEBMB (see D 1-5 below). For the majority of candidates documentary evidence will be sufficient. However the Examining Board at its discretion may ask a candidate to produce further documentary information or may require a candidate to attend for interview.The examination will be conducted in either English or French. Candidates not proficient in either of these languages may opt to have the assessment undertaken in a language of their choice. Translation facilities will be provided. A panel of examiners selected by the Board will undertake the assessment.

The candidate will need to demonstrate the following:

1. That he/she is a registered medical practitioner in one of the countries affiliated to the U.E.M.S. The specific names of the diplomas, certificates and other evidence of formal qualification valid in each member state and which comply with the E.U. required training period are listed in Article 3 of Directive 93/16/EEC.

2. The candidate must have completed a period of training in one of the specialties of Medical Biopathology. The duration of training should be at least 4 years (according to the E.U. directive) and preferably 5 years as recommended by U.E.M.S. The training centre must fulfil the requirements outlined in the section on Qualities Required of Training Centres.

3. The candidate must be registered as a specialist in one of the specialties of Medical Biopathology in his home country for a period of not less than three years.

For the purpose of awarding the Fellowship the European Board of Medical Biopathology, national specialist qualifications in Medical Biopathology and its specialties will be recognised. The Examination Board however may at its discretion examine the contents of a candidate's training programme. If a candidate's specialist training involves taking an examination or examinations or production of a logbook as a condition for registration as a specialist in Medical Biopathology he or she will be asked to produce evidence of having passed these examinations.

4. Candidates for European Board of Medical Biopathology are required to have practised in one of the specialties of Medical Biopathology for a period of not less than three years since obtaining specialist registration. The candidate will be asked to produce certification from the Head of Department or other responsible individual that he/she has completed this period of Post Specialist Registration work.

5. The candidate will need to prove that he/she has shown continuing scientific interest in Medical Biopathology. The candidate will do this by demonstrating that he has participated in a programme of Continuing Medical Education/Continuing Professional Development (C.M.E./C.P.D.). The candidate must participate in his national C.M.E/C.P.D. programme. The evaluation of C.M.E./C.P.D. credits will be facilitated by the European Accreditation Council for Continuing Medical Education (E.A.C.C.M.E.). This will provide a standard system for C.M.E./ C.P.D. credits throughout Europe. No more than 30% of a candidate's C.M.E./ C.P.D. credits should be in an area of special interest or research. Seventy per cent of the C.M.E/.P.D. credits should be obtained in the broad area of the specialist discipline of Medical Biopathology in which the candidate is seeking the Fellowship. It is recognised that not all countries of the E.U. have developed a C.M.E./C.P.D. programme, Candidates from those countries where such a programme does not exist will be required to produce documentary evidence of ongoing education. The Examination Board will evaluate this evidence and credits will be assigned in the same way as they would in a formal C.M.E/.P.D. programme.

D. THE STRUCTURE OF THE EXAMINATION FOR THE FELLOWSHIP OF THE EUROPEAN BOARD OF MEDICAL BIOPATHOLOGY

1. The European Board of Medical Biopathology will be responsible for the conduct of the Examination. The Board may, if it wishes, appoint a Director, as head of the Examination Panel, to organise the examination. The candidate may elect to have the proceedings conducted in English or French, or may elect to have the proceedings conducted in his own language. In the latter case translation facilities will be provided.

2. The examination will be based on guidelines produced by the European Board of Medical Biopathology. The European Board of Medical Biopathology will appoint the panel of examiners. It will include:

- Representatives of the U.E.M.S. Board of Medical Biopathology.
- Representatives of the specialty of Medical Biopathology in the country of origin of the candidate.
- Representatives of academic life.
- Practitioners in the specialty of Medical Biopathology in which the candidate is seeking Fellowship in European countries other than the country of origin of the candidate.

3. The candidate will be required to pay a fee, the level of which will be determined by the European Board of Medical Biopathology. The candidate will be required to pay this fee in advance.

E. FOUNDATION FELLOWSHIP

Foundation Fellowship of the European Board of Medical Biopathology will be granted to individuals who are currently practising Medical Biopathology as a specialist for a period of not less than ten years. They will be required to demonstrate that they hold a registered medical qualification in one of the U.E.M.S. countries, and that they have a specialist qualification or training in Medical Biopathology.

Foundation Fellowship of the European Board of Medical Biopathology will only be available for a period of four years from the date of conferring of the first Fellowship in Medical Biopathology, after which time it will no longer be conferred.

F. HONORARY FELLOWSHIP OF THE EUROPEAN BOARD OF MEDICAL BIOPATHOLOGY

The European Board of Medical Biopathology may grant Honorary Fellowship to distinguished individuals in the area of Medical Biopathology. The number of such Honorary Fellowships will be limited and will need the unanimous approval of the members of the European Board of Medical Biopathology.

G. APPEAL AGAINST THE DECISION OF THE EUROPEAN BOARD OF MEDICAL BIOPATHOLOGY

A candidate for the Fellowship of the European Board of Medical Biopathology will have the right to appeal any decision of the European Board of Medical Biopathology to the President of the European Specialist Section of Medical Biopathology. The President, in conjunction with the representative of that individual's country, will appoint a panel of three individuals to review the decisions made by the European Board of Medical Biopathology. The President of the European Specialist Section of Medical Biopathology will then put the recommendations of the Appeal Board to the next meeting of the Specialist Section of Medical Biopathology. A vote will then be taken as to whether the candidate's appeal is accepted or rejected. The majority vote will decide. Candidates may be asked to pay a fee to appeal.

H. REVOCATION OF THE FELLOWSHIP OF THE EUROPEAN BOARD OF MEDICAL BIOPATHOLOGY

A Fellowship of the European Board of Medical Biopathology that has been conferred on a candidate may be revoked in special circumstances. The Fellowship will be revoked if a Fellow is removed from the Medical Register in the country in which he/she is practising or is removed from the Specialist Register in Medical Biopathology in his/her home country or in any country in which he/she is practising.

REFERENCES

No Number - Biopathologic Medical - "provides a definition of speciality" D 91:3 1: Medical Biopathology Training in E.U
D 92:64:Minutes of meeting of Reps.of the Laboratory Medicine-"Establishes Medical Biopathology Subspecialties and Commissions in the present format".
D93.176 Compendium of Medical Specialists Training in the E.C
D93:67 Charter on Training of Medical Specialist
MB:95:01: - Text 1: Situation of Specialist Section of Medical Biopathology in E.U
NW:95:02: - Text 2: Defines Medical Biopathology
MB:94:05: Statutes of European Board Medical Biopathology
NIB:94:06: Summary 94:05
* 95:03: Annex 1: Rules of Procedures of UEMS
* 95-07: Quality Assurance in Europe
Text 3: (Draft 1997) " Further Defines Medical Biopathology"
No Number - Response of Medical Biopathology Section to Chapter 6 of document D93:67: which refers specifically to Medical Biopathology
D 97:70: - Charter of Visitation of Training Centres.
D 98:15: - Structuring CME (Draft)
D 98:16: - Charter an CME Annex 1998

UEMS:N99397 - EACCME- European Accreditation Council for continuing Medical Education

QUALITIES REQUIRED OF TRAINING CENTRES FOR MEDICAL BIOPATHOLOGY SPECIALITIES

This document specifies the qualities needed by training centres for each of the polyvalent and monovalent medical specialities that are represented within the Section of Medical Biopathology.

1. Training arrangements should allow rotation between departments and laboratories in university centres, large district or regional hospitals with about 200 beds or more, and other suitable institutions or hospitals providing specialised care. Experience in independent laboratories may be suitable for training. Ideally all countries should have an accreditation system for training centres. In those countries where such a system exists accreditation would be mandatory. Laboratories in countries where accreditation does not exist should have equivalent standards.

