

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. DCM has a National Institutes of Health (NIH) grant for training veterinarians for careers in biomedical research. The division also has an active research program funded by numerous grants from NIH. DCM's total personnel now comprises 165 individuals. DCM's administrative headquarters, along with its diagnostic and research laboratories, are located on the eighth floor of Building 16 and Building 56. A \$15 million NIH infrastructure C06 grant awarded to professor James G. Fox in FY2010 is being used to renovate the E25 vivarium completely. These renovations are expected to be complete by the end of 2012. During the renovations, animals will be moved from Building E25 to the Building E17/18 animal facility. The division now encompasses approximately 213,000 gross square feet devoted to animal research activities.

Facility Management and Animal Care

DCM has updated the *Laboratory Animals Users' Handbook* and the sixth edition will be available online in the third quarter of 2012. The average daily census of laboratory animals increased 3 percent in FY2012. Mice remain the primary species used by MIT investigators and represent more than 98 percent of DCM's animal population. The division has two core facilities to support gene "knockout" and transgenic 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 the freezing of all stages of preimplantation embryos and on a technique to freeze and successfully retrieve sperm. The transgenic core also provides genetically engineered mice to the investigative community at MIT. DCM established a second transgenic core in Building 46 to meet current demands for this service. DCM staff provides colony management of mouse models for investigators using mice in their studies. They advise investigators on breeding paradigms and tracking systems to optimize efficiency of production colonies, as well as providing hands-on services for routine mating, weaning, and genotyping.

DCM also provides diagnostic laboratory services to support the veterinary care, surveillance, and quarantine programs. The diagnostic laboratory is equipped and staffed to provide technical services in microbiology, mycology, mycoplasmaology, chlamydiology, virology, serology, hematology, parasitology, clinical chemistry, urinalysis, histology, and pathology. Two board-certified veterinary pathologists, Dr. Nicola Parry and Dr. Suresh Muthupalani, provide histopathological interpretations. Plans are under way to acquire a pathology diagnostic information system that will enable DCM to manage diagnostic and pathology data acquisition and dissemination more efficiently.

Research Activities

Currently DCM faculty and scientific staff have 10 NIH-funded grants supporting in vivo studies of nitrite carcinogenesis and the pathobiology of emerging enterohepatic *Helicobacter* spp. in mice. Division faculty and staff are also conducting studies of:

- The role of *H. pylori* as a tumor promoter in gastric cancer, helicobacter-associated colitis, and colon cancer;
- *Helicobacter* species-induced hepatocellular carcinoma;
- The role of stress-induced reduction in *Lactobacillus reuteri* on colonic inflammation;
- The role of human-derived *L. reuteri* to activate innate immunity;
- In vivo studies investigating CD4⁺ and CD25⁺ regulatory cells' abilities to treat colon and breast cancer; and
- The study of viral ecology, epizootiology, and evolution of influenza in animal and environmental reservoirs.

Total research expenditures were \$1.6 million in FY2012.

FY2012 was the 24th year of the division's NIH postdoctoral training grant (the grant is funded through 2013). DCM's NIH three-to-four-year sponsored postdoctoral training program has been completed by 44 trainees; 35 have become diplomates of the American College of Laboratory Animal Medicine. An additional 16 participants with 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 in pharmaceutical and biotechnology companies. Previous fellows have been elected to fill the presidency of three national organizations; Dr. Steve Niemi, director of animal welfare at Massachusetts General Hospital, at the American College of Laboratory Animal Medicine, and both Dr. Scott Perkins, director of the division of laboratory animal medicine at Tufts-New England Medical Center, and Dr. Kim Saunders, professor and director, Department of Comparative Medicine at Oregon Health and Science University, at the American Association of Laboratory Animal Science. Dr. Susan Erdman, a former DCM postdoctoral fellow and currently assistant director at DCM, is 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 FY2012, DCM had seven short-term trainees for periods ranging from six to 10 weeks. Many have, upon graduation, entered careers in biomedical research. Sixty-nine veterinary students have participated in the summer training program during the past 10 years. The division also hosted six veterinary students who elected to spend two- to four-week externships at DCM during the school year.

Academic Activities

Jonathan Runstadler, DVM, PhD, was recruited as a new faculty member and joined DCM and the Department of Biological Engineering in August 2011. He is studying the epidemiology of influenza infection in humans and animals with funding from NIH.

DCM faculty and staff published four chapters and 24 papers in 2011 and presented numerous research papers at national and international meetings. Drs. Fox and Marini are editing the third edition of *Biology and Diseases of the Ferret* and Drs. Fox and Whary are editing the third edition of the text *Laboratory Animal Medicine*.

Dr. Fox will assume the chairmanship of the board of directors of the National Association of Biomedical Research and continues to serve on the board of directors of national associations and editorial boards of scientific journals. Dr. Fox was elected to the National Academy of Practices in 2012. 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. Susan Erdman, assistant director of DCM and principal research scientist, serves on an ad hoc committee for NIH/NCR and Dr. Nicola Parry, chief of comparative pathology, is a member of the examination committee of the American College of Veterinary Pathology. DCM faculty and staff teach course 20.202 In Vivo Models: Principles and Practices, a graduate course in the Department of Biological Engineering. Dr. Runstadler will teach 20.109 Laboratory Fundamentals in Biological Engineering and 20.450 Molecular and Cellular Pathophysiology. 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 courses (HST 542J Quantitative Systems Physiology and HST090 Cardiovascular Pathophysiology).

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 MIT. Individual and group didactic training sessions for MIT personnel on topics pertaining to the care and use of laboratory animals are also offered on a regular basis. CAC, DCM, and the MIT Medical Department coordinate an occupational health program for animal-related occupational health issues. In addition to its work on the MIT campus, CAC provides protocol review to the Whitehead Institute and the Broad Institute.

James G. Fox
Professor and Director, Division of Comparative Medicine
Professor, Department of Biological Engineering