

Could you have learned
from a computer
 what you learned from your
anatomy professor?

EDITOR'S NOTE

In her "From the Dean" column published in the spring 2004 issue of *Buffalo Physician*, Dr. Paroski talked about how technology is changing medical education. In particular, she focused on Gross Anatomy, a course medical students have always viewed as a "rite of passage."

In closing, she posed the following dilemma and question to readers: "In a world that increasingly focuses on the cellular and molecular level, fewer and fewer individuals are being trained as classical anatomists. My colleagues have told me not to worry—surgeons can teach anatomy. Some say there is no longer a need to dissect cadavers, as computerized virtual dissection programs do the job in a more efficient, uniform and odor-free fashion.

"Part of me embraces new technology. Another part of me says it can never replace what I learned hands-on, dissecting my cadaver freshman year. What do you think? Could you have learned from a computer what you learned from Dr. O. P. Jones, Dr. Frank Kallen or Dr. Charles Severin? Are computer-based programs sufficient? Or should dissection of a cadaver remain an integral part of medical education? Please send your thoughts on this topic and memories of your Gross Anatomy experience to me at paroski@buffalo.edu."

Following are responses Dean Paroski received.

—S. A. Unger

Responses to the Dean's Question

LEARNING FROM A "LARGER-THAN-LIFE" CHARACTER

The obituary for E. Russell Hayes, PhD, retired Distinguished Anatomy Professor, in this morning's *Buffalo News* (see also page 33) and your recent column "From the Dean" have caused me to reflect on the Anatomy Department of the late 1950s, and that larger-than-life character Oliver P. Jones!

He was a "wonderment!"—combining the austere mien of a John Houseman in *The Paper Chase* with the benign grandfatherly attitude of a Walter Brennen in *The Real McCoys*.

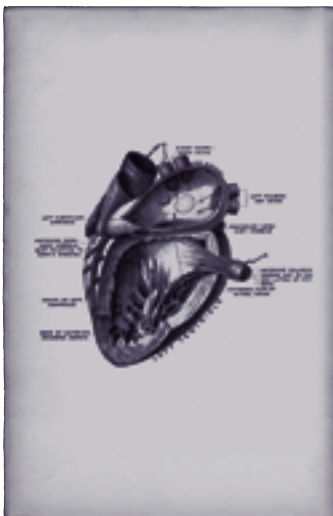
Knowing that he was a world-renowned hematologic morphologist, chairman of the Anatomy Department, the former dean of admissions and reputedly unflinching in his discipline toward unprepared medical students gave us an impending sense of awe and dread. His vaunted Saturday morning recitation class is forever etched in the memory of each and every Buffalo medical student privileged to have been present.

Someone at our dissection table garnered a score of ninety-nine on the first practical anatomy quiz, and when presented with the results, looked a trifle disappointed. Dr. Jones, with a twinkle in his eye, told the young man, "We put the last medical student who got a hundred in the loony bin." Everybody roared in mirth, and the medical student learned not to take himself, or his situation, too seriously.

About a week prior to Thanksgiving, Dr. Jones called each of us into his private office to discuss our progress in the course. He had by then assessed answers in recitations and on quizzes, listened to comments from staff and synthesized his own keen observations of our accomplishments, attitudes and deportment. He was unsparing of the truth as he saw it, and many students first felt "the fear of the Almighty" in those sessions.

Many years later, after becoming a

FIG. 427



surgeon, I was privileged to dine with him. A cocktail I imbibed at the reception prior to dinner inordinately loosened my tongue, and I blurted out: "Dr Jones, you scared the 'p—' out of me!" He smiled and said, "Yes, I know, but you really learned anatomy!"

It was his philosophy that a modicum of anxiety is helpful in the acquisition of knowledge, for without that stimulus we become complacent and not as amenable to learning.

Whether computer software in demonstration of human anatomy for medical students replaces the classical rigors of dissection is still to be proven. But none of those modalities will ever replace the influence of a truly great and gifted teacher such as our Distinguished Professor of Anatomy, Oliver P. Jones!

