



# Primate Research Center Tulane National

**The mission of the Tulane National Primate Research Center is to improve human and animal health through basic and applied biomedical research.**

To fulfill this mission, the TNPRC:

- Conducts basic and applied biomedical research on human health problems that require the use of nonhuman primates
- Investigates nonhuman primate biology and diseases
- Serves as a regional and national resource and center of excellence for biomedical research using nonhuman primates
- Provides training for graduate students, postdoctoral fellows, veterinarians, undergraduates, and visiting scientists; and
- Educates the general public the critical link between research with animal models and improvements in human health.

## Research Highlights

### HIV/AIDS

- Demonstrated the mucosal immune system as the primary target of SIV/ HIV infection because of the predominance of “memory” CD4+ T cells, which are the primary target of infection. This has led to a paradigm shift in HIV vaccine development.
- Demonstrated that topically applied inhibitors of viral fusion to cell membranes can completely prevent vaginal SHIV transmission. This work is progressing to clinical trials in humans.
- Demonstrated the ancient origins of SIV in African nonhuman primates.
- Demonstrated the efficacy of long acting integrase inhibitors to prevent mucosal transmission of SIV/HIV for up to three months after a single dose.
- Demonstrated the critical role of macrophages in the pathogenesis of AIDS in macaques.

### Tuberculosis

- Developed a model of human TB using rhesus macaques inoculated via the natural inhalation route.
- Refined the NHP TB model to be able to study active TB, latent TB and AIDS co-infection-based reactivation of latent TB as well as to assess the protective effects of prior vaccination on infection.
- Provided the first transcriptomic description of the host granulomatous response to *M. tuberculosis* infection using microarrays.
- Identified a *M. tuberculosis* mutant lacking a functional stress response factor SigH that is nonpathogenic in NHPs. This provides a basis for rational attenuation of *M. tuberculosis* to generate novel, next-generation anti-TB vaccines.

### Lyme Disease

- Discovered an immune evasion mechanism that *Borrelia burgdorferi*, the spirochete that causes Lyme disease, uses to cause persistent infections.
- The C6 test for serologic diagnosis of Lyme disease, which was developed at the TNPRC was approved by the FDA for use in humans and the USDA for use in animals. It is now widely used both for human and canine Lyme disease diagnosis.

### Malaria

- Conducted the first study in nonhuman primates using DNA microarray to follow gene expression in a sporozoite-induced malaria infection.
- Performed the first successful DNA vaccine study in nonhuman primates related to the generation of transmission blocking immunity to *P. falciparum* malaria.

## Research Highlights (continued)

### Biodefense

- Demonstrated the protective efficacy of a receptor-based therapeutic in a cynomolgus macaque model of inhalation anthrax without the use of adjunctive antibiotics.
- Developed a nonhuman primate model of Chikungunya virus infection and successfully developed a protective vaccine. Chikungunya is an arthropod-borne infectious disease that has recently entered the southern US.
- Evaluated the therapeutic protective effect of a fully humanized monoclonal antibody in an aerosol model of Staphylococcal enterotoxin B (SEB) intoxication in the rhesus macaque. This is the first time that any therapeutic against SEB has shown efficacy when administered after exposure.

### Gluten Sensitive Enteropathy

- Developed a nonhuman primate model of GSE in rhesus macaques and described the immunologic, histopathologic and physiologic hallmarks of GSE. This model has now been used to visualize the transepithelial transport gluten peptides that are thought to initiate disease.

### Regenerative Medicine

- Determined that dysregulation of monocyte/macrophage/microglia and up-regulation of specific cytokines contribute to the pathogenesis of Krabbe's disease in the rhesus macaque model.
- Determined that mesenchymal lineage stem cells are potent inhibitors of inflammation associated with Krabbe's disease progression.
- Identified biological aging effects on cell cycle checkpoints and expression and activity of stem cell fitness markers.

