

Laboratory medicine: a guide for foundation doctors

Introduction

As increasing pressure is placed on the medical school curriculum, many foundation doctors will begin their first jobs with little or no formal training in the disciplines making up pathology. However, a large part of the work done by foundation doctors involves organizing and interpreting diagnostic tests and using their results in the clinical context to trigger further investigations or treatment.

A large proportion of illnesses treated in hospital require some form of laboratory diagnostics and it is often easy to overlook the knowledge resource the laboratories offer, in addition to simply producing results. This short article reviews the facilities available to foundation doctors from the laboratory medicine disciplines found in the majority of hospitals – notably clinical biochemistry, haematology, immunology and microbiology. Additional more specialized services such as neonatal screening and genetics tend to be more centralized on a regional or sub-regional basis, and are not included here, although the same principles described below do apply. Similarly, the work of the cellular pathologist – histopathologist-cytologist-forensic pathologist and post-mortem related work are examined separately.

How are the laboratories organized?

Most hospitals will have a directorate of pathology which incorporates all of the pathology and laboratory medicine disciplines. Depending on the size of hospital and departments, these may be organized into entirely separate areas or buildings, or alternatively may be grouped within one area, and several disciplines may work out of the same laboratory space. It is becoming increasingly common to find single large laboratory areas shared by biochemistry, haematology and microbiology, operating either as independent departments within the area, or, particularly in some

smaller hospitals, working as multidisciplinary laboratories. Each will normally be led by a consultant-level member of staff, who in several disciplines will exclusively be medically trained, although in others, notably clinical biochemistry, medically qualified consultants and consultant clinical scientists will work together and either may run a department.

Many departments will have one or more medical staff in training (several in the case of some larger teaching hospitals) and in some disciplines (again notably clinical biochemistry) the departments are also supported by scientists in training (grade A) or at a more senior level (grade B).

The technical work of specimen preparation, sample analysis and monitoring the different quality controls during tests is normally performed by biomedical scientists, previously known as medical laboratory scientific officers (MLSO), who have been historically responsible for the technical aspects of testing. Increasingly the skills of the biomedical scientist are being deployed more widely to support, for example, specialist clinics and point of care testing (near patient testing), with increasing clinical emphasis. The biomedical scientists are supported by medical laboratory assistants (MLAs) whose responsibilities and defined competencies are more restricted, but who are invaluable and help with a great deal of preparatory work under supervision.

What does the laboratory do?

The repertoire of tests offered by laboratories varies depending on laboratory size and the regional facilities which are available. Most acute hospitals will offer a range of tests covering the great majority of diagnostics required in everyday practice, but some of the more specialist tests, such as certain tumour markers, analysis of haemoglobin variants, specific microbiological antigen testing and more specialized autoantibodies, may be referred to other laboratories.

Doctors in training will find it extremely helpful to pay a brief visit to their laboratory or look through their laboratory's handbook to get an idea of what tests

the laboratory does not do locally, and therefore those which may take longer to obtain results. These handbooks, many of which are now on-line on trust intranets, contain valuable information about how the laboratory operates and about the tests they perform.

What do I do when I am on-call?

Historically, laboratories opened from 9.00 am till 5.00 pm and the rest of the day was 'on-call', a time when a biomedical scientist would either come in from home or be resident to do urgent tests. Increasingly, laboratories are moving towards shift systems, where a member of each discipline (or one person for small multidisciplinary laboratories) is resident out of 'routine' hours and available to do tests any time. Laboratories will usually have lists of routine tests available on request at any time and other tests which, for medical or technical reasons, require approval by a more senior member of the laboratory. The decision to restrict some tests for higher level approval is based on a combination of clinical need, resource and technical availability, and is not because the laboratory consultant or others are trying to be difficult.

Understanding how the laboratories work

Laboratories will all differ slightly in their routine opening times, the blood collection systems they use, their systems for obtaining results (telephone or computer) and their requirements for completing laboratory forms and specimen bottles. Laboratories also use different analytical methods for certain tests, which may have significantly different reference ranges.

Although considerable efforts are being made nationally to standardize these areas, doctors in training will find it extremely helpful if they learn that the peculiarities of their own hospital laboratories – being able to use computerized patient records or the laboratory computer results service if available, can save enormous amounts of time compared to waiting on the telephone. Knowing the best times to have samples delivered for speedy results will

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save frustration. Understanding what specimen types to send for specific tests will avoid needless repetition. An occasional visit to the laboratory and getting to know and meeting members of staff always makes things easier in the long run.

Using the laboratory as a knowledge resource

Apart from producing results which are hopefully accurate and timely, the most important function the laboratory offers is a source of knowledge. Interpreting test results in the clinical context, knowing which tests to request and what action to take faced with the result, can all be difficult. For example, taking a sample for digoxin measurement at the wrong time can produce spuriously high results, and topping up an inadequately filled blood bottle for biochemistry tests with some blood from a haematology full blood count bottle will invalidate much of the biochemistry. The presence of micro-organisms in a urine specimen does not necessarily indicate infection and the choice of antibiotics in a case of infection will often be driven by local sensitivity and

resistance patterns. Because diagnostic tests are so intricately involved with the investigation and management of illness, anyone with a good understanding of how to use and interpret these tests will find themselves well-placed for their foundation years.

There is a wealth of information contained within the laboratories and all laboratory consultants should see education as an integral part of their job, whether this is through formal education sessions in a foundation programme or better still from receiving and answering questions from doctors in training (and we are all still in that position).

It is a pity that less and less laboratory medicine appears to be being taught at medical student level but the author's own experiences suggest that when he has

taught foundation doctors, they have found laboratory medicine to be far more clinically relevant to their jobs and to medicine in general than they perhaps originally thought.

Conclusions

The laboratory medicine specialities are invaluable knowledge resources as well as result engines. Sometimes this can be overlooked by the busy doctor in training when so much needs to be done. Knowing how the local laboratories operate and establishing contact with laboratory staff will help enormously in the early years of medical practice. **BJHM**

Conflict of interest: Dr Smellie has received various small honoraria from diagnostic and pharmaceutical companies for giving talks on laboratory organization, management and use of tests.

KEY POINTS

- Organizing and interpreting laboratory tests constitutes a large part of a foundation doctor's job.
- Effective test organizing needs knowledge of how the laboratory operates.
- Consultants and laboratory staff are a valuable knowledge and teaching resource for foundation doctors.
- Go to your laboratory and meet the staff – your life will be easier as a result.