2. The training curriculum should include experience in:
a) The provision of laboratory services to a wide range of medical specialties within hospitals and should include the major specialties of internal medicine, surgery, paediatrics and gynaecology and obstetrics, and to patients cared for by medical and paramedical specialties in the community. It is also recommended that training centres cater to the need for laboratory services within the public health sector in their areas. **Note**: Not all the clinical services listed above will be provided in one hospital or institution, but the trainee's training programme should cover the important aspects of laboratory investigation in relation to the clinical specialities listed above.
b) Laboratory resources
i) The laboratory equipment and the analytical techniques used in the laboratories providing training must conform to current practice.
ii) Computer systems and information technology must be adequate for providing the laboratory service, and for the basis for training.

3. Facilities for training departments and laboratories
a) Floor space and equipment should be sufficient to meet workload needs, within national requirements for safety.
b) Trainees should have adequate bench space and desk space for their own work.
c) Adequate modern textbooks and relevant journals should be available. The trainees should have access to other library facilities with modem information technology.

4. Laboratory emergency service: Laboratories that undertake training must have arrangements on site to meet the requirements of a supervised emergency service covering 24 hours.

5. Workload: Most of the laboratory work generated by the clinical services

referred to in paragraph 2a should be carried out in the laboratory's premises; this includes decentralised laboratory services (using more than one laboratory), in which case the trainee should rotate to obtain the necessary experience. The range of laboratory procedures is more important than the number of tests performed.

6. Quality systems: a) should meet international standards. b) It is essential that laboratories providing training should partake fully in recognised quality assurance systems and have comprehensive quality control procedures in their departments.

7. Consultative and interpretation advice: Training programmes should provide the means for trainees to acquire skills in consulting with other health-care personnel involved in the management of patients and the maintenance of health. Trainees should develop expertise in interpretative advice of laboratory investigations including advice in relation to emergency laboratory tests.

8. The educational supervisor of the trainee should be a medical biopathologist.

9. General staffing: a) there must be a sufficient number of trainers in each department or laboratory, b) there should be a sufficient number of trained technical and scientific staff to undertake the workload of the laboratory. The staffing should be sufficient to undertake appropriate research and development, in which a trainee should be able to take part

10. Training programmes: a) national training programmes should be available, b) trainees should have the experience in writing scientific papers, presenting oral communications and posters, c) training programmes should include basic management training.

INSPECTION OF TRAINING CENTRES

The Inspection of the Training Centres is an important method of ensuring the quality of training and Training Centres. The U.E.M.S. has produced a document (D9770) entitled Charter on Visitation of Training Centres. This document states that there is a need for harmonisation in the field of inspection of Training Centres as there is a good deal of variation between national centres. At present the U.E.M.S. does not plan to establish a system of inspection itself. Instead it relies on the national authority to complete this task. Increasingly, inspection of Training Centres is a statutory requirement. Like other sections of the U.E.M.S. the section of Medical Biopathology will rely on the national professional authority to undertake the task of visitation of Training Centres. However, it does reserve the right to carry out inspections itself, should the need arise in the future.

CONTENT OF THE TRAINING PROGRAMMES

INTRODUCTION

In the following pages the European Board of Medical Biopathology describes the contents, of the Training Programme of the various specialties of Medical Biopathology . The Curriculum will be updated regularly as progress in Medical Biopathology as in all areas of medicine is occurring at a very rapid rate. It should be recognised that it is the responsibility of both the Trainer and the Trainee to ensure that all recent advances are included in the training programme even if not specifically mentioned m the Curriculum. It is recognised that most Trainees will have to rotate to obtain a comprehensive training. The European Board of Medical Biopathology supports the idea of rotations within countries and also between various countries associated with the UEMS.

TRAINING PROGRAMME IN CHEMICAL BIOPATHOLOGY

DEFINITION

The Specialty of Chemical Biopathology is the medical discipline that employs Biochemical knowledge and measurements to diagnose diseases and monitor the effects of treatment through the chemical investigation of body fluids, tissues, cells and excretions from the body and through organ function tests. Chemical Biopathology has its skills in the interface between clinical knowledge and understanding of pathogenic mechanisms, biochemistry, analytical chemistry, molecular biology and information technology.

Article 1.

CENTRAL MONITORING AUTHORITY for CHEMICAL BIOPATHOLOGY at EU LEVEL

1.1 The Chemical Biopathology Commission of the Specialist Section of Medical Biopathology is the monitoring authority for Chemical Biopathology. The European Board of the Specialist Section acts on its behalf for the operation of its policies.

1.2 The Chemical Biopathology Commission of the Specialist Section of Medical Biopathology accepts national standards for each country in the European Community (EU), and for institutions and teachers recognised for training in the specialty. The European Board of Medical Biopathology will review national standards over the next few years working with recognised national bodies towards harmonisation within the EU.

1.3 The Chemical Biopathology Commission will work towards a European system of formative and summative assessment of training in Chemical Biopathology which it will recommend as part of a quality assurance system for the teaching and training. This is likely to cover questionnaires for the trainers and an assessment of the effectiveness of the interviews and examinations to which they are subjected.

1.4 On behalf of the Specialist Section its European Board will convene meetings in each European Union country with representatives of those responsible for the training of specialists in the specialty of Chemical Biopathology.

1.5 The Chemical Commission of the Specialist Section of Medical Biopathology collaborates closely with recognised national bodies to initiate and maintain a system of manpower planning for the specialty of Chemical Biopathology.

GENERAL ASPECTS of TRAINING in Chemical Biopathology

2.1 The aim of the training is to produce trained Chemical Biopathologists to provide specialist opinion in his/her clinical discipline and who should have developed the appropriate management skills to lead a department.

2.1 Selection of trainees and their access to training in Chemical Biopathology should be competitive.

2.2 The minimum duration of training in Chemical Biopathology should be 5 years including one year of clinical practice (outside the Medical Biopathology Department) gained after obtaining licence to practice as a doctor.

2.3 The Chemical Commission of the Specialist Section of Medical Biopathology recommends that a common trunk of training in Medical Biopathology should be a period of one year (within the Medical Biopathology Department). During this period experience in the fields of molecular biology, immunochemistry, statistics, quality assurance, information technology and management and communicative skills would be obtained.

2.4 Programmes to cover the training requirements for the specialty should be available to all trainers and trainees. The Specialist Section recommends the use of logbooks by trainees, which should be confirmed by trainers.

2.5 The Chemical Commission of the Specialist Section of Medical Biopathology proposes to establish a system of quality assurance and assessment of training in the specialty (see 1.3. and 1.4.).

2.6 The Chemical Commission of the Specialist Section of Medical Biopathology supports the existing arrangements in the European Union countries to control entry into the training grades. Manpower planning policies are limited by the lack of adequate data (see 1.5.).

2.7 The Specialist Section supports the ad hoc arrangements that are currently available in most European Union countries for the arrangement of training in other countries. More formal arrangements are limited by the lack of financial support which trainees require during such periods.

2.8 General objectives of the training:

a Knowledge in the anatomy, physiology, biochemistry and pathophysiology of human organ systems above the basic knowledge acquired after medical studies.

b Comprehensive knowledge of the pathogenetic mechanisms and natural history and epidemiology of those diseases commonly diagnosed and monitored by Chemical Biopathology.

c Knowledge of the most common Biochemical tests and organ function tests used in medical practice including; indications for ordering the tests, the Biochemical and physical/Biochemical principles of the measurement process and the pre- and post-analytical precautions to be taken.

d Interpretative skills in order that a clinically useful opinion can be derived from laboratory data and other relevant medical data which he/she, as a consultant, can effectively communicate to colleagues by consultation.

e Technical knowledge gained from the close acquaintance with laboratory methods, so that the most efficient technology appropriate to a clinical problem can be chosen, and that procedures for quality control and quality assurance can be implemented. Trainees should be familiar with the European and other standards for laboratory quality systems.

f The trainee should be able to develop new research protocols and interpret research data. He/she should be capable of collecting and evaluating organised scientific knowledge and share it orally or in written form.

g The trainee should develop the life-long habit of Continued medical education

(CME), reading, literature searches, consultation with colleagues, attendance at scientific meetings and the presentation of scientific work as part of his/her daily work.

h Skills in information technology to cope with the large quantities of data routinely processed by modern laboratories. These skills should include familiarity with the use of databases, spreadsheets, statistical procedures and data packages etc.

i Skills in management and communications. The trainee should, under supervision, gain insight in planning departmental policies and develop leadership skills necessary to implement them.

j The trainee needs familiarity with the legal and technical aspects of health and safety issues for the management of clinical laboratories.

k The trainee should have experience in teaching more junior trainees and scientific/technical staff.

