

**Behind the Curve of Medical Education: The Use of Animals for
Physiology Instruction at the Medical College of Wisconsin**

A Report by the Physicians Committee for Responsible Medicine

John J. Pippin, M.D., F.A.C.C.

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I. Executive summary

Twenty years ago, live dogs, cats, pigs and other animals were commonly used in physiology, pharmacology, and surgery courses at medical schools. A standard laboratory exercise involved anesthetizing an animal, injecting the animal with a series of drugs or otherwise manipulating its physiological responses, and performing various surgical or other procedures. These were known as terminal exercises, because the animals were killed while under anesthesia.

Today, more than 90 percent of medical schools in the United States have eliminated animal laboratories from their curricula. Advances in medical simulation technology and computer-based interactive learning, increased awareness of ethical concerns, and progressive curriculum reform recognizing the need for human-based learning are a few of the many factors that have contributed to the replacement of live animals in medical education.

Despite these imperatives, the Medical College of Wisconsin (MCW) has historically used as many as 120 dogs¹ per year in terminal exercises to instruct a first-year physiology course. As of the 2007-2008 academic year, and in response to intense public opposition to its dog lab, MCW has decided to use live pigs instead of live dogs for this physiology course.

Several aspects of MCW's continued animal use are particularly troubling: (1) MCW already owns four state-of-the-art human patient simulators specifically designed to replace animal use for physiology teaching; (2) MCW is one of only 10 U.S. medical schools (of 126 allopathic schools and 28 osteopathic schools) that still use live animals to instruct students; (3) While 12 more U.S. medical schools have ended

live animal use since January 2006, MCW has refused to do so; (4) By switching from dogs to pigs, MCW has elected to use an animal "model" it has already determined to be inferior; and (5) MCW continues to ignore the fact that the use of *any* live animals for medical school physiology instruction is an educationally and ethically discredited practice.

Humane and scientific considerations support eliminating the use of animals for medical student teaching at MCW, and the school should immediately replace the use of animals with alternative non-animal teaching methods.

II. Non-animal educational alternatives in United States medical schools

In the early 1990s, medical schools began rapidly replacing the use of animals for medical education with non-animal teaching methods. Currently, the use of animals for all medical school educational courses has been eliminated by more than 90 percent of U.S. medical schools. The use of animals specifically to instruct physiology courses (the current practice at MCW) has been eliminated by all of the 25 top-ranked schools.²

This change has been facilitated by the emergence, adoption, and validation of excellent non-animal educational alternatives (such as lifelike simulation models, computer-based learning methods, and interactive virtual reality programs), and by the progressive refinement of medical school curricula to emphasize human-based learning and ethics in medical education. Many medical simulation center directors, medical school curriculum and course directors, and other education professionals are on record

supporting the educational, ethical, and economic advantages of human simulators and other non-animal teaching alternatives.³

Modern simulator and computer technologies provide excellent and clinically relevant teaching in physiology and pharmacology. The METI Human Patient Simulator⁴ (HPS) is a programmable and interactive lifelike simulator that accurately mirrors *human* responses to a variety of physiological situations, including intravenous administration of more than 90 drugs. HPS facilitates repetition, progressive learning, and immediate feedback and correction in safe but true-to-life scenarios, all of which are important for optimal physiology education and not possible using live animals.

Human simulators are just one of several widely adopted alternatives to animal use. In many top-ranked medical schools, physiology instruction is focused on didactic teaching, class and small-group case discussions, standardized patient exams, interactive computer-based methods such as virtual reality programs, and hands-on mentorship opportunities with faculty in anesthesiology, surgery, emergency medicine, and other clinical disciplines.

In response to a recent survey,⁵ the curriculum office of a top-five ranked U.S. medical school wrote the following:

. . . It has been a decade since we used animals in the lab. As there are very few individuals left who teach that remember using animals, there have not been any concerns with not using animals. Our curriculum is very successful, providing our students with a strong foundation without using animals.

Some of the country's most highly regarded medical schools stopped using animals in their undergraduate curricula more than a decade ago. Yet these schools continue to be highly ranked year after year, making it clear that the use of

non-animal alternatives has not impaired the quality of medical education provided by these schools. At a time when the mainstream of American medical education has successfully and advantageously replaced the use of animals, just a few schools, including MCW, adhere to archaic and inhumane methods.

III. The campaign to replace animal use at the Medical College of Wisconsin

The Physicians Committee for Responsible Medicine (PCRM) has worked with medical schools for more than a decade to help them eliminate the use of animals to teach their students. These efforts have included outreach to MCW.

More recently, in February 2006, PCRM sent a letter to MCW physiology course director Jean-Francois Liard, Ph.D., and copied the letter to Physiology Department chairman Allen W. Cowley, Jr., Ph.D., and dean and executive vice president Michael J. Dunn, M.D. This letter explained the benefits of replacing animal use for physiology teaching, and asked MCW to incorporate this change into its curriculum. A second letter was sent in March 2006 to provide supplemental information to Drs. Liard, Cowley, and Dunn. PCRM did not receive any response to these letters.

