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Introduction

Laboratory medicine is the branch dealing with changes in the human body that can be detected only by analyzing the body in the laboratory. Essential for the assessment of various clinical problems, the services of laboratory medicine can be used for many important applications as follows:

- Diagnostic disease-oriented testing. Such testing is usually ordered by a physician and is part of the initial workup of patients. These tests are routinely performed in ambulatory medical facilities.
- Pretreatment assessment of patients. Laboratory tests are routinely performed before entering a hospital for medical treatment.
- Follow-up after treatment. Laboratories or ambulatory clinics are used to determine the effects of treatment. Patients treated with insulin must regularly monitor their blood sugar levels to determine if the amount of insulin or other medications is correct.
- Screening for diseases. Screening is performed for populations at risk for certain conditions, such as blood lipid profiles in patients with familial hyperlipidemia, or after a certain age, such as prostate specific antigen tests in men older than 55 years.
- Periodic monitoring of the health of workers. Laboratory tests are typically part of the annual physical examination recommended to monitor job health. Additionally, they are almost always performed in special circumstances, such as pregnancy, infancy, and childhood. Many jobs require a pre-employment

medical examination and school districts mandate annual fitness examinations that include routine laboratory testing. Together with physical examination, laboratory testing represents the most important part of the yearly medical examination performed by numerous health care providers.

Research. Laboratory tests are usually included in monitoring patients or normal persons being treated with new drugs (clinical trials) or those enrolled in studies of various diseases.

Laboratory tests are performed on body fluids or tissue specimens. Laboratory tests can be classified as follows:

- Routine tests performed in most hospital laboratories.
- Specialized tests performed only in specialized reference laboratories or under specific conditions and during complex medical procedures.
- Emergency tests performed on short notice and results immediately to the ordering physician.

Routine laboratory tests are most often performed on blood and urine, but on occasion the same tests can be performed on other body fluids such as the cerebrospinal fluid, joint fluid, or effusions in the abdominal, thoracic, or other cavity.

Blood tests are performed usually in batteries, or panels, known as sequential multiple analysis (SMA-6, SMA-10, SMA-12) (Table 1-1).

Blood may be submitted in tubes that either contain anticoagulants or do not contain anticoagulants. The tops of these tubes are color-coded to avoid confusion. Blood collected into a tube