MARVIN Z. KURLAN '64, MD, FACS

THE FIRST OF THE BONDINGS

You've got to be kidding! First-year of medical school without the sights and smells of [Gross Anatomy Laboratory] and father-like figures such as O. P. Jones—unthinkable! Actually, much more than the learning of anatomy took place at the dissecting table. We lost a couple [of students] who decided within the first week that this simply was not their "cup of tea." This was the first of the "bondings" that were to sustain at least some of us through the rigors of the first two years. We really got to know our "tablemates" and, by virtue of the hours spent on the subject of anatomy, these folks tended to support each other in other classes as well.

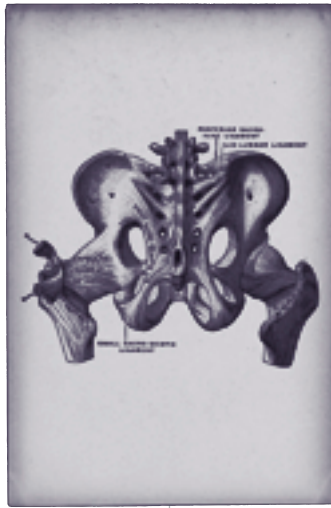
Hands-on cold-body surgery also helped start the career selection process. Some were fascinated, some tolerated it, and others intensely disliked this phase of their practicum. We could definitely pick out those destined to become surgeons; the rest of us were to wait for exposure to other fields of medicine.

I certainly would like to have had access to computerized virtual dissection programs during my initial foray into medicine, but the stench of formaldehyde at the "table" will remain



FIG. 164

FIG. 248



in my memory bank forever. You are right—this was the first true medical school course. It seems that by just relying on computers alone, the first year of medical school would lack the drama of getting your own (shared) body from cold storage and making those first, oh-so-tentative incisions with that newly purchased scalpel.

DON HAULER, MD '57, MPH '67

NO REPLACEMENT FOR A KNOWLEDGEABLE TEACHER

I'm a retired pediatrician who practiced for 35 years in Kenmore, New York. My primary hospitals were Buffalo Children's, Kenmore Mercy and DeGraff. I graduated from UB Medical School in 1946, and Dr. O. P. Jones was my anatomy teacher. I can't imagine learning anatomy from a computer instead of from a knowledgeable teacher like Dr. Jones. One has to get the feel of dissecting the body itself to really find out what it's all about. Maybe I'm old-fashioned, but I believe some of the high-tech ways of replacing the way we used to learn do not stay with you as well as the old ways did.

ALAN RECKHOW, MD '46

DR. O. P. JONES'S LEARNING THEORY

It was toward the end of anatomy class in early 1969. Dr. Jones had just given my cadaver group a very intimidating lecture that had our neighbors cringing. Shortly afterward, while I was walking in the hall, Dr. Jones approached me and said, "Don't take it personally, Mr. Hoffman (my memory tells me he always called us 'Mr.'). "It's just that a certain level of anxiety is necessary to maximize learning."

As I walked away, I wished I'd had the guts to tell him, "I agree, but you and I disagree vastly on how much anxiety is needed and how much interferes."

MARTIN HOFFMAN, MD '72



FIG. 732

TOO MUCH TV AND NOT ENOUGH PLAY OUTSIDE?

I am a psychiatrist in full-time private practice in Albany, New York. I read with interest your column in the spring 2004 issue of *Buffalo Physician* regarding Gross Anatomy and would like to share with you some thoughts on the issues you raised.

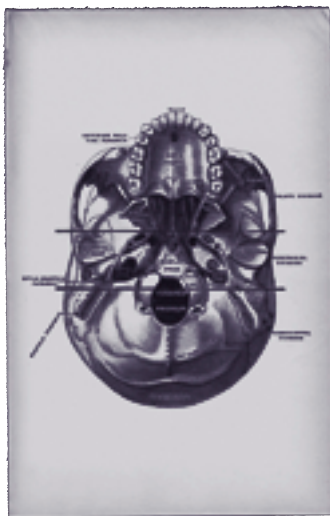
I would hope that any considerations to replace Gross Anatomy with computer-generated learning programs are being quickly dismissed as woefully misguided and, ultimately, dangerous.

