

Care, Use and Welfare of Marmosets as Animal Models for Gene Editing-based Biomedical Research: A Workshop

Committee

Saverio Capuano, III

Co-Chair

Dr. Buddy Capuano is a diplomate of the American College of Laboratory Animal Medicine with 33 years experience working with non-human primates, 22 as a veterinarian. As a Primate Medicine Resident and Associate Veterinarian at the California National Primate Research Center from 1993-1998, Dr. Capuano assisted in managing daily husbandry, providing clinical care, and performing experimental support for a large colony of non-human primates (3500 animals). As the Attending Veterinarian for the Pittsburgh Facility for Infectious Disease Research from 1998-2001, he provided veterinary care for a large colony of macaques (200) and acted as collaborator and co-investigator on numerous protocols involving a variety of infectious agents (e.g., Simian Immunodeficiency Virus, Human Papilloma Virus, Human Influenza Virus, Mycobacterium tuberculosis, Listeria monocytogenes, Pneumocystis carinii, and Trypanosoma cruzi) and transgenic vectors. As the Attending Veterinarian for the Magee-Womens Research Institute (MWRI) from 2001-2005, I was responsible for the daily clinical care of the animal colony of the MWRI (250 NHPs, 2000 rodents) and provided experimental support for numerous investigators performing reproductive, stem cell, and cloning research at the Institute. As Attending Veterinarian and Associate Director of Animal Services of the WNPRC, he oversees the veterinary, animal husbandry, and animal research support programs of the WNPRC and develops policies for these units. He also serves on the University of Wisconsin-Madison Graduate School IACUC, the Occupational Health Committee, and he is a member of the WNPRC Senior Management Team. He is also the Director of the current ACLAM accredited Laboratory Animal Medicine Training Program at the University of Wisconsin-Madison. He also served for several years on the BOD of the Association of Primate Veterinarians (President 2006-2007).

James G. Fox

Co-Chair

Dr. James Fox received his veterinary training at Colorado State University. He was an NIH postdoctoral fellow at Stanford University before accepting a position at the University of Colorado Medical Center as an Assistant Professor. He was later recruited to MIT and is currently Professor and Director of the Division of Comparative Medicine. He is also an Adjunct Professor at Tufts University School of Veterinary Medicine. Dr. Fox has received numerous scientific awards, and was elected to the National Academy of Medicine in 2004. He has been the principal investigator of an NIH postdoctoral training grant for veterinarians for 28 years and has trained 80 veterinarians, physicians, and PhDs for careers in biomedical research. He also has a NIH training grant for veterinary students and has introduced over 120 veterinary students to careers in biomedical research. He has been funded by NIH and NCI to study infectious diseases of the gastrointestinal tract for the past 40 years and has focused on the pathogenesis of *Campylobacter* spp. and *Helicobacter* spp. infection in humans and animals. Dr. Fox has a longstanding interest in studying the gastrointestinal microbiome and how it interfaces and influences the host's immune response to gastrointestinal pathogens, particularly *Helicobacter* species. These studies are complemented by extensive experience with mouse models, including those maintained under gnotobiotic conditions. His laboratory developed the ferret as a model for both campylobacter and helicobacter associated disease as well as the first rodent model to study helicobacter associated gastric disease, including gastric cancer. Dr. Fox is considered an international authority on the epidemiology and pathogenesis of gastric and enterohepatic helicobacters in humans and animals. He is largely responsible for identifying, naming, and describing many of the diseases attributed to various helicobacter species; most notably their association with hepatitis, liver tumors, inflammatory bowel disease and colon cancer.

Jaco Bakker

Member

Dr. Jaco Bakker, DVM in companion animals. Immediately after graduation in 2002, he was employed at the Biomedical Primate Research Centre (BPRC), Rijswijk, the Netherlands as a veterinarian. At the BPRC, he was and is involved in general animal care, enrichment programmes, reviewing research protocols, disease monitoring (preventive medicine), new treatment options for the animals, breeding programmes and public education. Over the years he has worked with several primate species including owl monkeys (*Aotus trivirgatus*), chimpanzees (*Pan troglodytes*), cotton top tamarins (*Saguinus oedipus*), cynomolgus macaques (*Macaca fascicularis*), rhesus monkeys (*Macaca mulatta*) and marmosets (*Callithrix jacchus*). Although knowledge of primate medicine has increased considerably over the last decades, especially in the field of welfare management, improvements can still be made. Jaco started a PhD programme aimed at further improvement of veterinary care and welfare management of marmosets, leading to the animals' better health. In 2017 he successfully finished his PhD at the University of Utrecht, the Netherlands, entitled 'veterinary care and welfare management of common marmosets'. Apart from his projects on marmosets, he was and still is actively involved in research in the other nonhuman primate species at the BPRC to improve veterinary care and welfare management. On these topics he set up a number of (inter)national collaborations with veterinary groups, which have already resulted in various joint publications and invitations to present his research.

