

# The state of gross anatomy

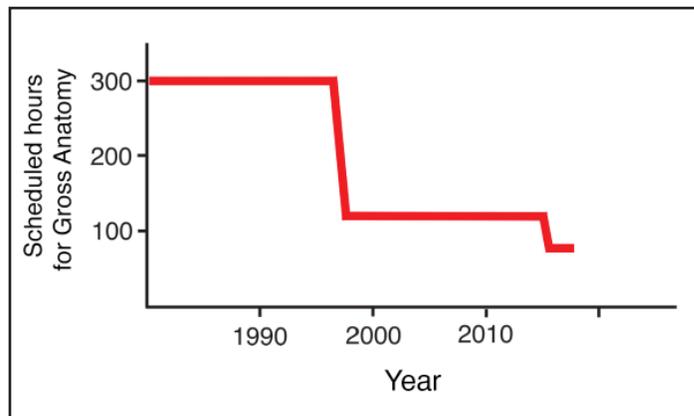
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Citation: UBCMJ. 2017; 8.2 (4)

“To dissect or not to dissect?”—that is the question. Although students in many medical schools are still exposed to at least some dissection as part of the process of learning Gross Anatomy, curriculum leaders are increasing the pressure on faculty to replace dissection with alternative methods such as prosections (professionally dissected isolated body parts) and various forms of digital media. In part, this pressure is the result of an increase in breadth of content related to medical training, changes in curricular design, and the high costs associated with running dissection laboratories.

At the University of British Columbia (UBC), our Gross Anatomy program has dramatically changed since the early 1980s when the discipline was a course of around 300 scheduled hours and ran three half days a week for the entire first year. When we transitioned to a blended Problem-Based curriculum in the late 1990s, all basic science courses were eliminated as stand-alone courses and Gross Anatomy was integrated into systems blocks that ran for two years. The total time for the Gross Anatomy program was decreased to around 120 scheduled hours (Figure 1). Although Gross Anatomy was still taught with lectures and dissection laboratories, the way in which the material was covered changed. Gone were the more traditional anatomy lectures where one emphasized the anatomy itself and structures were learned in-depth. In the newer curriculum, excessive detail was removed and sessions were focused on providing concepts of body design, presenting overviews of regions, and covering major clinically-relevant details. Dissection remained the primary method of learning; however, dissection sessions became more focused on meeting specific objectives. Prosections were included to illustrate material that was too difficult to dissect within the scheduled time constraints, or to illustrate certain concepts. Many of the dissections were “anchored” by specific activities that had significant educational value and long lasting impact. What student will ever forget opening the skull and seeing how tightly the dura mater adheres to bone, and seeing the brain and cranial nerves for the first time? Who could forget opening the vertebral canal, seeing the spinal cord and discovering that the cord does not extend the entire length of the vertebral column, or opening the thorax and seeing the heart and lungs for the first time, and discovering how “thin” the diaphragm is? Lectures and laboratories emphasized structure/function relationships and clinical significance rather than detailed anatomy. In the older traditional curriculum, the answer to the question, “What do I need to know?” was simply “Everything!” In this newer curriculum, the answer became, “It’s in the learning objectives and in the laboratory checklist.” Other changes that have impacted our gross anatomy teaching over the years have been an increase in class size from 120 in the early 1980s to almost 300 students at present, and our transition in the early 2000s to a distributed program where all students are present at UBC for the first three months and then cohorts move to three additional satellite campuses around the province for the remainder of their medical undergraduate training. We have anatomy laboratories and faculty at all sites and deliver interactive lectures and pre-lab talks to all sites via videoconference to large screens.

Our current curriculum, implemented in 2015, is Case-Based, where content is focused around the clinical case of the week. Total Gross Anatomy time over the first two years has been further reduced to approximately 70-80 hours (Figure 1). Lecture sessions on Diagnostic Imaging usually occur immediately after the lectures on Gross Anatomy, and imaging sessions are now included in the laboratories, many of which have been reduced from three to two hours. Certain Gross Anatomy content and dissection laboratories have been entirely deleted, and those



**Figure 1** | Total scheduled hours of Gross Anatomy over the first two years of medical education from the 1980s to present.

that remain have been further refined to concentrate only on “significant” structures and on material “relevant to the case of the week”. Although time is limiting, we have retained dissection as the cornerstone of learning. At each table, a group of six students participate in revealing the structures indicated by faculty, and in discussing the significance of their findings amongst themselves and with laboratory instructors and teaching assistants. Anatomy observed in the cadavers is correlated with “state of the art” imaging presented by radiologists at the new Sectra Visualization Table that enables three-dimensional reconstruction, rotation, and dissection of structures from CT and MRI data sets

The use of information technology has been embraced by faculty. Numerous digital resources, including online modules and videos, are being created to augment student learning. Interestingly, the use of high definition digital cameras in the lecture theatres has made “something old new again”. Drawing and writing on the blackboard is captured in real time by the cameras and projected onto large screens so that even learners sitting at the back of the room, or at distributed sites, can see what is being done. In addition, most lectures are recorded, and PDFs or PowerPoint copies of lecture materials are made available on the student portal website prior to the presentation so that students can add notes to them on their mobile devices during the lecture. High definition cameras together with monitors in the gross anatomy laboratories enable instructors to orient students to the dissection during pre-lab talks and also to videoconference the talks to distributed sites.

My answer to the question “to dissect or not to dissect?” is a resounding “to dissect”. In my opinion, none of the current digital forms of anatomy resources, including computer-based dissection programs, visualization tables, and virtual reality tools adequately replace the educational value of dissection laboratories. Also, for ethical, budgetary, and educational reasons, the use exclusively of prosections for 300 students spread across four sites is not a viable alternative to dissection. Digital resources and the selective use of prosections within the context of students using “intact” cadavers certainly augment dissection, but they do not replace it. There is so much more to developing a “working knowledge of anatomy” than simply memorizing a list of terms or identifying structures on pre-dissected isolated body parts, and much of this development occurs in the dissection laboratory. I believe we are at a critical time threshold required to do the minimal amount of dissection that results in a “professionally useful” working knowledge of anatomy. Any further reduction in scheduled time will compromise the respectful and ethically appropriate dissection of cadavers by students, and will likely result in the adoption of alternative and much less time-effective, cost-effective and learning-effective means of presenting the discipline. My response to those that argue we can no longer afford “to dissect” is that we cannot afford “not to dissect”.

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