Being one of those students who knew that I was going to be a psychiatrist prior to entering UB Med, I approached Gross Anatomy with a mixture of fear, curiosity, revulsion and horror. However, once in school I was able to set aside these feelings and approach the course with a healthy interest for two reasons: I wanted to complete it as a "rite of passage" toward becoming a physician, and I wanted to satisfy my intellectual curiosity. To this day, I recall little of the content of my learning as regards the names of muscles, nerve locations, arterial supply and so on. However, the emotional impact of my experiences is what has remained, and this has been very influential in fully developing my identity as a physician.

I fail to see how computer-generated programs can possibly replace the complex learning experience that Gross Anatomy presents for integration. While such software may be able to structure visual information that can be directed to a student's retina, there's no way it can replace the immensely powerful experiences students encounter in the course, from first entering the lab and seeing a room full of metal coffins—knowing that each contains remnants of a human life donated to them so that they could learn and heal others—to the awesome amazement of actually seeing and carefully deconstructing how the human body is put together.

I must say I am concerned that this issue is even being seriously discussed. Those who would advocate for computer-generated teaching of Gross Anatomy seem to me to be similar to

FIG. 221



those who watch too much TV and don't actually go outside to play. By using not just our visual cortex to learn, but as many of the modalities of information intake available to us as possible, our learning experience is more comprehensive, touching on areas of growth and development that have implications far beyond the memorization of facts.

Thanks for your provocative article.

JAMES NALBONE, MD '95

AN IMPORTANT PSYCHOLOGICAL AND INTELLECTUAL STEP

I enjoyed your "From the Dean" letter in the spring 2004 *Buffalo Physician*. I graduated in 1973 and believe that we had similar experiences in the Gross Anatomy course.

Dr. Joseph Lee was another outstanding professor who assisted in the dissection, and he was greatly admired by the students.

Gross Anatomy was a unique course, remarkable for the intense emotions and large volume of material involved. I can still recall the Capen Hall top-floor dissection room.

The primary arguments for the discontinuation of the cadaver dissection include the reduction in the number of classical anatomists, the immense and rapidly growing volume of information in the overall basic-science curriculum and the effective instructional materials now available on the computer, such as touch-based virtual dissection software.

I lean, however, toward not eliminating the dissection. It's an important psychological and intellectual step on the journey to becoming a physician. The dissection also provides an understanding of anomalies, of human variation. I doubt that the glove or baton used in a virtual dissection can be as effective as the forceps and scissors in the development of light touch and fine motor skills, so essential for physicians.

How about instituting an abbreviated dissection course: maintain the didactic portion of Gross Anatomy as is, but alter the dissection to a semi-elective

pass-fail class, one month in duration? The first-year class could be divided into four sections: one-quarter to dissect the head and neck, one-quarter the thorax, one-quarter the abdomen and pelvis, and one-quarter the upper and lower extremities. Cadaver resources would still be fully utilized.

STEPHEN NASH, MD '73, MPH

IT'S A RITE OF PASSAGE!

I enjoyed your article and inquiry about computer-based Gross Anatomy. As a general surgeon who just completed his training, I can tell you that of all the surgical principles ingrained throughout medical school and residency, the two pearls that I consistently hold dear are "get good hemostasis" and "know your anatomy." Inevitably, these two simple phrases pay dividends toward performing successful surgical procedures and minimizing complications.

There's no doubt that surgeons can teach anatomy—we do it every day, to medical students, residents, each other, and various medical personnel. And there's no doubt that the virtual cadaver can be an efficient and odor-free adjunct to learning.

