

Clinical Laboratory Division

Introduction

The Clinical Laboratory has two divisions, clinical pathology and physiologic testing. The clinical pathology division is composed of seven sections: 1) urinalysis, 2) immunology and tumor markers, 3) biochemistry and endocrinology, 4) hematology, 5) bacteriology and molecular diagnostics, 6) molecular hematopathology and 7) transfusion. The physiologic testing division has four sections: 1) ultra-sonography (US), 2) electrocardiography, 3) electroencephalography and 4) respiratory function. Each section of the Clinical Laboratory supports the clinicians in patient care by providing laboratory data.

Routine Activities

Eleven doctors, 35 medical technologists, and 4 assistants are engaged in the services of the clinical pathology and physiologic testing divisions. Meetings for laboratory management are scheduled from several weekly to monthly for the purposes of staff-education and quality control of the laboratory tests. The Clinical Laboratory provides an important service as one of the in-hospital diagnostic units by examining submitted laboratory specimens and screening for disorders. Urgent laboratory service is also provided to support the clinicians. Tumor markers or other tumor-associated tests are also available as well as evaluations of new tests in the Clinical Laboratory.

The blood-drawing section accompanied by a satellite laboratory is located near the outpatient clinic. In this satellite laboratory, 4 full-time technologists draw blood, analyze blood samples, and report complete blood counts (CBC). Because of the increase of the number of patients, the waiting time for blood-drawing became a major problem in this section. To solve this problem, an "on-demand helper system" was introduced and finally the waiting time has decreased dramatically.

A laboratory automation system was introduced to the sections of biochemistry and endocrinology, immunology and tumor markers in 1999. Under this system, blood specimens are automatically checked in, picked up and analyzed. Currently, most of the tests are processed and their values are determined by automated analyzers. With these automated systems, lab technologists have been freed to help other sections, such as the blood -drawing section and the physiologic testing division.

The bacteriology section has two subdivisions: a traditional bacteriology unit and a molecular diagnostics unit. In the traditional unit, cultures are prepared for identifying infectious agents. In the molecular diagnostics unit, polymerase chain reaction (PCR), quantitative PCR, and direct sequencing are used to detect infectious agents. Additionally, an automatic nucleic acid extraction device was introduced to this unit to facilitate the sample processing.

In the molecular hematopathology section, at least seven PCR based protocols and five southern blot based protocols are utilized as routine tests for detection of the various hematologic malignancies.

In the transfusion section, blood groups are typed and further screened for irregular antibodies to ensure that blood related products are supplied promptly and efficiently. One lab technician at this section helps at harvesting patients' peripheral stem cells.

In the physiologic testing laboratory, US (ultra-sonography) has become an important tool for the detection of the disorders of abdominal organs, breast, and thyroid gland. Also US examinations are frequently performed before and after chemotherapy or surgery.

Research Activities

One technologist of the bacteriology section serves to participate at the infection control within the hospital. To cover the immunological problems such

as viral infection and vaccination related matters, another technologist of the immunology section has participated in the infection control program since the summer of 2003.

The technique of fluorescent in situ hybridization (FISH) for breast cancer diagnosis is under optimization for future routine service.

The Research Center for Cancer Prevention and Screening will be opened in February, 2004. To support this center, several technologists have participated in the various preparation activities, such as physiology, clinical laboratory, and pathology testings.

Four technologists passed examinations and acquired licenses certified by the medical technologist committee. We have 17 certified medical technologists in this Clinical Laboratory. All medical technologists are encouraged to acquire certification.

Clinical Trials

Under the strong demands for medical laboratory standardization and quality control, a program to ensure that every National Hospital Clinical Laboratory could provide well standardized and

quality controlled laboratory tests was under review in 2003. The program will be introduced to this hospital on January, 2004.

One research activity article regarding alpha-Fetoprotein and Des-gamma-carboxyprothrombin was produced and published during the routine clinical laboratory activities. Several publications will follow this article.

In addition to these activities, several collaborations are in progress. A couple of stem cell transplantation based programs are in progress with in-house collaboration. A quantitative cytomegalovirus detection methodology was developed with other universities in Japan.

To help research activities, we continue to maintain the "bio-sample bank" established in 2002 for use by various researchers thanks to the support not only from in-house doctors but also from the Research Institute of this Center.

We are continuously working to provide more useful laboratory information and services and to create more effective laboratory procedures.

● K. Furuta and H. Kato ●

Numbers of Laboratory Tests Performed in 2003

Section	Total	Outpatients	Inpatients
Urinalysis	573,379	388,651	184,728
Biochemistry	3,059,226	1,787,033	1,272,193
Immunology	289,604	197,747	91,857
Hematology	1,069,150	583,488	485,662
Bacteriology	61,004	10,991	50,013
Physiological tests	39,392	31,529	7,863
Surgical pathology	20,849	12,717	8,132
Cytology	14,711	11,768	2,943
Blood transfusion tests	66,152	34,312	31,840
Total	5,193,467	3,058,236	2,135,231

*Additionally, 890 molecular diagnostics tests and 161 molecular hematopathology tests were performed.