The initial training in these 5 years can only provide the foundation for the judgement, skills and knowledge which comes with mature experience. It cannot be emphasised too strongly that sound clinical experience, based on patient care, is an important element in a biopathologist's preliminary training.

Article 3

REQUIREMENTS for TRAINING INSTITUTIONS

3.1. In the first instance all nationally recognised training centres will be accepted for training.

3.2. National standards for training institutions differ. The Specialist Section believes that a European standard is desirable and should be developed over the next few years.

3.3 National recognition for training centres should be based on structured educational visits and on the European Union standards when these have been defined.

3.4 The trainers should be medical specialists in Chemical Biopathology having practised Chemical Biopathology actively for more than five years.

3.5 To achieve full training in Medical Biopathology it may be necessary to gain experience and receive training in more than one centre.

Article 4

REQUIREMENTS for TEACHERS within the SPECIALTY

4.1 The chief of training as head of the department in a training centre should have been practising as a specialist in that specialty for more than 5 years.

All trainers should have been recognised as trainers by the national authority for specialist training and should be knowledgeable in research work.

4.2 Taking into account the variations in availability of training in particular centres the training of individuals should meet the requirements of national rules, the European Union directives and the recommendations of the UEMS/European Boards.

4.3 The ratio between the number of qualified specialists in the teaching staff and the number of trainees should provide a close personal monitoring of the trainee during his/her training and provide adequate exposure of the trainee to training.

Article 5

REQUIREMENTS for TRAINEES

5.1 Experience: to build up his/her experience the trainee should be able to perform a sufficient number of practical procedures of sufficient diversity. He/she should understand the scientific basis of such procedures and the clinical basis for applying them to particular problems of diagnosis and patient-management.

5.2 The trainee should receive sufficient training in the management of clinical laboratories.

5.3 The trainee should have sufficient linguistic ability to communicate fluently with patients, with medical and other colleagues and to write meaningful reports. He/she should be able to study the international literature and to communicate with foreign colleagues.

5.4 The time spent by trainees in unsupervised service work should not exceed the time devoted to directly supervised training. Service work, which is an important part of training, should be graduated in difficulty and should match the skills and knowledge of the trainee at that point in time.

5.5 The trainee should keep his/her personal log- book or equivalent up to date according to national rules and European Union directives, as well as UEMS/European Board recommendations.

5.6 Clinical training in internal medicine or a closely -related specialty is mandatory for one year. The clinical training should provide first-hand knowledge about the role of the laboratory in clinical diagnostic strategies and improved knowledge of the needs of the health sector that should be catered for by the laboratory.

5.7 Curriculum
Trainees should be instructed and be familiar with the following areas of Chemical Biopathology over and above the knowledge level required of Medical students:

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/CO2 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
- diseases caused by nutritional disturbances
- 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
- diagnosis and monitoring by chemical tumour markers
- interference and effects of drugs on laboratory investigations

Analytical Techniques

Trainees should be familiar with the theoretical basis of the following techniques.

- spectrophotometric methods;
- flame emission photometry;
- automated instrumentation;
- electrochemical methods;

- osmometry;
- enzymology;
- radioisotope counting;
- chemoluminiscent methods
- immunochemical methods;
- immunoassay;
- electrophoretic methods;
- chromatography;
- drug analysis;
- solid/dry phase chemistry;
- atomic absorption spectroscopy/metal analyses;
- mass spectrometry;
- DNA/RNA analyses;
- cell culture techniques;
- miscellaneous analyses (occult blood, calculi, urinary pigments, faecal fat);
- point-of-care analytical methods including techniques of dry chemistry, reagent strips etc.;
- specimen collection, centrifugation, handling and storage;
- methods of standardisation and calibration;
- preparation and storage of reagents;

Data Management

- The trainee should acquire skills in the statistical interpretation of laboratory and population data, nomenclature, units, reference intervals and biostatistics.

- The trainee should havebe 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.

Laboratory Training

- Analytical and General Laboratory Procedures

- The trainee should a good understanding of method development, performance and application. Wide experience should be combined with an in-depth experience of a limited range, which should include the most commonly measured components.

Logistics and automation

- The trainee should learn the principles of logistics in the laboratory including request forms, sample identification, information technology, work- flow, instrument interfacing and reporting of results.

Quality Control and Quality Assurance

- internal quality control
- external quality assessment
- interpretation of QC/QA and subsequent course of action
- near-patient testing

Basic Investigation of an Analytical Method

- practicability
- optimisation
- robustness
- inaccuracy, imprecision, sensitivity, specificity, range, detection limit
- criteria for acceptability
- problem solving

Health and Safety

- regulatory and other aspects of health and safety

Laboratory Management and Communication Skills

The trainee needs 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. He/she 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 regional and national system of

health care. Communication skills should be developed by report writing, presentation of data at (scientific) 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 act, etc.
- staff training, motivation, continuing education
- clinical audit
- handling of conflicts.

CLINICAL TRAINING

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 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
- the potential use of chemical analysis for monitoring the health of healthy individuals and the cost-risk-benefit analysis that is necessary in this context

They should undertake training in the direct clinical care of patients with metabolic and other relevant disorders.

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.

Direct Patient Care

Medical trainees must spend sufficient time in direct patient care to obtain the experience required to take responsibility for the clinical care of patients at a senior 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 (e.g. inborn errors of metabolism);
- osteoporosis and other bone/connective tissue disorders;
- renal calculi;
- diagnosing intoxication;
- the basis of coagulation disorders and transfusion medicine;
- the basis of diagnosing anemias.

Experience should be obtained in the in-patient management of parenteral nutrition, electrolyte disorders and metabolic aspects of intensive care. Training in direct patient care must be supervised by a senior Chemical Biopathologist or physician who is directly responsible for this activity.

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.

Therefore the trainee should independently carry out medical research, as well as participate in supervising the younger doctors, chemists and students in research.

All trainees should undertake at least one research project during their 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/publication in a peer-reviewed journal. Research for a higher degree, or for a dissertation may be initiated during this period.

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.

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.

The present goals for the education should serve as the basis for the specialist training and a more detailed individual training plan should be written by the tutor and the trainee soon after the start of the training.

A tutor who is an acknowledged specialist in Chemical Biopathology should guide the specialist training. The head of department and the tutor should plan the education together with the trainee in such a way that it can be completed within the stipulated 5-year time, including the clinical training in internal medicine and/or related discipline. By regular contacts with those responsible for the department of internal medicine the tutor should also see to that the trainee gets the best possible training in the clinical field.

TRAINING PROGRAMME IN HAEMATOLOGY

Haematology is both a clinical and laboratory speciality. Whilst it is recognised that most Haematologists will have responsibilities in both clinical and laboratory areas the extent of their responsibilities in the different areas will vary. Many Haematologists will work entirely in the laboratory.

Length of Training

The U.E.M.S. recommends that Post Graduate Training in Haematology should be for a minimum of five years. The Board of the Specialist section of Biopathology recommends that a period of clinical training should be an integral part of the training of all Medical Biopathologists. All Haematologists should have at least one years clinical experience as part of their Post Graduate training. Part of this should be in clinical Haematology but other areas that may be suitable are Medical Oncology, Transfusion Medicine, Internal Medicine, Transplantation Medicine, Paediatrics or any other area which may be relevant. Those trainees who plan to practice clinical Haematology will need to extend the period of clinical training for at least a further year. Those who intend to pursue a career in Laboratory Haematology may wish to gain experience in other areas of laboratory medicine such as Clinical Chemistry, Immunology, Microbiology or other relevant disciplines

Objectives in Training

The Board of Medical Biopathology have set out the following objectives of training:

1. Specialised knowledge of the natural history of haematological diseases

2. Interpretative skills so that a clinically useful opinion can be derived from laboratory data and microscopic examination of the blood and the bone marrow

3. Technical knowledge of laboratory haematology including the implementation of quality control and quality assurance procedures

4. Research and development experience

5. Continuing medical education (CME)

6. Data Management skills to evaluate information derived from the technical procedures within the Haematology Laboratory. These skills

should include familiarity with information technology and the use of spread sheets, data bases and statistical packages.

