

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's total personnel is now 165 individuals. DCM's administrative headquarters, along with its diagnostic and research laboratories, are located on the eighth floor of Buildings 16 and 56. Animals were moved from E17/18 to a 39,000 gross square foot vivarium in the new Koch Institute for Integrative Cancer Research this past January. There is also a core imaging facility to facilitate *in vivo* oncology studies in the Koch Institute. A \$15 million NIH infrastructure C06 grant awarded to DCM in FY2010 is being used to completely renovate the E25 vivarium. The design phase is complete and renovations will commence shortly. The division now encompasses approximately 213,000 gross square feet devoted to animal research activities.

Facility Management and Animal Care

The average daily census of laboratory animals increased 4.5 percent in FY2011. 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 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 underway 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 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.

Research Activities

Currently, DCM faculty and scientific staff have 12 NIH-funded grants supporting *in vivo* studies of nitrite carcinogenesis and the pathobiology of emerging enterohepatic *Helicobacter* spp. in mice. Studies are also conducted involving the role of *Helicobacter pylori* as a tumor promoter in gastric cancer and helicobacter associated colitis, *Helicobacter* species-induced hepatocellular carcinoma, 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⁺CD25⁺ regulatory

cells' abilities to treat colon and breast cancer. Total research expenditures were \$1.9 million in FY2011. An additional \$1 million for design costs was also expended for the E25 renovation project.

FY2011 was the 23rd year of the Division's NIH postdoctoral training grant. This grant is funded through 2013. Our NIH three-to-four-year sponsored postdoctoral training program has been completed by 42 trainees; 32 have become diplomates of the American College of Laboratory Animal Medicine. An additional 16 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, previous fellows have been elected to fill the presidency of two national organizations; they include Dr. Steve Niemi, director for comparative medicine at MGH, for 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 of the Department of Comparative Medicine at Oregon Health and Science University for the American Association of Laboratory Animal Science. Dr. Susan Erdmann, a former DCM postdoctoral fellow and currently assistant director at DCM, is the 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 FY2011, DCM had five short-term trainees for periods ranging from four to 10 weeks. Sixty-nine veterinary students have participated in the summer training program during the past 10 years. Also, as many as 10 veterinary students per year elect to spend two-to-four week externships at DCM during the school year.

Academic Activities

Jonathan Runstadler, DVM, PhD, has been recruited as a new faculty member and will join DCM and the Department of Biological Engineering in August 2011.

DCM faculty and staff published three book chapters and 18 papers in FY2010 and presented numerous research papers at national and international meetings. Dr. Fox and Dr. Marini will be editing the 3rd edition of *Biology and Diseases of the Ferret*.

Dr. Susan Erdman, assistant director of DCM and principal research scientist, serves on an ad hoc committee for NIH/NCR. Dr. Fox will assume the vice-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. 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*. DCM faculty and staff teach a graduate course in the Department of Biological Engineering (20.202 In vivo models: Principles and Practices). 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 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, DCM, and the MIT Medical Department coordinate an occupational health program for animal-related occupational health issues. In addition to the MIT campus the CAC provides protocol review to the Whitehead and Broad Institutes as well as the SMART program in Singapore.

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