GENERAL PATHOLOGY- MEDICAL BIOCHEMISTRY

Goals and Objectives

At the completion of training, the resident will have acquired the following competencies and will function effectively as a:

Medical expert

General Requirements:

Demonstrate diagnostic and therapeutic skills for ethical and effective patient care. Access and apply relevant information to clinical practice. Demonstrate effective consultation services with respect to patient care, education and legal opinions.

At the completion of training, the residents will demonstrate the diagnostic skills required for ethical and effective patient care and will demonstrate effective consultation skills with respect to patient care, education and legal opinions. The level of knowledge in all areas will reflect the needs of community or regional laboratories. It is not expected that the residents will have the same depth or breadth of knowledge in the laboratory medicine specialties as residents trained in a single discipline. From a functional standpoint the General Pathology residents must be able to recognize and diagnose common morphological and clinical entities. “Common” may be defined as likely to occur one or more times in the course of a year in a laboratory medicine population base of 50,000. The residents must appreciate those clinical situations, cases or specimen types which will require referral to a laboratory medicine specialist working in a tertiary hospital setting.

Specific Requirements:

Medical Biochemistry is the study and measurement of biochemical abnormalities in human disease and forms a core component of the training program in general pathology.

In all specialties, but especially those that are technologically driven, there is a rapid evolution to be expected in diagnostic test methodology. In addition, as understanding of biochemical abnormalities increases, there is a constant need to update and expand test menus in order to provide rational and efficient strategies to confirm or exclude disease. The increasing availability of new technologies is also expected to blur the distinction between traditional clinical disciplines, enhance the capabilities of community or regional hospital laboratories, and increase the consultative role of the General Pathologist.
The discipline of Medical Biochemistry as it pertains to General Pathology involves the following major areas of activity:

• The supervision and direction of the clinical biochemistry laboratory at the level of a community or regional hospital.

• The provision of consultation services to clinical colleagues with respect to appropriate and effective biochemical testing strategies and their interpretation. At completion of training, the residents will have a broad knowledge of biochemical testing and laboratory instrumentation pertinent to supervising a community or regional hospital laboratory and offering consultative services to clinical colleagues. The residents must understand the common disorders of, and test strategies pertinent to diagnosis of:

  • Body water and electrolytes
  • Acid-base control
  • Renal function
  • Liver function
  • Lipid disorders
  • Bone disease
  • Pancreatic function and digestive disease
  • Cardiac disease and hypertension
  • Blood sugar control
  • Iron, porphyrin and bilirubin metabolism
  • Endocrine function (especially thyroid, parathyroid, gonadal, pituitary, adrenal)
  • Uric acid metabolism
  • Protein metabolism
  • Common genetic disorders of metabolism

A more basic knowledge of pediatric and prenatal clinical biochemistry, nutrition, cancer associated biochemical abnormalities, therapeutic drug monitoring, pharmacokinetics, and toxicology is required with special emphasis on testing available in community or regional hospital laboratories.

The residents will demonstrate the following skills by the conclusion of the residency program:

i) Given a clinical scenario, will provide appropriate advice regarding biochemical test selection with a view to optimizing laboratory utilization.

ii) Will have a practical knowledge of statistics pertinent to clinical biochemistry. This will include the concepts of sensitivity, specificity, efficacy, precision, accuracy, incidence, prevalence, predictive value, reference ranges, means, standard deviation, variance, parametric and non-parametric distribution, and the control of pre-analytical variables.
iii) Will demonstrate knowledge of common analytical techniques and instrumentation in the biochemical laboratory.

iv) Will demonstrate an understanding of laboratory equipment selection.

v) Will define the components of a quality assurance program and describe the methods of quality control and their application.

vi) Will demonstrate an understanding of the principles of laboratory safety and the regulations as they apply to workplace hazards and transportation of dangerous goods.

vii) Will define the basic components of a Laboratory information system and its application to the modern biochemical laboratory.

**Communicator**

*General Requirements:*

Establish therapeutic relationships with patients/families. Obtain and synthesize relevant history from patients/families/communities. Listen effectively. Discuss appropriate information with patients/families and the health care team.

*Specific Requirements:*

Laboratory physicians, as active members of the health delivery team, will establish appropriate relationships with consulting physicians and surgeons. From time to time, especially in the clinical disciplines, the pathologist may find it helpful, in the best interests of patient care, to communicate directly with patients, families, and other health care providers. In this regard the residents must demonstrate skills in communicating, both in verbal and written form, in a manner appropriate to the intended recipient. The residents must understand effective clinical history taking and must have a broad knowledge of the laboratory basis of diagnosis in order to appropriately advise regarding test strategies and interpretation. Effective communication with clinical colleagues is essential in order to interpret surgical and autopsy pathology findings in the clinical context. The residents must be able to formulate comprehensive and clinically meaningful surgical pathology reports and organize diagnostic summaries to prioritize the features of importance. Diagnostic uncertainty must be clearly expressed with appropriate differential diagnoses and suggestions regarding further studies or ancillary investigations. There must be an awareness of ethical and medico-legal issues regarding the release and dissemination of confidential patient information. The residents must demonstrate awareness of the importance of timeliness, clarity and accuracy in all verbal and written communications.
Collaborator

General Requirements:

Consult effectively with other physicians and health care professionals. Contribute effectively to other interdisciplinary team activities.

