This book is about clinical biochemistry. This term conveys two things: first, that the subject is about patients and patient care, and second, that it uses chemical or biochemical methods to investigate disease (Fig. 1.1). Other labels, such as clinical chemistry, chemical pathology, pathological biochemistry and biochemical medicine, also all attempt in different ways to convey this. The vast majority of patient samples sent for biochemical analysis are blood and urine, largely reflecting the relative ease with which they can be collected. Clinical biochemistry is a ‘high-throughput’ laboratory specialty – it accounts for approximately one-third of all hospital laboratory investigations.

### The use of biochemical tests

Biochemical tests are widely used to diagnose disease and monitor treatment, so if a patient is having a blood test done, there is a good chance that at least one of the specimens collected will be sent for biochemical analysis. For example, someone with suspected viral hepatitis will likely have blood sent (to a virology laboratory) for viral serology but will also have blood sent to the clinical biochemistry laboratory to assess the degree of liver damage caused by the virus. Less common uses for biochemical tests include screening for disease and assessing prognosis (Fig. 1.2).

### Core biochemistry

Even fairly small hospitals usually have a biochemistry laboratory facility, reflecting the widespread use of biochemical tests. Some tests are more commonly requested than others and are sometimes referred to as ‘core analyses’, reflecting the fact that the provision of these tests is seen as a core function of the clinical biochemistry laboratory. Table 1.1 lists some of these tests.

### Specialised tests

Other tests are less commonly requested, or more difficult to measure, or both, and are not performed in every biochemistry laboratory. Such specialised tests are usually sent to larger departments which may handle specimens from an entire region or even country. These tests are often grouped together. For example, hormones – substances produced by one part of the body that act on another part – are usually grouped together in laboratories. This is partly because the methods used to measure them are similar.

### Urgent samples

Some biochemical tests are considered so important for diagnosis and management that they are provided around the clock, i.e. at
night and at weekends, as well as during ‘routine’ hours. These tests sometimes need to be performed urgently, so all clinical biochemistry laboratories provide facilities or processes that allow for this, e.g. larger hospitals may have laboratory facilities away from the main laboratory, such as in the theatre suite.

Automation and computerisation

Once a sample is received in the laboratory, nearly all of the steps involved in processing it involve some degree of automation or computerisation. For example, the request form may be a simple barcode on the specimen that contains all of the necessary information. After that, the sample may be put onto a ‘train-track’, which conveys it to the centrifuge (where the heavier cells are separated from the lighter plasma), and then to the analyser, which will perform all of the requested tests. The results produced at the end of this process are then usually communicated electronically to the requesting clinician.

Clinical note

The clinical biochemistry laboratory plays only one part in the overall assessment and management of the patient. For some patients, biochemical analyses may play little or no part in their diagnosis or the management of their illness. For others, many tests may be needed before a diagnosis is made, and repeated analyses may be required to monitor treatment over a long period.

Test repertoire

Hundreds of different tests are carried out in clinical biochemistry laboratories. The technology involved varies in complexity and, crucially, in how easily it can be automated. Tests such as sodium and potassium are easily automated and are performed in high volume on automated analysers.

Others, such as screening for drugs, identification of intermediary metabolites or differentiation of lipoprotein variants, involve technology that cannot be easily automated and require a high degree of staff involvement in the measurement process. Some tests are measured using commercially prepared reagents packaged in ‘kit’ form. Rarely, analyses are carried out manually (Fig. 1.3).

The focus of this book is on how the results of biochemistry analyses are interpreted, rather than on how the analytes are actually measured in the laboratory. Advances in analytical methodology and in our understanding of disease continue to change the test repertoire of the biochemistry department as the value of new tests is appreciated.

Laboratory personnel

As well as performing the analyses, the clinical biochemistry laboratory also provides advice to clinicians on how to make best use of the service. Medical and scientific personnel are familiar with the clinical significance and the analytical performance of the test procedures and will readily advise on the interpretation of the results. Do not be hesitant to take advantage of this advice, especially where a case is not straightforward.

Want to know more?

Lab Tests Online UK: http://labtestsonline.org.uk/
Written primarily for patients, this website provides a very useful database of laboratory tests, explaining why each test is carried out and what the result means. Laboratory tests from all of the main laboratory disciplines (including clinical biochemistry) are included. A mobile app is also available.

http://acb.sagepub.com/content/50/3/285.full.pdf+html
A personal look at the impact of automation on clinical biochemistry. It gives a glimpse into how hospital laboratories worked before the era of automation.