7. Management and communication skills

8. Health and safety requirements and familiarly with the legal and technical aspect of health and safety issues in their individuals countries.

Curriculum

Trainees should be instructed and be familiar with the following areas of general laboratory haematology.

1. Automated blood counting

2. Staining and examination of peripheral blood films

3. Cytochemical and Immunophenotyping examination of bone marrow, including flow cytometry

4. Knowledge of the methods for the identification of abnormal haemoglobins and thalassaemias

5. Molecular Biology and in particular its role in Haematology

6. Knowledge of the techniques for the diagnosis of coagulation disorders such as Haemophilia and Von Willebrands disease. Knowledge of the methods and techniques used for identification of congenital and acquired bleeding disorders.

7. Knowledge of the methods and techniques used for identification of hypercoagulable syndromes

8. Knowledge of the basic techniques used for crossmatching of blood and its components and for the identification of antibodies, as well as knowledge of:

   1. The direct anti-globulin test

   2. Techniques used for the identification of blood transfusion reactions

   3. Knowledge of quality control and quality assurance procedures.

9. Knowledge of the techniques used for the preservation of Stem Cells.

Clinical Haematology training

The trainees should receive instruction in both the management of In patients and Out Patients with haematological diseases. These should include a knowledge of the non malignant haematological diseases such as Iron Deficiency, Haemolytic Anaemia, Megaloblastic Anaemia, Haemoglobinopathies and Thalassaemias and also the Myeloproliferative disorders including Polycythaemia and Myelofibrosis. The trainees should also receive instruction in the management of patients with malignant disorders including Acute and Chronic Leukaemia, Multiple Myeloma and the Lymphomas. The trainees should receive an introductory training in the management of patients undergoing bone marrow transplantation procedures including Allogeneic Autologous and Stem Cell techniques. The trainees should also be familiar with the diagnosis and management of patients with coagulation disorders including Haemophilia, Von Williebrands Disease other coagulation defects both congenital and acquired and the Hypercoagulable Syndromes. The trainees should receive specific instruction in the haematological aspects of other hospital specialities such as ICU and Obstetrics. Trainees should receive an introduction to Paediatric Haematology including Neonatal Haematology

Transfusion Medicine

Trainees in General Haematology including both trainees in Clinical and Laboratory Haematology should have experience in Transfusion Medicine. Those trainees who intend to develop Transfusion Medicine as a speciality will need to develop their knowledge further in this particular area. The Curriculum should include the following:

a. Organisation and management of Blood Transfusion Centres

b. Knowledge of Blood Donor sessions

including Autologous Blood Donation

c. The preparation of Blood Components, including quality assurance

d. Microbiological aspects of Blood Transfusion, including knowledge of CMV Hepatitis and HIV viruses and particularly their transmission via Blood Transfusion. Knowledge of the development of viral inactivation procedures

e. Red Cell Serology including knowledge of the standards for Reagent and Red Cell panels and quality assurance in Blood Group Serology. A knowledge of antibody quantitation is necessary. The trainee should have experience in the clinical significance of Red Cell alloantibodies including the interpretation of antenatal serology, the prevention and management of Haemolytic Disease in the new born and Immune Haemolytic Anaemias. The trainee should be familiar with the maintenance of Red Cell Panels and the Cryopreservation of Red Cells. Knowledge of the investigation and Management of Transfusion reactions is essential and the trainee should be familiar with handling day to day queries from clinical colleagues.

f. White cell and platelet serology. Management of HLA typed Donor Panels and knowledge of the development of techniques for the management of HLA sensitisation

g. Plasmapheresis

Research and Development Experience

Throughout their training individuals should be encouraged to critically assess and evaluate published work. Ideally, the training should allow the individual to undertake a period of original research

Data Management Skills

The trainees should receive formal instruction in information technology skills including the use of spread sheets, data bases and statistical packages.

Management and Communication Skills

The trainee should gain experience in all aspects of laboratory planning and management. The trainee should gain experience in departmental policies and developing leadership skills.

Health and Safety Requirements

The trainee should be familiar with all health and safety issues including their legal aspects

TRAINING PROGRAMME IN MİCROBIOLOGY

Core Training Programme And Training Record For Medical Microbiology (Includes Bacteriology, Virology, Mycology And Parasitology).

INTRODUCTION

GENERAL AIM

to produce trained medical microbiologists to provide specialist opinion in their clinical discipline and who should have developed the appropriate management skills to lead a department, if required. The trained medical microbiologist should be competent to:

1. Give advice as a physician on the diagnosis, treatment and prevention of microbial diseases.

2. provide a scientific basis for laboratory diagnosis; to set protocols and to maintain standards within the laboratory.

3. undertake the management responsibilities required from the director of a medical microbiology laboratory.

4. take charge of infection control in hospitals

5. propose hospital policies on the control of antibiotic usage and on the prevention of hospital acquired infection

6. collaborate with national surveillance organisations and public health authoroties and to provide services for these organisations

7. participate in the training programs for medical microbiologists, infection control doctors and other experts in the field of microbial diseases.

8. undertake research and development in the specialty of microbiological biopathology

OBJECTIVES

Over a minimum 5 year period the trainee should acquire or develop:

a) Specialised factual knowledge of the natural history of those diseases upon which the chosen discipline is based.

b) Interpretative skills so that a clinically useful opinion can be derived from laboratory data. Emphasis should be made on the importance of clinical training and multidisiplinary care together with clinical and pathological conferences.

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.

The life-long habits of reading, literature-searches, consultation with colleagues attendance at scientific meetings, and the presentation of scientific work as part of continuing medical education (CME).

f) 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.

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

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

SUPERVISION AND REVIEW OF PROGRESS IN TRAINING

Trainees are required to keep a training record detailing their training experience. This will be inspected on a regular basis by their Educational Supervisor i.e. the consultant in charge of training. Trainees will be regularly informed of their progress and, in addition, trainees must be encouraged and given every opportunity to discuss any deficiencies in the training programme. The Educational Supervisor should discuss the trainee's progress with each consultant (trainer) with whom a trainee spends a period of one month or more. Trainees should agree a training programme with their supervisor soon after appointment.

The trainee should have supportive appraisal twice a year:

a) an informal meeting involving the Educational Supervisor and trainee, should be held every six months and the record of training should be signed by the Educational Supervisor;

b) an assessment by a panel approved by the Postgraduate Dean and/or a national board or committee for the registration of medical specialists on completion of each year's training or similar. Any reports or appraisals prepared during the year should be available to the trainee.

Educational Supervisors would be expected to have substantial experience in the specialty, to have demonstrated an interest in training, to have appropriate teaching resources, to be involved in appropriate regional training committees, to be involved in annual reviews and to liaise closely with the national board or committee for the registration of medical specialists.

MANAGERIAL TOPICS WHICH ARE PART OF CORE TRAINING

1. Management

Aspects of management - strategic planning, preparation of a business plan, contracting processes, service level agreements, departmental and directorate budgeting etc. - should be part of training. The trainees should be encouraged to attend appropriate management courses in which the programme will be sustained by professional managers. Trainees may, as "colleagues", be permitted to sit in on departmental, directorate and other local committee meetings as observers. The aims and objectives of this should be to provide them with some experience of committee procedures, aspects of confidentiality, decision making at a local level and the importance of maintaining good interpersonal relationships.

2. Health and Safety

Irrespective of discipline, each trainee should, from the start, become fully familiar with all aspects of Health and Safety in the laboratory and should be made aware of the legal obligations and the role of the Health and Safety Executive or equivalent national body requirements which have to be met to obtain and retain full laboratory accreditation.