Specific Requirements:

The residents must be aware of the strong interface between the laboratory and clinical disciplines. The residents must also develop skills in supporting educational and/or research endeavours of clinical and laboratory colleagues through individual opportunities or group learning experiences.

In the realm of surgical pathology the residents must be aware of, and respond appropriately to, situations in which the laboratory will significantly affect critical patient management decisions. Such situations will include intraoperative consultations, assessment of surgical margins, staging procedures, situations where deferral of diagnosis is recommended, and situations where ancillary investigations or consultation is required for optimal case management. In the clinical disciplines the residents will be able to assist in optimal laboratory utilization appreciating the diagnostic limitations of laboratory tests and the importance of control of pre-analytic variables. The residents will understand the clinical requirements for turnaround time in specimen reporting, the range of testing which should be continuously available in the community/regional hospital and the appropriate laboratory response to critical values. The residents must understand the value of interdisciplinary and intradisciplinary collaboration in patient management decisions. This includes the need for case review including review by external institutions and agencies. The residents must demonstrate a willingness to seek consultation opinions if so requested by clinical colleagues with modification of subsequent diagnostic impressions if appropriate.

Manager

General Requirements:

Utilize resources effectively to balance patient care, learning needs, and outside activities. Allocate finite health care resources wisely. Work effectively and efficiently in a health care organization. Utilize information technology to optimize patient care, life-long learning and other activities.

Specific Requirements:
At the end of training, the residents will understand the basic principles of laboratory management.

Specifically the residents will have some knowledge of:
- Staffing and personnel management.
- Budgeting (personnel, materials, capital equipment)
- Workload measurements.
- Funding structures for laboratories.
- Hospital medical staff organization and roles.
- Quality control, quality assurance and continuous quality improvement.
- Laboratory safety and the transportation of dangerous goods.
- Management styles.
- Principles of optimal laboratory utilization.
- Equipment purchasing and selection.
- Relevant legislation and/or regulations governing the operation of laboratories, including issues of informed consent.
- Relevant legislation and/or regulations governing laboratory operation and informed consent
- Laboratory information systems and components (hardware and software).

It is expected that management issues pertinent to the laboratory will be taught as part of the academic activities of the residency-training program and may be supplemented with specific research activities.

**Health Advocate**

*General Requirements:*

Identify the important determinants of health affecting patients.
Contribute effectively to improved health of patients and communities.
Recognize and respond to those issues where advocacy is appropriate.

*Specific Requirements:*

As part of an interdisciplinary team of professionals responsible for patient and community health care, the residents will understand those components of the laboratory and its services that are required to:

i) Respond adequately to community, and hospital service demands including the need for population screening.

ii) Respond to hospital, community and regional public health needs to detect and control infectious disease.

iii) Provide sufficient and safe blood bank resources.
The residents will demonstrate the ability to recognize and respond to situations where health advocacy and application of health care resources is required. This will include the introduction of improved instrumentation and methodologies to augment community health care.

Scholar

General Requirements:

Develop, implement and monitor a personal continuing education strategy. Critically appraise sources of medical information. Facilitate learning of patients, house staff/students and other health professionals. Contribute to development of new knowledge.

Specific Requirements:

During the training period, the residents will demonstrate an ability to develop and implement a strategy for learning including a program of continuing education following completion of the residency. There must be a working knowledge of statistics applicable to all aspects of laboratory medicine and the capability of appraising sources of medical information. An important aspect of the role of the general pathologist is the continuing education of laboratory technologists and clinical medicine colleagues. An ability to perform this educational role must be developed by the senior residency years. Contribution towards new knowledge is a major role of academic laboratory medicine specialists and the General Pathology residents must also be familiar with research methodology. In this regard the residents should have undertaken at least one research project during the 5-year program and must be familiar with the principles of critical appraisal.

Professional

General Requirements:

Deliver highest quality care with integrity, honesty and compassion. Exhibit appropriate personal and interpersonal professional behaviours. Practise medicine ethically consistent with obligations of a physician.

Specific Requirements:

The residents must develop a broad understanding of the role of the physician within the community and hospital structure. The residents must establish a high standard of laboratory medical practice, appreciating personal limitations in diagnostic skill which will require referral of particular types of case in the best interests of patient care. The residents will demonstrate integrity, honesty and compassion in all aspects of the practice of laboratory medicine as well as
personal and interpersonal professional behaviours of a high ethical standard. These behaviours will include those relating to confidentiality, respect for others, conflict of interest, codes of conduct, personal and professional boundaries, consent, and the role of professional self-regulation and continuing education.