### Other Biomedical Research Models Using Non-Human Primates

The TNPRC is capable of supporting biomedical research utilizing nonhuman primate models in the areas of:

- Physiology (reproduction, cardiovascular disease, diabetes)
- Neuroscience
- Genetics
- Stem Cell Biology
- Transplantation
- Aging
- Drug Abuse
- Developmental Biology
- Behavioral Biology

### For More Info:

Research Business Development  
James R Zanewicz, CBO  
zanewicz@tulane.edu  
mobile: 504.919.3800



### Resource Cores

The TNPRC provides highly integrated clinical and laboratory support cores for studies using nonhuman primates. These include:

- A Full-time Staff of Clinical Veterinarians, Pathologists and Technicians
- Anatomic Pathology
- Biotelemetry
- Cellular Immunology
- Clinical Pathology
- Confocal Microscopy and Image Analysis
- Diagnostic Parasitology
- DNA Microarray and Gene Expression
- Flow Cytometry
- Genetics and Genome Banking
- Infectious Disease Aerobiology
- Pathogen Detection and Quantification
- Maintains Arthropods That Are Important for the Study of Vector-Borne Diseases
- Virus Characterization, Isolation and Production.

Established in 1964, the Tulane National Primate Research Center has become one of the country's premier infectious disease research facilities.

The 500-acre site, located in Covington, Louisiana, is 35 miles north of New Orleans.

Federal, State, private research funding: \$25-35 million per year.

300 employees, including 37 faculty.

Nonhuman primates: More than 4,000 are housed at the TNPRC.

Primary research strength is in infectious diseases and development of vaccines, diagnostics, and therapeutics.

Functions as a regional and national resource for research using nonhuman primates; one of seven National Primate Research Centers.

Site of one of 13 Regional Biosafety Laboratory (BSL3) in the NIH/NIAID National Biodefense Program.

<http://tnprc.tulane.edu>



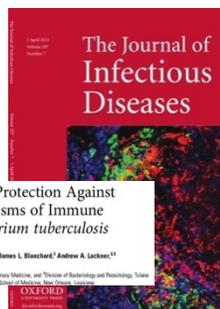
Innate Immune Activation in the Pathogenesis of a Murine Model of Globoid Cell Leukodystrophy

Elly R. Snook,<sup>1</sup> James M. Fisher-Parkins,<sup>1</sup> Roger A. Searing,<sup>1</sup> Kim H. Lee,<sup>1</sup> Xavier Abance,<sup>1</sup> Andrew G. MacLean,<sup>1</sup> Keith C. Peterson,<sup>1</sup> Andrew A. Lackner,<sup>1</sup> and Bruce A. Bonstein<sup>1</sup>



Long-Acting Integrase Inhibitor Protects Macaques from Intrarectal Simian/Human Immunodeficiency Virus

Charity D. Anderson,<sup>1</sup> William R. Spear,<sup>1</sup> Hiroshi Mishi,<sup>1</sup> Lee Bao,<sup>1</sup> Susan Ford,<sup>1</sup> Agnieszka Gietlik,<sup>1</sup> Karl Russell Ludwig,<sup>1</sup> Russell F. Bolan,<sup>1</sup> Cecilia Cheng-Mayer,<sup>1</sup> Zhi Hong,<sup>1</sup> Martin Markowitz,<sup>1</sup> David D. Ho<sup>1</sup>



Granuloma Correlates of Protection Against Tuberculosis and Mechanisms of Immune Modulation by *Mycobacterium tuberculosis*

Savitri Mahan,<sup>1</sup> Xavier Abance,<sup>1</sup> Peter J. Dittie,<sup>1</sup> Lora A. Doyle,<sup>1</sup> James L. Bluestone,<sup>1</sup> Andrew A. Lackner,<sup>1</sup> and Deepak Kulkarni<sup>1</sup>

<sup>1</sup>Division of Microbiology, <sup>2</sup>Division of Comparative Pathology, <sup>3</sup>Division of Veterinary Medicine, and <sup>4</sup>Division of Biotechnology and Precision, Tulane National Primate Research Center, Covington, Louisiana, and <sup>5</sup>Tulane University School of Medicine, New Orleans, Louisiana

Tulane

SCHOOL OF MEDICINE