3. IT and Communication Skills

The trainee should, from the start, become familiar with fundamental aspects of computing within the laboratory - databases, spread sheets, internet etc. - and how these are used on a day to day basis.

4. Audit and Quality Assessment

All trainees must, from the start, become familiar with audit procedures and should participate in regular clinical audit. Trainees should gain understanding of quality control and quality assurance. At the end of formal training they should have a full understanding in these two areas; they should have an understanding of external quality assessment and the processing of data by these schemes.

CORE TRAINING PROGRAMMES:

This document sets out a curriculum for medical microbiologists which cover the scientific base of medical microbiology, as well as applied aspects, including related fields such as infectious diseases and communicable diseases control. Some element of medical microbiology training is common to the training of consultants in communicable diseases control and of infectious diseases physicians.

AIMS OF TRAINING

The core training programme aims to provide the trainee with both the theoretical foundation and the practical, technical, clinical and managerial skills necessary for the independent specialist practice of medical microbiology in a clinical environment and for the advancement of the subject. Although some information relating to the appropriate clinical experience is listed in section 11, it must be appreciated that laboratory work and clinical experience must be closely integrated, therefore laboratory associated clinical duties are an essential component of the training programme.

SUPERVISION

Programmes based on this curriculum should be appropriate to the needs and previous experience of the trainee and should set out educational objectives against which the trainees' progress can be assessed. The trainee should have an educational supervisor at each site of any rotation. The training programme should identify how specific areas of training not covered by the departments involved will be obtained (eg secondment for experience in virology, communicable diseases/epidemiology, public health microbiology) together with any courses deemed necessary.

A CORE TRAINING PROGRAMME: MEDICAL MICROBIOLOGY

1. Scientific basis of medical microbiology

Trainees should have an understanding of the principles of the following, together with how they may be applied to clinical and research problems:

a) microbial structure, physiology and genetics;

b) microbial taxonomy, classification and typing methods;

c) host defence mechanisms, the immune system and immunity to infection;

d) microbial pathogenicity;

e) epidemiology of infectious diseases - their surveillance and control;

f) antimicrobial agents, their mode of action and mechanisms of microbial resistance.

2. Laboratory safety

Prior to any "hands on" experience of laboratory work, the trainee should be instructed in basic safety requirements including correct laboratory dress and laboratory hygiene. Instruction should also be given on the immediate handling and disposal of specimens and contaminated articles (eg inoculating loops, pipettes) at the laboratory bench, the dangers of aerosols and the procedure for dealing with spillages.

At the end of formal training, the microbiologist should be familiar with:

a) local procedures for the safe transport of specimens or cultures and also with national and international postal and packaging regulations for such material;

b) current requirements and recommendations of the National Advisory Committee on safety in microbiological laboratories.

c) the principles and operation of microbiological safety cabinets containment level III facilities and the procedures for their safe use, decontamination and monitoring of air flow.

3. Sterilisation and Disinfection

At the end of formal training, the microbiologist should understand the principles and uses of sterilisation and disinfection procedures for the preparation of media and instruments and for microbiological waste disposal. Trainees should be familiar with methods of monitoring and be capable of formulating a policy on the use of sterilisation and disinfection in the laboratory, hospital or community.

4. Handling of specimens

At the end of formal training, the microbiologist should:

a) be aware, for each specimen type, of the optimal methods for collection, transport (including transport media), storage, reception, identification and documentation, including the requirements for high-risk specimens.

The trainee should develop a sense of the continuity of identification of specimens from collection, through culture and further testing to the issuing of a final report. He or she needs to be aware of critical points in processing where this continuity may fail and be able to minimise the risk of this.

b) be able to assess degrees of urgency for the processing of specimens, including the provision for an out of hours service and the communication of preliminary results as applicable;

c) be able to decide upon further testing or processing of a specimen as appropriate;

d) be aware of existing reference facilities and their appropriate use.

5. Microscopy

At the end of formal training, the microbiologist should:

a) understand the principles of light, darkground, phase contract, fluorescent and electron microscopy and be able to set up a light microscope with dark ground and phase contrast facilities;

b) be able to perform routine staining techniques including fluorescent dyes;

c) be familiar with the appearance of stained preparations and be able to recognise artefacts and their possible origin.

6. Culture methods

At the end of formal training, the microbiologist should:

a) have a basic understanding of the diversity of microbial metabolism;

b) be aware of the wide range of selective, enrichment and inhibitory media available for general and specialised use and be able to choose relevant media in common use or in medical and environmental laboratories;

c) be familiar with physical growth requirements of micro-organisms including atmosphere and optimal temperature and have an appreciation of the growth kinetics of both solid phase and broth cultures. It is important in this context to know those micro-organisms and clinical situations in which detectable growth may require prolonged incubations;

d) be familiar with the preparation of media in common use and have an understanding of internal quality control of such preparations;

e) be able to process all common specimens, recognise potential pathogens from a mixture of colonies on culture plates, separate such colonies in order to achieve the pure growth necessary for further work.

7.Further processing of cultures

At the end of formal training, the microbiologist should:

a) be able to perform tests leading to the identification of all common pathogens including the use of commercially produced kits (eg. kits for enzyme assays) and rapid diagnostic kits, ELIZA, latex agglutination;

b) understand the principles of identification media and be able to use them appropriately;

c) understand the principles behind multipoint identification technology.

8. Antimicrobial investigations

At the end of formal training, the microbiologist should:

a) be aware of available reference facilities for further identification including serotyping and all other typing schemes both phenotypic and genotypic;

b) be able to test the antibiotic sensitivities of an isolate using the common techniques of disc testing and break points and to be aware of the principles behind multipoint sensitivity technology;

c) be able to perform and interpret MIC and MBC tests as appropriate;

d) be able to perform antimicrobial assays using biological and automated techniques;

e) have an understanding of antimicrobial assays and their relationship to the therapeutic and toxic effects on a patient and be able to advise on dosage regimens accordingly.

9. Emerging technologies

At the end of formal training, the microbiologist should:

a) be aware of all major new technologies available in medical microbiology based on DNA techniques (eg PCR) and monoclonal antibodies;

b) be aware of automated, rapid techniques available to medical microbiology;

c) be able to evaluate critically the need for emerging techniques within the laboratory including cost effectiveness and effects on staffing levels and working practices.

10. Data handling

At the end of formal training, the microbiologist should:

a) have a basic understanding of information technology and in particular, computerised data handling. He or she should have an appreciation of the advantages and disadvantages of such systems and a basic understanding of the need for data protection;

b) be aware of available technologies for data broadcasting.

11. Clinical experience

At the end of formal training, the microbiolo-

gist should:

a) have gained experience of liaison with clinical colleagues through regular ward visits and participation in collaborative clinical activities. In particular, a close relationship with high dependency units (eg ICU, NICU) and specialist units (eg haematology, paediatrics, transplantation etc.) where available;

b) have gained experience of liaison with general practitioners;

c) have participated in on-call rotas (including weekends) with consultant cover;

d) have participated in postgraduate educational meetings such as Grand Rounds and lunchtime case presentations;

e) be able to provide informed advice on vaccination and immunisation with all products normally available in the EU.

12. Infection control in hospital and community

At the end of formal training, the microbiologist should:

a) have had first hand experience of local infection control problems, including, outbreaks of infection and their management;

b) be familiar with the workings of infection control meetings including local and regional infection control committees;

c) be aware of those areas of hospital and community health that require infection control policies;

d) have worked closely with the infection control nurse both in day to day duties and in the education of those involved with infection control issues;

e) have participated in visits to clinical and non-clinical areas to advise on infection control. These should include kitchen inspections especially those conducted by environmental health officers. Relationships should be developed with key personnel in the central sterilisation unit, pharmacy and laundry;

f) have an understanding of the principles of patient isolation and their application;

g) be familiar with any national documents relevant to infection control. Also a knowledge of any existing working party recommendations (eg MRSA, Shigella, Clostridium difficile);

h) gained some experience of public health microbiology with secondment if necessary to a Public Health Laboratory;

i) have had some experience of communicable disease control in the community working Environmental Health Officers.

j) become familar with the physical and chemical agents used in hospital infection control.

