Why teach human anatomy at Otago School of Medical Sciences?

Robin Fraser

Thorough teaching of human anatomy is the core undergraduate business of the University of Otago’s Department of Anatomy and Structural Biology in Dunedin. This may seem a routine and, in this modern era, an unexciting exercise; however, (as reported in this Journal issue) the Department’s careful enquiries into the profile of body donors, reasons for donating, and changes in motivation over many years, indicates their contemporary commitment to this essential training of our undergraduate students in normal structure.¹

Otago, by an accident in history, has an archive of valuable and historic anatomy and other medical books and manuscripts in its Medical Library, most of which originally belonged to one or other of three men; father, son, and grandson, each called Alexander Monro.² These men in succession, over a period of 126 years from 1720 to 1846, held the Chair of Anatomy at Edinburgh University. They were also responsible for the teaching of surgery. Thus the importance of structure, function, and healing go back over the centuries, from Edinburgh (in the north) to Dunedin (the Edinburgh of the south).

This legacy came to our Medical School via the great grandson, David Monro, a doctor-turned-immigrant farmer and politician in Nelson, New Zealand, who had inherited the collection and donated it to his friend and son-in-law, the Edinburgh-trained explorer, naturalist and surgeon Sir James Hector, Founding President of the New Zealand Institute (later the Royal Society of New Zealand) and Chancellor of the University of New Zealand.³

Hector, who first was employed in New Zealand in Otago as a geologist, passed this treasure to our Dunedin Medical School. Emeritus Professor Douglass W Taylor, (a physiologist, so representing function) is the current guardian of this priceless collection, which has surely influenced our current morés of our University’s teaching and research.

I am biased towards structural anatomy, being both an experimental and anatomical pathologist by profession. I tell our students that they must know the normal to explain the abnormal anatomy and physiology in the understanding of the pathogenesis or step-by-step changes leading to disease from abnormal structure and function. These include the smallest of structural changes, such as an individual amino acid, so changing the shape of a vital protein such as alpha-1-antitrypsin leading to emphysema and cirrhosis.⁴

It is now known that similar conformational changes in proteins lead to other genetic diseases, such as some dementias.⁵ On the larger scale, changes to the sun’s structure and function, such as a decrease in sun spots, led to the little Ice Age of 1645 to 1715 and probably the increase in scurvy in Europe from the death of citrus trees.⁶
University teaching by statute is research-based, as well as being a vocational apprenticeship in our Faculty.\textsuperscript{7} The Dunedin anatomists must believe also in this—as evidenced in their well-known diverse research on anatomical ultrastructure, molecular biology, effect of hormones on structure, function and behaviour, as well as the gross dissection of human corpses.\textsuperscript{1,8} The recent documentary Donated to Science produced in the Dunedin Department and recently shown on TV3, depicted the altruistic behaviour of the donors as well as our students’ mature and compassionate learning, which augers well for the nation’s future medical care.\textsuperscript{9} I noted in the documentary an important aspect was the Otago University’s regional thanks to the relatives of those who had donated, yet in their current paper some donors are reported that they did not wish a fuss over their own death.\textsuperscript{1} This documentary may solve both family and donors’ wishes?

In summary, the Human Anatomy course in Dunedin in my opinion is superb and will equip our students to be knowledgeable about structure as well as function and to be thoughtful doctors, surgeons, and medical scientists. In our own field of research in Christchurch, structure and function are supreme. The ultrastructural filter of the liver fenestrated sinusoids (liver sieve) has been shown to control hepatic metabolism of cholesterol and triglycerides in lipoproteins so affecting diseases as diverse as atherosclerosis, and cirrhosis.\textsuperscript{10} In the United States, recent experiments on the filtration of adenovirus vectors (carrying factor IX genes to hepatocytes to cure haemophilia)\textsuperscript{11} and lipoid nanoparticle vectors (transporting siRNA to inhibit the formation of mutated or foreign proteins in hepatocytes to suppress genetic diseases such as amyloidosis, some cancers and of hepatitis C) have been shown to be dependent on the relative diameter of the vector to that of the fenestrae in the liver sinusoid.\textsuperscript{12} Decreased fenestral diameter may also decrease immune tolerance to hepatocyte derived proteins. These are examples from our personal medical research interests stressing the importance of structure and function in the treatment and understanding of the pathogenesis of disease.

Long live the teaching, understanding, and research into the relationship of structure and function. We give thanks for our early instruction made possible by our beneficent body donors.

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