Marina Emborg

Member

Dr. Marina Emborg obtained her M.D. and Ph.D. at the University of Buenos Aires. She did her postdoctoral training at Somatix Therapy Corp. and The Parkinson's Institute in Sunnyvale, California, followed by fellowships in the department of Pharmacology at the University of Michigan-Ann Arbor, and the department of Neurological Sciences at Rush University, in Chicago. Since her graduate studies Dr. Emborg's research focus has been in understanding and finding solutions for neurodegenerative disorders, with an emphasis on Parkinson's disease. Her body of work includes nonhuman primate models of neurological disorders, gene and cell-based therapies for Parkinson's and the development of conceptual frameworks for ethical clinical translation of novel treatments. In 2004 she became faculty at the University of Wisconsin, Madison, where today she is Professor of Medical Physics and directs the Preclinical Parkinson's Research Program at the Wisconsin National Primate Research Center. She is Editor of Neuroscience and Tissue Engineering Section for the journal Cell Transplantation, past President of the American Society for Neural Therapy and Repair and the 2016 recipient of the Bernard Sanberg Memorial Award for Brain Repair.

Eric K. Hutchinson

Member

Dr. Eric K. Hutchinson is the Associate Director of Research Animal Resources and an Assistant Professor in the Department of Molecular and Comparative Pathobiology at the Johns Hopkins University School of Medicine. His research focuses on the behavioral and physiological consequences of laboratory environments for research animals, and how those may impact experiments. Dr. Hutchinson studied English and psychology at Georgetown University, then worked as an animal behavior and enrichment specialist at the National Institutes of Health Division of Veterinary Resources for four years before attending veterinary school at Colorado State University. At CSU, he worked as the enrichment coordinator for Laboratory Animal Resources and conducted research on the effects of typical cage enrichments on the physiology and behavior of mice. He completed the laboratory animal medicine residency at the Johns Hopkins School of Medicine and became a diplomate of the American College of Laboratory Animal Medicine in 2012. He directed the behavioral management program at NIH's Division of Veterinary Resources from 2014-2016 before returning to Johns Hopkins.

James Pickel

Member

Dr. James Pickel is a Staff Scientist, as well as, Chief of Transgenic Core Facility at the National Institutes of Mental Health, which was established when Dr. Pickel became the Chief. Since then the Core specialized in innovative technology (including developing new transgenic research animals) and collaborated with intramural, extramural, as well as international laboratories to advance transgenic methods. Dr. Pickel obtained his PhD from the Department of Microbiology University of Alabama at Birmingham. He also was a postdoctoral fellow at the National Cancer Institute at Frederick Cancer Research and Development Center. Dr. Pickel is also a member of the Division of Veterinary Resources Advisory Committee at the National Institutes of Health.

Erika Sasaki

Member

Dr. Erika Sasaki is Director in Center of Applied Developmental Biology, Central Institute for Experimental Animals (CIEA). Erika joined CIEA in April 2003 from The Institute of Medical Science (IMS), University of Tokyo where she had been a research associate at Division of Molecular Therapy. Erika was also faculty of Keio University from 2004-2018. She obtained her PhD in University of Tsukuba in 1995 and continued as a post-doctoral research fellow in National Institute of Animal Health, Ministry of Agriculture, Forestry and Fisheries and University of Guelph, Ontario Canada until 2001, when she move to ISM. Her current research focuses on establishing human disease models in genetically modified marmosets for preclinical research and assessing safety and efficacy of regenerative medicines in disease treatment. For this purpose, Erika has generated the world's first transgenic marmoset with germline transmission in 2009. For the scientific interest, she is also studying early embryonic development in marmoset and gametogenesis in marmoset to understand the difference between rodents and primates' early development. Erika has an extensive record of publications, invited lectures, and service activities. Erika has received several awards for her expertise and achievement in this area including Prize for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology and the Andoh-Tajima Award of the Japanese Association for Laboratory Animal Science. She is an organizing committee member of Japan Society for Marmoset Research and Asia-Oceania Research group for Common marmoset.

Suzette Tardif

Member

Dr. Suzette Tardif is the Associate Director of Research at the Southwest National Primate Research Center and the Co-Leader of the Preclinical Core for the Claude Pepper Older Americans Independence Center based at University of Texas Health-San Antonio. She received her PhD in Zoology from Michigan State University in 1982. Dr. Tardif has worked for over 30 years in the development of common marmoset monkeys as biomedical models in diverse areas including reproductive biology, infectious disease, neuroscience, aging and obesity. She has extensive experience coordinating large, integrated research. She served as the marmoset expert for the team charged with sequencing the marmoset genome and also served as the species expert for recent studies on development of iPS cell technologies. Dr. Tardif's research has centered on reproduction, metabolism, and behavior with more recent work extending to the characterization of the marmoset as a model for obesity, aging, and prenatal viral exposure. Her research has been consistently funded through the National Institutes of Health since 1984.

Lida Anestidou

Staff Officer