

## Division of Comparative Medicine

The Division of Comparative Medicine (DCM) provides animal husbandry and clinical care for all research animals on the MIT campus. Since its inception in 1974, DCM has evolved into a comprehensive laboratory animal program that provides a full range of veterinary and surgical support. Additionally, DCM has a National Institutes of Health (NIH) grant for training veterinarians for careers in biomedical research and is funded by NIH to introduce veterinary students to careers in biomedical research. The division also has an active research program funded by numerous grants from NIH. DCM employs 165 personnel. Its administrative headquarters, along with its diagnostic and research laboratories, are located on the eighth floor of Buildings 16 and 56. A \$15 million NIH infrastructure C06 grant awarded to DCM in FY2010 will completely renovate the E25 vivarium. The design phase is under way and renovations should begin mid-2011. The division now encompasses approximately 175,000 gross square feet devoted to animal research activities. The new Koch Institute for Integrative Cancer Research, which will open in November 2010, contains a new vivarium comprising an additional 39,000 gross square feet. It also has a core imaging facility to facilitate in vivo oncology studies.

### Facility Management and Animal Care

The average daily census of laboratory animals increased 8.5% in FY2010. Mice remain the primary species used by MIT investigators and represent more than 98% of DCM's animal population. The division has two core facilities to support transgenic and gene "knockout" in vivo experiments and performs a range of transgenic services, including in vivo embryo transfer for rederivation of mice with endemic disease that have been imported to MIT from laboratories worldwide, in vitro fertilization, and genotyping of mice. During the past year services were expanded to include a full range of cryogenic services, including laser-assisted in vitro fertilization. Efforts are currently under way to perfect a technique of vitrification freezing that will allow us to freeze all stages of preimplantation embryos as well as a technique to freeze and successfully retrieve sperm. The transgenic core also provides genetically engineered mice to the investigative community at MIT. We established a second transgenic core in Building 46 to meet current demand for this service. DCM staff provide colony management of mouse models for investigators using mice in their studies. They also advise investigators on breeding paradigms and tracking systems to optimize efficiency of production colonies, as well as provide hands-on services for routine mating, weaning, genotyping, and culling.

### Research Activities

Currently DCM faculty and scientific staff have 14 NIH-funded grants supporting in vivo studies of nitrite carcinogenesis, *Helicobacter hepaticus*, and tumorigenesis; pathogenesis of inflammatory bowel disease; and *H. pylori*-induced gastric cancer. Studies are also conducted involving diet and *H. pylori* infection, microflora-induced colitis, *Helicobacter* species-induced hepatocellular carcinoma, virulence factors of *Escherichia coli* O157:H7 genotypes, the role of probiotics in attenuating inflammatory bowel disease, the role of human-derived *Lactobacillus reuteri* to activate innate

immunity, and in vivo studies investigating CD4<sup>+</sup>CD25<sup>+</sup> regulatory cells' abilities to treat colon and breast cancer. Total research expenditures were \$1.6 million in FY2010. FY2010 was the 22nd year of the division's NIH postdoctoral training grant. This grant is funded through 2013. Forty trainees have completed our three- to four-year sponsored postdoctoral training program; 31 of 34 who have taken the examination have become diplomates of the American College of Laboratory Animal Medicine. An additional 15 DVMs, PhDs, or MDs completed postdoctoral fellowships sponsored by individual R01 or program project grants.

Many former trainees hold leadership positions in academia as well as pharmaceutical and biotechnology companies. For example, two previous fellows have been elected to fill the presidency of two national organizations: Dr. Steve Niemi, director for comparative medicine at Massachusetts General Hospital, for the American College of Laboratory Animal Medicine; and Dr. Kim Saunders, professor and director, Department of Comparative Medicine at Oregon Health and Science University, for the American Association of Laboratory Animal Science. Dr. Susan Erdman, principal research scientist and assistant director of DCM and former DCM postdoctoral fellow, is immediate past president of the American Committee on Laboratory Animal Diseases.

The NIH training grant also provides short-term training opportunities for veterinary students interested in careers in comparative medicine. During FY2010, DCM had four short-term trainees for periods ranging from four to 10 weeks. Sixty-eight veterinary students have participated in the summer training program during the past 10 years. In addition, as many as 10 veterinary students per year elect to spend two- to four-week externships at DCM during the school year.

### **Academic Activities**

DCM faculty and staff teach two graduate subjects in the Department of Biological Engineering (20.202 In vivo Models: Principles and Practices and 20.450 Molecular and Cellular Pathophysiology), and one undergraduate subject (20.106J Systems Microbiology). Dr. Robert Marini, assistant director and chief of surgical resources, serves as a lecturer in the Harvard-MIT Division of Health Sciences and Technology, where he is involved in the teaching of two subjects (HST.542J Quantitative Systems Physiology and HST.090 Cardiovascular Pathophysiology).

Faculty and staff published four book chapters and 20 papers in FY2010, and presented numerous research papers at national and international meetings.

Dr. James Fox serves on the Institute of Laboratory Animal Research in the National Academy of Sciences, and was invited to present five distinguished lectures at several universities and international meetings.

Dr. Mark Whary, associate director of DCM, is a member of the editorial board of the journal *Comparative Medicine* and the *Journal of the American Association of Laboratory Animal Science*.

Dr. Erdman serves on an ad hoc committee for NIH.

Recruitment for a new faculty member to replace the late professor David Schauer is nearing completion.

### **Committee on Animal Care Activities**

All students, staff, visiting scientists, and principal investigators who use animals in teaching or research must be certified by the Committee on Animal Care (CAC). To enable protocol submission and personnel training, CAC's website provides required forms, continuing education material, and information about CAC activities. In conjunction with CAC, DCM staff have developed an online training program that is combined with individual orientation and training in animal use by the veterinary staff at the Institute. Individual and group didactic training sessions for Institute personnel on topics pertaining to the care and use of laboratory animals are also offered on a regular basis. CAC has also developed an occupational health program for animal-related occupational health issues and periodically sponsors seminars on health issues such as zoonotic diseases. The CAC has increased its protocol review to include in vivo studies by MIT scientists in Singapore under the Singapore-MIT Alliance for Research & Technology program.

**James G. Fox**  
**Director**  
**Professor of Biological Engineering**

*More information about the Division of Comparative Medicine can be found at <http://web.mit.edu/comp-med/>.*