13 Antimicrobial usage

At the end of formal training, a microbiologist should have knowledge of:

a) empiric, directed and prophylactic antimicrobial use.

b) the means of prevention of emergence of resistance

c) surveillance of antibiotic resistance

14.Virology

At the end of formal training, a microbiologist should have knowledge of:

a) basic diagnostic and screening virology methodology;

b) interpretation of results, both for clinical and infection control purposes;

c) virology policies in relation to health care workers, pregnancy, transplantation and immunisation;

d) when to refer to or request specialist virological expertise.

A period of six months to one year in total should be spent in a specialised virology laboratory during training.

15 Mycology

At the end of formal training, a microbiologist should have knowledge of:

a) basic diagnostic mycology methodology;

b) interpretation of results, both for clinical and infection control purposes;

c) special problems associated with the immunocompromised host

16 Parasitology

At the end of formal training, a microbiologist should have knowledge of:

a) basic diagnostic parasitology methodology;

b) interpretation of results, both for clinical and infection control purposes;

c) special problems associated with the immunocompromised host

17. Quality control

At the end of formal training, the microbiologist should:

a) have an understanding of quality control and quality assurance;

b) have had experience of the regular processing of specimens, distributed by an organisation for external quality control.

c) have an understanding of the existing external quality control schemes and the processing of data by these schemes.

18. Audit

At the end of formal training, the microbiologist should:

a) have an understanding of the principles of audit;

b) have participated in microbiological audit both in house and in the microbiological audit of clinical specialties. The trainee should have also participated in clinical audit led by other specialties.

19. Accreditation

At the end of formal training, the microbiologist should have knowledge of the requirements of any existing laboratory accreditation schemes and the process whereby accreditation is conferred.

20. Management

At the end of formal training, the microbiologist should have achieved a basic knowledge of important aspects of laboratory management including budget

control,personnel management and administration. Attendance at local or national management courses should be strongly encouraged.

TRAINING RECORD & TRAINING PROGRAMME

Medical Microbiology

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Scope of the manual

The training manual is designed to provide a record of the training received by junior medical microbiologists during the whole of their period of training.

It is intended to assist the trainee and his/her designated supervisor in considering the whole range of skills required of a newly appointed consultant medical microbiologist in a district general hospital or in a teaching hospital. Consideration is also given to training in communicable disease control and in environmental, food and water microbiology. In view of the diverse nature of the subject, the list of techniques and points covered is not necessarily comprehensive, but is designed to provide a framework for fuller discussion of each topic.

The first section outlines the aims of the training, the resources required and a suggested general structure of training. However, the suggested structure may be amended to suit local circumstances after approval of any significant changes are agreed by the Postgraduate Dean and/or any official board or committee on the registration of medical specialists.

The background and qualifications of the trainee at the commencement of training in Microbiology should be recorded.

An individual programme should be constructed for each trainee planned around the past experience, aptitudes and aspirations of the trainee. It should be designed after discussion between the trainee, the designated trainer and the Postgraduate Dean and/or any official board or committee on the registration of medical specialists. This programme is intended to outline the structure of the training and should be planned and reviewed at least annually.

The completion of the training record should be complemented with Individual Performance Reviews (IPR) where appraisal of progress can be undertaken and where the trainee's opinions of the training being received should be considered.

Training programme - a description

1 Introduction

This document sets out a curriculum for trainee medical microbiologists.

1.2 The general outline is complemented by a training record in which specific items are listed in some detail.

2 Aims of training training

2.1The aims of training should be to develop the knowledge, skills and attitudes required of medical microbiologists and to give wide experience of the practice of medical microbiology.

The curriculum should centre on training in the following areas (the eight main tasks of the microbiologist as defined by the Microbiology Commission in Helsinki in 1996) to ensure competence to:

a) Give advice as a physician on the diagnosis, treatment and prevention of microbial diseases.

b) Provide a scientific basis for laboratory diagnosis; to set protocols and to maintain standards within the laboratory.

c) Undertake the management responsibilities required from the director of a medical microbiology laboratory.

d) Take charge of infection controls in hospitals.

e) Propose hospital policies on the control of antibiotic usage and on the prevention of hospital acquired infection.

f) Collaborate with national surveillance organisations and public health authorities and to provide laboratory services for these organisations.

g) Participate in the training programmes for medical microbiologist, infection control practitioners and other experts in the field of microbial diseases.

h) Undertake research and development in the specialty of microbiological biopathology.

2.2 The precise composition of an individual's training programme should be structured around the past experience and aspirations of each trainee. The programme should be designed, and continually reviewed, by discussion between the trainee, the trainer and, at regular intervals, the Postgraduate Dean and/or any official board or committee on the registration of medical specialists.

2.3 Each trainee will have to successfully acquire skills in each of the following categories:

2.3.1 specialized factual knowledge of the natural history of infection and its clinical presentation;

2.3.2 technical ability, to enable the trainee to select appropriate methodology and laboratory instrumentation based on practical skills and experience derived from close acquaintance with laboratory technology acquired during training, which includes quality control procedures and quality assurance;

2.3.3 data management skills, including the statistical evaluation of data referring to the populations of patients served and the technical procedures applied in the laboratory as well as familiarity with the application of information technology within the laboratory and familiarity with the use of spreadsheets, databases and statistical packages;

2.3.4 management and communication skills, including experience, under supervision, in formulating departmental policies and applying the leadership and team-work skills necessary to implement them, report writing and report presentation, costing

procedures, preparing budgets and acquaintance with contracting procedures;

2.3.5 research and development experience, as this is important for developing skills in independent and team-driven problem solving and in the critical assessment of published work;

2.3.6 presentation skills, both oral and written;

2.3.7 knowledge of health and safety at work requirements for laboratories including control of substances hazardous to health regulations;

2.3.8 continuing study, leading to continuing medical education (CME) beyond the training post stage. This will enhance the acquisition of life-long habits of reading, literature searches, consultation with colleagues, attendance at scientific meetings, and the presentation of scientific work as part of continuing professional development (CPD).

3 Training supervision

3.1 Every trainee must have a designated trainer of Consultant status at the trainee's base laboratory who will be personally responsible for the trainee's day-to-day training and who will be accountable to the Postgraduate Dean and/or any official board or committee on the registration of medical specialists.

3.2 When referred to another location for training, a Consultant, or Scientist of equivalent status, should be identified as being responsible for training for the duration of the attachment.

3.3 Before agreeing to become a trainer, a Consultant must be able and prepared to set aside sufficient time to undertake this demanding duty. Each trainee should anticipate a weekly, regular, formal one hour tutorial session as a minimum. Furthermore, in addition, there should be training in benchwork and in clinical liaison/ward rounds by the trainer/another consultant or qualified SpR* (delegation of certain duties to a senior SpR does not abrogate trainer's responsibility) as well as frequent open access on an ad hoc basis.

3.4 All trainees must have Consultant cover (preferably on-site) at all times.

3.5 For more junior trainees, the trainer must be responsible for identifying publishable projects suited to the trainee's experience and interests, for arranging resources, and for overseeing the project up to publication.

3.6 The progress of training should be reviewed with the trainer, and where relevant the laboratory head, and separately with the Postgraduate Dean and/or any official board or committee on the registration of medical specialists on at least an annual basis, or more frequently if requested. This review should be undertaken on a formal basis, with clear agreed goals and achievement reviews.

4 Training locations

4.1 Before a laboratory can be designated as a training site, the suitability of the site must be carefully considered.

4.2 Each post and laboratory must have appropriate recognition.

4.3 Each laboratory should ideally have the full appropriate accreditation.

4.4 There should be sufficient non-training grade staff in a laboratory to carry out the routine clinical work. While trainees will often undertake routine work, they must not be relied upon for the running of the laboratory as this will interfere with the training programme.