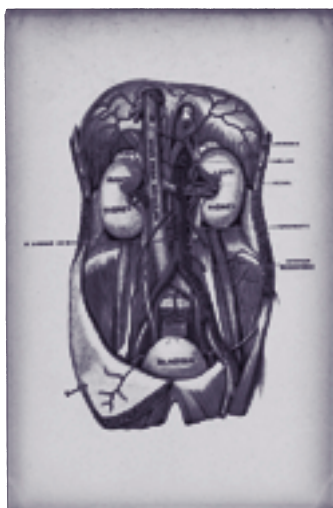
In my opinion, however, there is no substitute for the classical anatomist who is dedicated to teaching eager first-year medical students the "ins and outs" of the human body—literally, not virtually—in the Gross Anatomy Lab. Not only are these professors exceptionally knowledgeable, but they enthusiastically impart their knowledge and help expose areas of the body that some physicians (and surgeons) never again see in their lifetimes.

While many surgeons, including myself, would probably enjoy teaching anatomy, the fact of the matter is that most are too busy to give first-year medical students the full-time commitment that they both need and deserve. While we should certainly utilize virtual computer programs and surgeons to enhance the anatomy lab experience, we definitely need to preserve the classical anatomist as a fundamental pillar to medical student education.



FIG. 320

FIG. 470



I am sure there are some medical students who would have relished the idea of eliminating the lab entirely and would have opted for using the computer as anatomy professor. But I would also venture to guess that many of these same students would now say they developed an invaluable appreciation for the workings of the human body during their lab experience. And, given the opportunity, I bet some might even jump at the chance to return to the lab for yet another anatomy lesson!

Finally, we should not forget all the friendships (and rivalries) that stemmed from anatomy partnerships and teams, relationships that often helped build a sense of camaraderie amongst fellow students. Even today as I look back fondly on my med school days, I know that Gross Anatomy Lab is one of those key classes along the way that really inspired me to pursue a career in surgery.

Besides, let's face it, Gross Anatomy is definitely a rite of passage!

BRIAN DUFFY, MD '99

DR. KALLEN AND THE LAME WOLF

I'm an orthopedic surgeon who graduated from UB's medical school in '82. I'm writing because I read your column on Gross Anatomy, a topic I have thought about a lot.

As head of hand surgery [at Henry Ford Hospital in Detroit], I have taught orthopedic residents for many years. I have tried to be a mentor, sparking a love of learning, an interest in research and a concern for quality and compassion—things I regard as essential to patient care. The rare individual (perhaps one in 10) learns to embody these goals and—along with excellent manual and three-dimensional skills—becomes a great surgeon. The common denominators I've seen are a willingness to work hard and, not coincidentally, a solid knowledge of anatomy, not based on multiple-choice answers, but rather on an

expansive essay-style knowledge. High board scores are not a requisite for this type of knowledge. In fact, I've noticed that such scores might preclude these qualities and instead merely reward those students who are most adept at gleaming testable knowledge.

If you accept this theory, then you must ask, Why is a solid foundation in anatomy necessary for physicians (and other health-care professionals), along with the other essential qualities I mentioned?

This is why: Human beings are not two dimensional. An act as simple as putting in an antecubital IV, much less a subclavian line, requires an appreciation for depth, a concept that of course can be learned from high-quality virtual 3-D video-game software. However, appreciating the compliancy of a filled vein, the wiggly translatability of the vessel in the subcutaneous tissue, or the give of the toughness of the skin relative to the thin vein wall, and so on, is another matter.

Anatomy dissection teaches one to appreciate danger. Louis Pasteur said that "chance favors only the prepared mind." Only a surgeon who knows the normal anatomy is prepared to deal with anomalies or difficult situations, such as sudden unexpected bleeding, or a nerve that "shouldn't be in that position."

Anatomy is hands-on experience in medicine, gained without the trial and error that would harm a patient. In this way, the cadaver is actually providing the miracle of being our first "patient." The only harm we can do is to ourselves—and potentially to a patient later in our careers—if we miss the opportunity to learn from the cadaver dissection.