PCRM then sent a letter dated March 27, 2006, to MCW IACUC chair Bonnie N. Dittel, Ph.D., requesting that this oversight body deny the use of animals to teach physiology due to the availability of equivalent or superior non-animal alternatives, as required by the federal Animal Welfare Act (AWA). That letter stated in part:

Regarding the MCW M1 [first-year] physiology course, which uses live dogs, every reasonable criterion for elimination of live animal use has been met. Excellent non-animal alternatives are available, including the METI human patient simulators available at MCW. Additionally, the suitability of this

simulator and other non-animal alternatives to replace live animal use for physiology and pharmacology teaching is confirmed by the fact that all but several of the 125 allopathic and 20 osteopathic U.S. medical schools have already eliminated these animal labs.

PCRM received no reply from Dr. Dittel. On April 12, 2006, PCRM filed a complaint with the Animal and Plant Health Inspection Service (APHIS) of the USDA, requesting an inspection to determine if the MCW IACUC was noncompliant with the AWA in its approval of this animal use. That inspection was performed May 11, 2006, and found the MCW IACUC in violation of its responsibility to require adequate justification for animal use in the physiology course.¹ The APHIS inspector wrote:

Protocol 038-95-1 describes an alternative search but does not list that any alternatives were found. A search conducted by the inspectors showed that alternatives exist. If alternative methods are available, the written narrative must justify why the available alternatives were not used. There is not enough information for the IACUC to determine that a reasonable and good faith effort was made to identify alternatives, refinements, reductions and replacements.

The same inspection report states that Protocol 038-95-1 requested 180 dogs over three years, yet the MCW IACUC approved 360 dogs for this time period with no explanation for the discrepancy. The inspector wrote that there was "...miscommunication and the IACUC must review the number of animals required and approved."

The APHIS inspector required that these deficiencies be corrected by Sept. 1, 2006. At this time, PCRM is not aware of what, if any, corrective action was taken by MCW in response to the APHIS report.

After many months resisting the growing

opposition to its use of live dogs, MCW disclosed in fall 2007 that live pigs will replace live dogs for the first-year physiology course. This was done to disarm public opposition to the live animal lab by substituting a species supposedly less endearing than dogs. MCW physiology faculty previously determined that pigs are poor "models" for this purpose, and rejected the use of pigs for that reason.⁶ Rather than taking this opportunity to join the progressive movement in medical education away from live animal use, MCW has elected to present its students an even worse educational model than live dogs, while continuing to ignore the fact that current non-animal teaching methods are superior to the use of any live animals for medical school physiology teaching.

The MCW administration has stated in conjunction with the MCW physiology faculty that the use of animals as a teaching tool produces superior physicians from the MCW program. MCW has provided no evidence to support this claim and, in fact, students are allowed to opt out of animal use. No objective information has been presented suggesting that MCW graduates are equivalent or superior to graduates of schools that do not use animals, a claim that in any case is refuted by past and current published medical school rankings.⁷

There are also no data comparing the academic and clinical performances of students who participate in the animal lab with those who opt out, or even surveys of graduates in practice to determine if in retrospect this animal lab contributed in any substantial manner to the quality of either their medical education or their professional competence. This absence of supporting data or documentation makes the administration's claim of educational superiority groundless.

Worthy of special mention is the fact that MCW already owns as many as four HPS models designed to replace animals for physiology education. Thus there is both no additional

economic burden and more than adequate capacity available to replace animal use immediately. Failure to do so is a decision to pursue an inhumane and discredited medical teaching method despite the alignment of educational, ethical, standard of practice, regulatory, and economic reasons favoring the replacement of animal use with non-animal alternatives.

IV. Conclusion

MCW should immediately eliminate the use of animals to teach physiology to medical students.

The use of human simulators, computer-based interactive learning, didactic and case-based teaching, standardized patient exams, mentoring by medical school faculty, and many other methods provides a validated equivalent or superior educational experience for medical students. The success of these teaching methods is irrefutably confirmed by long application at the highest ranked U.S. medical schools, including all of the 25 top-ranked schools² and more than 90 percent of all U.S. medical schools.

Whether the considered factor is educational quality, availability of suitable alternatives, medical ethics, standard of practice, regulatory guidance, or economic impact, the choice for MCW should be the use of non-animal methods rather than animals to teach medical students.

References

¹ The APHIS inspection report is dated May 11, 2006.

² *America's Best Graduate Schools 2007* by U.S. News & World Report.

³ Information available from PCRM.

⁴ METI HPS Web site:

www.meti.com/Product_HPS.html.

⁵ In September 2006, PCRM sent surveys to the top-20 ranked U.S. medical schools that no longer use live animals in their undergraduate medical curricula.

⁶ During a lecture on Jan. 8, 2007, Dr. Cowley addressed the first-year medical student class on the issue of the then

upcoming dog lab. During his lecture, Dr. Cowley told students that he and Dr. Liard had attempted the lab using live pigs. Dr. Liard stated that the animals were an inferior model as they had difficulty reaching blood vessels in the animals' necks and the animals easily exhibited atrial fibrillation (an irregular heart rhythm), among other problems.