4.5 In addition to the suitability of the laboratory, consideration must be given to the scope of clinical material available. In laboratories attached to hospitals with a relatively small range of clinical services, rotation to laboratories at other hospitals will be necessary.

4.6 Ideally, trainees should be based in laboratories specializing in training which

will have more than one trainee. This will facilitate the suggested training structure outlined in section 0, below. In this situation, trainees can discuss cases and issues in medical microbiology with others who are also actively studying for examinations (or who have recently been doing so). This process is also of value to the more senior trainees who themselves begin to learn how to become effective trainers.

4.7 Resources which must be available before a trainee is allocated to a laboratory: Reasonable quiet office space with a telephone line from where confidential clinical conversations can be carried out; sole use of a desk; filing cabinet and shelf space; ready access to computing facilities (at least one computer between every two trainees) with appropriate software (e.g. wp; spreadsheet; epi-info; reference manager) and connected printer; internet access; a range of suitable up-to-date reference texts within the laboratory, e.g. Principles and Practice of Infectious Disease (Mandel et al), The Use of Antibiotics (Kucers et al), Principles and Practice of Clinical Virology (Zuckerman et al), Manson's Tropical Diseases (Manson-Bahr et al).

5 General structure of training

5.1 The structure of training needs to be flexible to allow for individual trainee and service requirements. A suggested training structure follows which may be used as a guideline to best practice. It is not intended to be prescriptive. If an alternative training schedule is already in place, this may be followed, subject to approval by the Postgraduate Dean and/or any official board or committee on the registration of medical specialists.

5.2 A significant part of training should be performed on an apprenticeship basis, with the trainee shadowing the trainer, another consultant or a qualified SpR in service laboratory and clinical duties (referred to as service work).

5.3 Adequate time should be allowed for non-service benchwork, private study, attending courses and research (referred to as elective work).

5.4 The proportion of service to elective work should vary between 1:1 and 1:2. It is essential that time for elective work should be allocated in blocks of sufficient length to allow the trainee to make maximum use of the elective time. The elective period should not be used exclusively for annual leave or for covering colleagues' planned annual/study leave. A suitable arrangement could entail a rotation (say every three months) of 'first on-call' for clinical duties between three trainees on one site, allowing the other two a clear six months for elective work in every nine months.

6 Qualifications of the trainee at the end of training

Required of the trainee:

6.1- Gaining knowledge and experience -

At the end of training the trainee should have gained experience in the following areas:

a) possess theoretical and practical knowledge , skillfulness and experience in bacteriology, virology, parasitology, mycology and serology, so that he/she is capable of independently arranging the content and organisation of a microbiological study for the benefit of patient care resulting in clinical consultation and a hospital epidemiological study;

The trainee should among other things:

b) be able to assess relevant scientific literature and to apply (adjust) it for use in diagnosis and scientific research;
c) have sufficient theoretical and practical knowledge of molecular biology and immunology;
d) make sure that he/she possesses sufficient knowledge of management methods, so that these can be used for organisation, management and personal policy of a medical microbiological laboratory;
e) orientate themselves to function in the

field of prevention and the fight against infectious diseases;
f) acquire sufficient knowledge to be able to execute or give guidance in hospital hygiene and hospital epidemiology programmes.

6.2 Cursory education

The trainee should through work placements and/or participating in courses have obtained insight in the parasitology, mycology, immunology, statistic/epidemiology, management and public health.

6.3 Educational duties

The trainee should have given information and fulfilled educational tasks to medical students, co-assistants, trainee - nurses and paramedical staff.

6.4 Participating in discussions and meetings-

The trainee should gain experience through regular attendance of clinical and pathological conferences.

Information Required for Training Record

Training record

Trainee details

Base laboratories

Customized training programme

Periods of training in laboratories or units outside base laboratory

Record of In-training Assessment Interviews

Courses and meetings attended

Qualifications obtained during Microbiology training

Detailed subject coverage

- Instructions for completion of numbered sections
- Health and safety at work
- Clinical experience
- Infection control in hospital and the community
- Sterilization and disinfection
- Specimen procurement and handling
- Specimen microscopy
- Culture methods
- Further processing of cultures
- Susceptibility testing and antimicrobial assays
- Laboratory techniques in virology for microbiology trainees
- Environmental microbiology for microbiology trainees
- Parasitology for microbiology trainees
- Mycology for microbiology trainees
- Epidemiology and statistics
- Data handling
- Quality Assurance
- Emerging technologies
- Research and development
- Teaching and training
- Laboratory management and legislation
- Additional topics

TRAINING PROGRAMME IN POLYVALENT MEDICAL BIOPATHOLOGY

INTRODUCTION

This document has been based upon the official national documents of Portugal, Austria, Luxembourg, Spain, Greece, France and Germany.

It has not been possible to access similar documents from the other European countries where Polyvalent Medical Biopathology Speciality exists.

NOMENCLATURE

- Austria: Medizinische und chemische Labordiagnostik
- Belgium: Biologie Clinique
- France: Biologie Clinique
- Germany: Laboratoriummedizin
- Greece: Medical Biopathology
- Italy: Patologia Clinica
- Luxembourg: Biologie Clinique
- Portugal: Patologia Clínica
- Spain: Análisis Clínicos
- Hungary:

DEFINITIONS and GENERAL CONSIDERATIONS

Polyvalent Medical Biopathology

The U.E.M.S. defines Polyvalent Biopathology as the field of knowledge and practice of all areas of Biopathology including Haematological Biopathology, Microbiological Biopathology, Chemical Biopathology and Immunological Biopathology.

The Medical Biopathologist is a medical doctor with expertise in several fields of Laboratory medicine. He/she works with other physicians in the diagnosis, therapy and prevention of illness. As a specialised medical doctor he/she should be able to select and perform the most appropriate laboratory tests to be used, and he also interprets laboratory results for other clinicians. He/she is active in the education of postgraduate medical trainees and other laboratory professionals.

Training Centres

Training centers should adopt the standards outlined in the U.E.M.S. document "Charter on Training of Medical Specialists in the European Community" and in the document produced by the Education Board of the Specialist Section of Medical Biopathology U.E.M.S. "Education Board: Qualities of Training Centres for Medical Biopathology Specialities".

It is recommended that each country provide a training program with national specifications that conform to the present document. Each country should have a list of approved training centers. Each country should have a national system of evaluation of trainees.

Structure of the Curriculum

It is recommended that the trainee rotate between different laboratories and sections within laboratories. An initial period of 2 years with general training should be followed by subsequent periods acquiring more specialised knowledge.

The training should be for a period of 5 years including 1 year of clinical training and point-of-care laboratory medicine. It should be in full time salaried employment including at least 35 hours a week.

The trainee should develop and acquire

Specialised factual knowledge:

a.1. General sciences (biology, physics, chemistry, mathematics and statistics);

a.2. History, evolution and future outlook of laboratory analysis;

a.3. Pre- and analytic factors;

a.4. Analytical methods and instrumentation;

a.5. Medicolegal factors;

a.6. General organisation and management of medical laboratories.

a.7. Automation, robotics and computing in the medical biopathology laboratory.

a.8. Quality control (principles and methods);

a.9. Interpretation, validation and communication of the results.

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

b) 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.

c) 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;

d) The life-long habits of reading, literature-searches, consultation with colleagues attendance at scientific meetings, and the presentation of scientific work as part of continuing medical education and/or development (CME/CPD);

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 (including national and European rules and laws).

h) Quality Management The trainee must be familiar to it's the theory and practice as well as to the international and national rules. He/she should be able to collaborate and/or improve quality system in use or to implement one if needed.

MEDICAL BIOPATHOLOGY COMMUN TRUNK:

It is recommended that the training program includes a "Common Trunk " shared with the other Monovalent Medical Biopathology Specialities. A more detailed description of the "Common trunk" is provided as an attachment to the present document.

