Research and Resources for the *Leptospirosis*, Microbiology and Infectious Diseases Research Community

Joseph Breen*, PhD
Suman Mukhopadhyay, PhD
Program Officer
Division of Microbiology and Infectious Diseases
NIAID, NIH, DHHS
NIAID Infectious Disease Research: A Dual Mandate

Maintain and “grow” a robust basic and applied research portfolio in microbiology, immunology, and clinical research

Respond rapidly to new infectious disease threats

Slide Source: A. S. Fauci
The National Institute of Allergy and Infectious Diseases (NIAID)

Conducts and supports basic and applied research to better understand, treat, and ultimately prevent infectious, immunologic, and allergic diseases
The Division of Microbiology and Infectious Diseases (DMID)

Supports extramural basic through applied research to control and prevent diseases caused by virtually all human infectious agents except HIV
Division of Microbiology and Infectious Diseases

- Fundamental biomedical research
  - Basic Research (major)
  - Product development
  - Clinical trials
  - Global health
  - Microbial genomics
  - Emerging and reemerging diseases
- >293 different pathogens
Distribution of NIAID FY ‘11 Funded Projects for Zoonotic Diseases

- Diagnostics
- Pathogenesis and Others
- Therapeutics and Drug Development
- Vaccine
Distribution of NIAID FY ‘11 Funded Projects for Zoonotic Diseases

- Spirochaetes
- Apicomplexan parasites
- Kinetoplastids
- Influenza (all species)
- Flaviviruses
- Arenaviruses
- Alphaviruses
- Mycobacteria
- Salmonellosis
- Plague
- Tularemia
- Anthrax
- Listeriosis
- Other
Overview of Research on *Leptospirosis* at NIAID
Selected Topics in Basic Research

NIAID-funded PI’s are studying *Leptospira* including those that causes human fatality. Studies are focused on understanding:

- The basic mechanisms of *leptospira* pathogenesis (highest number of funded PI’s).
- The role of pathogen-expressed immunogenic determinants in establishing an infection.
- The role of host-immunology.
- Pulmonary hemorrhaging.
Basic Research (Cont.)

- The determinants of clinical outcome.
- How to develop better diagnostics.
- How to improve interventional and prevention procedures (including future vaccines).
Over 250 globally diverse serovars of *Leptospira* including those that caused human fatality, are being sequenced to understand global, regional and clinical diversity (JCVI-Rockville). The goals are to:

- Delineate taxonomic and phylogenetic relationships among *Leptospira* species.
- Understand the mechanisms of leptospirosis pathogenesis and determinants of clinical outcome.
- Provide comparative genomics to examine genetic variation in populations of pathogens.
Leptospira: Clinical Proteomics

- Development and validation of a universal protein microarray fabrication and probing platform that can be used to profile the humoral immune response to infection of any organism on a genome-wide scale.
- Enable human specimens to be quickly screened for evidence of exposure to species causing febrile illness including other *Leptospira* species.
- Reference protein-array containing over 3,667 important proteins encoded by the organism has been made and currently being tested.
- Outcomes will help develop diagnostic markers and vaccine candidates.
Leptospira: Natural History Research

Conduct study in the endemic regions with high mortality rate (urban slums South America and rural settings in Asia) with goals are to understand:

• The human risk factors.
• The dynamics of host-reservoir.
• The determinants of clinical outcome.
• Develop better measures for prevention and treatment.
Resources for Researchers
Overview
Resources for Researchers

► Funding opportunities
► Research tools and technologies
► Preclinical and clinical services to facilitate product development
Funding Opportunities

• Apply for grants or contracts
  – NIH-Wide Funding Opportunity Announcements
  – NIAID Funding Opportunity Announcements and Requests for Proposals
Research Tools and Technologies

- Biological resources repository
- Sequencing, genotyping, and protein biomarker discovery
- Data, databases, and bioinformatics tools
- Biocontainment facilities
Preclinical Services to Support Product Development

- In vitro testing
- In vivo testing
- Lead identification and development
- Chemistry and manufacturing
- Synthesis and optimization
- Preclinical development, planning, and evaluation
Clinical Services to Support Product Development

- Clinical trials
- Support for clinical programs
DMID Resources for Researchers

Resources for Researchers

Microbiology and Infectious Diseases Resources
The Division of Microbiology and Infectious Diseases (DMID) supports extramural research to control and prevent diseases caused by virtually all human infectious agents except HIV.

Funding Opportunities
Apply for grants and contracts to conduct basic research, preclinical development, or clinical evaluation.
- NIH-wide Funding Opportunity Announcements
- NIAID Funding Opportunity Announcements and Requests for Proposals

Product Development Services and Research Tools and Technologies
Request development by DMID-funded contractors of critical information needed to move a product through the product development pathway. Note: Services are contingent upon availability of required preliminary data.

Click on labels below to view services for diagnostics, vaccines, and therapeutics; and for basic research, preclinical development, and clinical evaluation.

Click on research tools and technologies above for:
- Biological research resources (organisms and reagents)
- Microbial sequencing, genotyping, and protein biomarker discovery
- Data, databases, and bioinformatics tools
- Biodefense facilities

http://www3.niaid.nih.gov/LabsAndResources/resources/dmid/
Thank You