⁷ *America's Best Graduate Schools 2007* by U.S. News & World Report. MCW is unranked in the category *Top Medical Schools – Research*, and is ranked 50th in the category *Top Medical Schools – Primary Care*.

Appendix

Frequently Asked Questions: Animal Use in Medical School Education

Q: *Isn't using animals to teach medical students about anatomy, physiology, surgery, and other topics a widely accepted and routinely used method?*

A: Beginning in the early 1990s, the development and adoption of superior educational methods led to the replacement of animal use in many U.S. medical schools. That process has continued to the point that today animals are used in only a small number of medical schools.

Q: *How many U.S. medical schools still use animals and how many use non-animal teaching methods?*

A: Of the 126 allopathic and 28 osteopathic medical schools in the U.S., over 90 percent have entirely eliminated the use of animals for all medical student courses as of 2007. Almost all the remaining schools have only one or very few animal lab courses, and the number of schools still using animals continues to decline each year.

Q: *Don't medical students have to see and experiment with complex living systems in order to learn how the human body works?*

A: Not necessarily, but when this is the chosen method it should be taught using humans or lifelike human simulators as teaching tools, rather than animals with different anatomy and physiology. Such human-based teaching occurs routinely in medical schools in the form of anatomy classes, observed surgeries and other patient procedures, and mentored experiences with clinical faculty. Many schools use human simulators, computer-based learning, didactic teaching, and case discussions for this purpose.

Q: *What non-animal alternatives are available?*

A: Excellent validated and widely adopted alternatives are available for teaching all aspects of medical education previously taught using animals. High fidelity, lifelike, and programmable human simulators are now a mainstay of medical education at many U.S. medical schools. Computer-based learning such as interactive basic science and clinical programs, including virtual reality applications, are used to teach everything from basic anatomy and physiology to complex laparoscopic surgery techniques. Didactic teaching methods, class and small-group case discussions, standardized patient exams, observed surgeries, faculty-mentored hands-on training, and many other progressive educational methods have all replaced the use of animals.

Q: *Is the quality of medical school education affected by using non-animal alternatives?*

A: Comparative studies show that both students and instructors prefer simulation-based education to the use of animals. Student test scores are equivalent or superior when non-

animal methods are used, and student skills testing is improved by using simulation methods compared with using animals. Medical school course directors, curriculum directors, simulation center directors, and other education professionals are on record supporting animal replacement by non-animal alternatives.

Q: *Isn't it necessary to use live animals to show how the human body responds to drugs?*

A: Programmable human simulators that demonstrate *human* responses to dozens of drugs are far better than using anesthetized animals to learn *animal* responses to only a few drugs. And the lessons can be repeated as needed when simulators are used. Many schools also teach drug responses by having students work with anesthesiologists during surgeries, where real-time responses in real people can be observed.

Q: *Isn't it necessary to use live animals to teach surgery techniques to medical students?*

A: Many specially designed simulators are available to teach surgery skills ranging from suturing to laparoscopic surgery. Open surgery techniques are taught during surgery rotations, under the hands-on guidance of faculty and staff. In fact, the American College of Surgeons has instituted a surgery curriculum reform initiative that eliminates the use of animals even in surgery training programs. If surgeons in subspecialty training don't need to use animals, medical students certainly don't.

Q: *Don't graduates of schools that use animal labs become better doctors and surgeons than those trained at schools that only use non-animal methods?*

A: Even schools that use animals allow students to opt out of those labs, and studies have

shown that students who opt out test as well as those who participate in the labs. The highest ranked U.S. medical schools have almost all eliminated animal use, yet these schools continue to be highly ranked every year.

badly designed afterthoughts, because there is peer group or faculty pressure, or because they fear being at a disadvantage for exams or course evaluations. Again, when allowed to compare animal labs to simulators, most students prefer simulators.

Q: *Doesn't the faculty know the best way to teach medical students? Why would they use animals if this wasn't the best way to teach?*

A: In general, faculties probably do know the best ways to teach medical students—and faculties in more than 90 percent of U.S. medical schools have decided that animal use is neither essential nor preferred. In other schools, reluctance to change is often based on institutional inertia, lack of knowledge or skills regarding alternatives, unwillingness of basic science instructors to learn new methods, and economic or logistical issues.

Q: *Don't medical students enjoy learning by using live animals?*

A: Some do, some don't, and some are neutral. For those who like the animal labs, it is often due to the “wow factor” of their first exposure to live anatomy and physiology. But studies show that when given the opportunity to compare the learning experiences of animal labs and simulation-based teaching, most students choose simulators as the better learning experience.

Q: *Isn't it true that when students may choose whether to attend an animal lab or opt out, most students decide to attend the lab?*

A: This is generally true, but the reasons are often unfortunate. The “wow factor” of live animal dissection is attractive to some students, but most choose the animal lab because they are offered no educational alternatives, because those alternatives are