HAEMATOLOGICAL BIOPATHOLOGY:

Knowledge aims:

j.1. Structure and function of the bone marrow, lymphoid tissues and spleen;

j.2. Haematopoiesis; morphology, biochemistry and function of the blood cells;

j.3. Genetic principles and molecular biology.

j.4 Genetic basis and molecular biology of haematological disorders.

j.5. Phenotyping of cells;

j.6. Differential diagnosis of anemia of various etiologies.

j.7. Disorders of iron metabolism including haemochromatosis;

j.8. Erytrocyte disorders - erytocytosis;

j. 9 hemoglobinopathis and thalassemias

j.9. Benign and malignant pathology of leucocytes;

j.10. Hemostasis;

j.9.1. Morphology of megakaryocytes and platelets;

j.9.2. Biochemistry and function of platelets and platelet kinetics;

j.9.3. Biochemistry of coagulation factors;

j.9.4. Mechanism of coagulation and fibrinolysis. The role of blood vessels in haemostasis;

j.9.5. Disorders of haemostasis and thrombosis: classification and clinical features:

j.9.5.1. Quantitative and qualitative platelet disorders.

j.9.5.2. Vascular disorders;

j.9.5.3. Congenital disorders of blood coagulation. Acquired disorders of blood coagulation;

j.9.5.5. Laboratory control of antithrombotic and antiagregant therapy;

The trainee should have acquired technical expertise in the following areas

k.1. Preparation and morphological examination of periferal blood and bone marrow smears;

k.2. Bone marrow aspiration and bone marrow trephine biopsy

k.3. Laboratory methods of the study for the erythrocyte pathology:

k.3.2. Laboratory methods for studying polycythaemia.

k.3.3. Laboratory methods for studying haemachromatosis.

k.4. Blood grouping.

k.5. Laboratory methods for the study of the lucocytes,

k.5.1. Myelodysplastic syndromes, chronic and acute myelo- and lympho- proliferative disorders;

k.5.2. Laboratory methods for immunophenotying and cytochemistry of haematological diseases. Cytogenetics and molecular biology relating to malignant haematological disorders;

k.6. Laboratory methods for the study of hemorrhagic and thrombotic disorders;

k.7. Quantitative and qualitative study of coagulation and fibrinolysis;

CHEMICAL BIOPATHOLOGY:

I) Knowledge aims:

I.2. Analytical chemistry: metrology, solution preparations, reagents and basic laboratory materials.

l.3. Analytical procedures and instrumentation:

l.3.1. Photometry, fluorometry, nephelometry, turbidimetry, electophoresis, electrochemistry, osmometry, chomatography, radioactivity assay, mass spectrometry, immunochemistry;

l.5. Study of carbohydrates, lipids, lipoproteins and apolipoproteins, nucleic acids, aminoacides and proteins, nonproteic nitrogen substances, enzymes and isoenzymes, hormones and their metabolites, electrolytes, pH, blood gases and acid-base balance, calcium and phosphate metabolism, trace elements, porphyrins, vitamins, oncologic markers.

l.6. Therapeutic drug monitoring and clinical toxicology

l.7. Biochemical analysis of urine, CSF, faeces, saliva, seminal and amniotic fluids, exudates and transudates;

l.8. Biochemical aspects of respiratory, cardiovascular, hepatic, gastric, pancreatic and intestinal, osteo-articular disorders;

l.9. Endocrinological and nutritional disorders: hormonal studies and functional tests; Biochemical analysis in relation to gestation, fertility, growth and development and of the ageing process;

l.10. Molecular pathology, diseases and methods;

m) Technical skill competence:

m.1. Metrology. Solution and reagent preparation. Use, maintenance and validation of the basic material and equipment of the laboratory;

m.2. Laboratory methods for studying carbohydrates and their metabolites, lipids and lipoproteins, nucleic acids, amino acids and proteins, nitrogen substances, enzymes and isoenzymes, hormones and their metabolites, electrolytes, pH and blood gases, trace elements, porphyrins, vitamins, oncologic markers;

m.3. Laboratory methods for therapeutic drug monitoring including drugs of abuse and toxic substances;

m.4. Complementary methods for studying human fluids: the urine, CFR, amniotic and seminal fluids, faeces and other biologic fluids).

MICROBIOLOGICAL BIOPATHOLOGY

Knowledge aims:

n.1. Biology and pathology of infectious agents;

n.2. Host defences of the human body;

n.3. Epidemiology of infectious diseases;

n.4. Clinical signs, laboratory diagnosis of infectious diseases;

n.5. Prophylactic and curative anti-microbial therapy;

o) Technical skill competence:

o.1. Storage and preparation of reagents and culture media;

o.4. Laboratory technique for isolating, culturing and identifying infectious agents;

o.5. Preanalytical aspects of microbiology. Collecting, conditioning, transportation and processing the biological products (and others) techniques for being studied;

o.6. Serology of infectious diseases.

o.8. Nosocomial infection: role of the clinical microbiology laboratory;

IMMUNOLOGICAL BIOPATHOLOGY

Knowledge aims:

p.1. The basic biological concepts of immunology;

p.2. Cells involved in the immune response: The lymphocytes; "Null" cells; Mononuclear phagocytic system (monocytes);

Polymorphonuclear granulocytes;

p.2.1. Cell proliferation and maturation, cellular markers, regulatory and action function, cellular interaction (lymphokines and cytokines);

p.3.1. Molecular components of the immune system: immunoglobins (structure, biosynthesis, metabolism), antigenic specificity and immunogenicity, antigen-antibody reaction; The HLA system (genetic restriction of immunity);

p.4. Complement system and inflammatory intermediaries of the immune response;

p.5. Immune receptors diversity (T cell receptors and immunoglobins);

p.6. Immunopathology: pathways of the immune damage;

p.7. Immune diseases;

p.8. Methods in use of the immunology laboratory:

p.8.1. Antigen-antibody reactions (precipitation reaction, haemaglutination);

p.8.2. Complement fixation;

p.8.3. Direct and indirect immunofluorescence;

p.8.4. Immunoenzymatic reactions and radioimmunoassay;

p.8.5. Cells immunophenotyping and functional studies of phagocytic cells and lymphocytes (in vivo and in vitro);

Study of soluble immune complexes

Technical skill competence:

q.1. Soluble factors: qualitative, quantitative and functional of immunoglobins (classes and sub-classes) and complement factors; identification and quantification of auto-antibodies; screening, identification and quantification of crioaglutinins; screening for immune complexes;

q.2. Immunity cells: interpretation of dermal tests for delayed hypersensitivity; qualitative, quantitative and functional tests for the populations and sub-populations of the immune system cells (lymphocytes, PMN, monocytes/macrophages);

CLINICAL TRAINING

The trainee should have a clinical attachment of 1 year in relevant areas of clinical medicine. In addition the clinical relevance of laboratory results should be emphasised and the role of the medical biopathologist in the interpretation of laboratory results should be stressed.

ANNEX

Common Trunk

Definition: Common trunk is intended to mean all the technical and scientific knowledge necessary in the formation of a medical biopathologist (independently of his/her specialty). Semi common trunk relates to the knowledge areas common to more than one monovalent specialty but not to all.

From a practical point of view, the "common ground" defines scientific areas not strictly medical and defines a necessary but not sufficient level of formation.

The trainee can learn the common ground in his/her own specialty (in the monovalent areas) or in more than one.

The specific medical knowledge necessary to complete the formation, the medical common trunk, may have different approaches in different countries. It must be inferred from the monovalent curricula and adapted to each country.

The Common Trunk

1. **Management**

   Basic managerial knowledge;

   Information technologies;

   Health and safety in the laboratory environment;

   Legal aspects of the medical laboratory practice.

1. **Basic scientific knowledge**

   Specialised factual knowledge;

   Interpretative skill.

1. **Research, teaching and CME/CPD**

2. **Quality**

   Quality and quality assurance;

   Quality control;

   Audit/Clinical audit;

   Certification and accreditation schemes/systems.

1. **Preanalytical aspects: handling of specimens**

2. **Analytical techniques, methods and instrumentation**

   Theoretical and practical basis of medical laboratories technologies;

   Methodological and metrological aspects;

   Emergent technologies.