

# Pathology in education and practice: a time for integration?

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## Abstract

While there has been a strong history of pathology in understanding disease, in recent years we have seen less appreciation of the value of pathology in clinical practice. Divisions at the clinical level, with pathology delivered from isolated buildings at the periphery of hospitals rather than within the heart of it, confirms in the mind of the new graduate the lack of importance of the discipline, despite using the service daily. We argue that it is time for a reintegration of pathology services.

**Aust Health Rev 2008: 32(2): 319–321**

**PATHOLOGY IS THE STUDY** of the mechanisms of disease. Literally translated, it is the study of suffering (*pathos* — suffering; *logos* — study). It encompasses disease causation (aetiology) and the subsequent natural history of that process (pathogenesis).<sup>1</sup>

The principle of disease causation was long grounded in concepts of humoral imbalance. Hippocrates, living and writing around 400 BCE and an acute observer of clinical disease, popularised this hypothesis which was reinforced by Galen, the physician to Roman gladiators and subsequently to the great Stoic philosopher, the Emperor Marcus Aurelius in the first and second centuries CE. Despite his pagan origins, Galen's

backing by the church made him an unassailable medical authority for centuries, perpetuating the humoral theory of the basis of disease.

Things began to change when the great artists, such as Leonardo da Vinci (1452–1519) wished to extend their knowledge of human anatomy by cadaveric dissection. Leonardo's contemporary, the physician Antonio Benivieni (1443–1502) used post mortem dissection to investigate the causes of his patients' deaths and published a book entitled *De abditis morborum causis* (the hidden causes of diseases). The father of the modern autopsy however was Giovanni Morgagni (1682–1771), professor at the University of Padua and a student of Valsalva, who in turn was a student of Malpighi. What set Morgagni's contribution apart was his correlation of over 700 autopsies with clinical history and pathological manifestations of the disease.

Slowly, knowledge of changes in the human body produced by disease increased and by the 1800s autopsies and the study of gross pathology were well established. Although van Leeuwenhoek had discovered the microscope in the 1600s it was apparently not used in pathology until Rudolf Virchow (1821–1905) began to study the cellular basis of disease. The clinical practice of medicine, the study of illness and healing, and pathology, the study of disease, became inextricably entwined.

John Hunter (1768–1793), surgeon to St George's Hospital, London made huge contributions to surgery and pathology through his experiments investigating diseases in man and animals. He observed the healing of his own Achilles tendon after rupturing it jumping off some stairs, and subsequent experiments in dogs made him aware of the process of inflammation, healing and repair with scar formation. He demonstrated collateral circulation, probably carried out the first

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artificial insemination, and is of course famous for his dissection of the Irish giant, Charles Byrne.

### **The importance of autopsy**

The great physicians of the early 20th century, such as Sir William Osler were as at home in the autopsy room as they were in the hospital ward, and Osler often followed his patients from the latter to the former. Osler not only made pathology an integral component of the curriculum in his medical school at Johns Hopkins but also insisted that his senior colleagues carry out their own post-mortem examinations. As he put it, “tracking the necrotic footprints of their own missteps” would teach them lessons far more memorable than any text could. Osler recognised the true role of the autopsy — “to see for one self”.

Flexner, in his report about the state of medical schools in North America (1910),<sup>2</sup> emphasised the need for integration of understanding of clinical medicine and pathology, and the discipline of pathology became an important part of the undergraduate curriculum in the United States, as it already had in Europe.

With the increasing rise of specialisation, clinical medicine and pathology, began to take divergent paths. Despite this, the pathologist had significant experience in clinical medicine before beginning specialty studies and the clinician had significant undergraduate, and sometimes post-graduate, experience in pathology. Each understood the other’s language. Although this has declined significantly, it is worth emphasising that pathology is still the fabric that holds clinical practice together. It is difficult to envisage a surgeon today excising a breast mass or doing a laryngectomy without preoperative diagnosis and support from a frozen section service intra-operatively. The oncologist is unlikely to know which chemotherapy to give or how and where to radiate without information provided by pathologists. Investigations involving chemistry, haematology, microbiology and immunology are the foundations on which all patients are managed. Although, increasingly, hospitals throughout the

world separate pathology from the heart of hospital structures, it remains the core discipline that underpins the work.