I never liked—and even feared—the environment of the Gross Anatomy Lab, with its formaldehyde-laden air and the feeling of being surrounded by death. However, the lab taught me that the body retains dignity, even in death, and can inspire us to think about the living with renewed respect.

Using 3-D computer simulation or 2-D atlases alone, rather than actual 3-D



FIG. 371

FIG. 571



cadaver dissection, is inadequate. It's analogous to looking at a map while sitting in the passenger seat as another person attempts to navigate a difficult muddy road on a dark night.

Too, I know that if I did not have the opportunity to attend one specific freshman anatomy lecture on upper extremity anatomy given by Clay Peimer, a hand surgeon, I may not have been inspired to go into the field that I love so well.

In closing, I will relate a UB med school anatomy anecdote. Several students and I played a joke on Dr. Kallen, who had done some comparative anatomy over the years and in one lecture had mentioned a wolf. At a used book sale I found a children's book titled *The Wolf and the Bone* (if I remember correctly). On its cover it had an illustration of a lame wolf carrying a femur as a cane. I bought the book and we anonymously shoved it under Dr. Kallen's office door, with a note saying something stupid like "Here's a new textbook you can use."

At the next practical exam, Dr. Kallen turned the tables on us. He brought the book and opened it to a page that showed the wolf limping. He placed an arrow next to the greater trochanter and asked what muscle attached there was responsible for the wolf's limp. He then asked if the wolf in the illustration was using the cane on the correct side to compensate for the limb that was injured.

Of course I got the answer wrong.

JOE FAILLA, MD '82

UNDERSTANDING AND RESPECTING BOTH LIFE AND DEATH

My husband and I are graduates of the Class of 1992 at UB's medical school, and we tell everyone that we met over a cadaver because we first met in anatomy lab on the second day of school. He was Colucci and I was Dlugozima, so our anatomy tables were right next to each other. He came over and started telling jokes and that was the beginning. Now, seven years of marriage and two kids later, we have very fond memories of anatomy lab!

We both agree that computers can contribute tremendously to our understanding of anatomy, but how can you substitute hands-on experience with a keyboard? How will we entice future surgeons into a difficult field without the thrill of seeing the body firsthand? How will we remember the work of medical pioneers without traveling down the same path of discovery?

How can we encourage other people to become great teachers without the example of amazing educators like Dr. Severin who simultaneously educate and inspire you?

Computers can never substitute these experiences. There are more than enough opportunities in med school to sit and have information spit out to you for you to absorb. Sometimes you need to be able to feel what you are doing and have the opportunity for self-discovery. Gross Anatomy provides that. Life and death are inseparable entities in our field and we need to understand and respect both. Gross Anatomy should stay.

MAUREEN DLUGOZIMA, MD '92

THE ABOVE ILLUSTRATIONS ARE REPRINTED FROM A TEXT-BOOK OF ANATOMY, EDITED BY FREDERIC HENRY GERRISH, MD, PUBLISHED IN 1899. THE BOOK IS PART OF THE UNIVERSITY AT BUFFALO'S ROBERT L. BROWN HISTORY OF MEDICINE COLLECTION, HOUSED IN THE HEALTH SCIENCES LIBRARY.

FIG. 402 - Muscles in front and side of neck.

FIG. 427 - Left auricle and ventricle, the hind wall of each having been removed.

FIG. 164 - The bones of the right hand, palmar aspect.

FIG. 248 - Articulations of the pelvis, rear view.

FIG. 732 - Vessels and nerves of the choroid and iris, seen from above. The sclerotic and cornea have been largely removed.

FIG. 221 - Base of the skull, viewed from below.

FIG. 320 - Muscles in radial region of right forearm, and deep muscles in its dorsum.

FIG. 470 - Abdominal aorta.

FIG. 371 - Muscles in the outer side of right leg and dorsum of foot.

FIG. 571 - Floor of the lateral ventricles. On the left side the vein of the corpus striatum is lifted up. The director is in the right porta. Dotted outlines indicate the position of the posterior cornua.