### **Changes in medical education**

Times have also changed in medical schools. In Australia, and in many other countries, the introduction of shortened postgraduate medical courses, problem-based learning and the laudable desire to improve practitioners’ communication and ethical skills have led to de-emphasis of an understanding of disease processes, and pathology content has declined in the medical curriculum. The autopsy is no longer a major feature of undergraduate training, and pathology museums have either been converted into store rooms or decimated in order to use the space for generating revenue. With increasing age and debt at graduation from medical school there are powerful forces pushing young medical graduates into choosing their areas of practice early and minimising duration of training. Thus young doctors may enter pathology training after internship and those selecting more clinically focussed careers have no time to increase their knowledge of pathology. Hence, the vicious cycle has been set up. New doctors, having less exposure as students, do not appreciate the value of pathology in clinical practice, and the divisions at the clinical level with pathology delivered from isolated buildings at the periphery of hospitals rather than within the heart of it, confirms in the minds of the new graduate the lack of importance of the discipline, despite using the service daily.

There is a rapidly escalating shortage of pathologists, and academic pathologists are almost extinct. While the reasons for this are undoubtedly multiple and complex it is likely that decreasing exposure to pathology at medical school and in prevocational training is contributing to this shortage.

Autopsy rates have been declining in most countries since the 1960s. The reasons are again complex, including an unjustified confidence among physicians and surgeons in the clinical cause of death, reluctance of senior staff to seek

consent (it is the job of the most junior resident), unfavourable press reports linked to tissue and organ retention, and a shortage of pathologists and pathology services including mortuary facilities. It seems however that autopsy rates can be increased by simple measures such as communication training, involving treating clinicians in discussions with relatives, and instituting clinico-pathological meetings where autopsy results are presented.<sup>3</sup>

Declining autopsy rates not only reduce educational opportunities for health care students and practitioners but also remove an important quality assurance tool. Autopsies reveal major diagnostic errors in about 30% of cases, despite the huge innovations in diagnostic radiology — information that could be used to improve patient care. The information is not only useful at the local level due to the clinico-pathological correlation and discussion among doctors involved in the patients care, but has far reaching consequences related to changing the mortality statistics (based on death certificates) and hence planning future public health measures for the whole nation.

### Recommendations for the future

There is however some good news. The Royal College of Pathologists of Australasia and the Royal Australasian College of Physicians have developed combined training programs in haematology, microbiology and immunology, and more recently in chemical pathology. Trainees gain experience and dual qualifications in the clinical and laboratory aspects of their practice.

We believe that there are cogent educational and quality assurance arguments for increasing exposure to pathology at undergraduate and post-graduate levels. We also believe that pathologists,

whether in training or in practice, would benefit from increased contact with clinical practice. In the 1960s the then Brisbane General (now Royal Brisbane and Women's) Hospital found funding for medical registrars to spend up to 12 months in autopsy practice. These young doctors carefully reviewed the clinical notes and reported on gross and microscopic pathological findings of up to 200 autopsies each per year. Autopsy rates were relatively high and Pathology Grand Rounds with their combination of clinical and pathological presentations were the most popular educational meeting of the week.

Reintroduction of such a scheme that allowed true integration of specialities would have many benefits. Firstly, if coupled with the simple measures known to increase autopsy rates, a potent educational resource would be established in teaching hospitals. Secondly, a major quality assurance measure would be reinstated. Thirdly, new generations of clinicians would be exposed to gross and microscopic pathology, perhaps increasing recruitment into a rapidly dwindling specialty. Lastly, physicians, surgeons and pathologists would build solid professional links, with great benefit to clinical care.

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(Received 5/09/07, accepted 31/01/08)

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