

# **ENQUIRE Cluster 14**

**Microbiology and Infectious Diseases**

**Published Study Section Guidelines**

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## Bacterial Pathogen Group

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### PCMB – Prokaryotic Cell and Molecular Biology

The Prokaryotic Cell and Molecular Biology (PCMB) study section reviews applications addressing the genetics, genomics, biochemistry, structure, physiology, and behavior of bacteria (whether they cause disease or not), archaea, and their phages. The focus is on fundamental biology of bacteria and basic research projects with outcomes applicable principally to bacteria. Studies may use pathogenic or nonpathogenic bacteria and be at the genetic, molecular, biochemical, cellular, or community level and may also include computational approaches.

#### Topics:

- Microbial development, differentiation, morphogenesis, and cell division
- Prokaryotic DNA replication, transcription, RNA processing, gene expression and regulation, regulatory networks and dynamics
- Biochemistry and structural studies, including assembly of supramolecular structures in prokaryotic cells and phages
- Genetics, functional genomics and proteomics, modeling of microbial cell processes
- Central and intermediary metabolism and energetics of prokaryotes, including mechanisms of metal ion homeostasis
- Bacterial signaling in response to the environment, stress response, survival, and death, intercellular signaling, symbiosis, chemotaxis and motility
- Molecular and cellular studies of quorum sensing, biofilms, and microbiomes
- Molecular biology and genetics of phages
- Bacterial defense systems including CRISPR biology

#### Shared interests and overlaps:

There are shared interests in pathogenic bacteria, structure of toxins and mechanism of disease persistence with **Bacterial Virulence (BV)**. Applications that emphasize pathogenesis studies associated with bacterial infections may be reviewed in **BV**. Applications that focus on the basic genetics, biochemistry, and fundamental biology of bacterial pathogens may be reviewed in **PCMB**.

There are shared interests in molecular biology with **Molecular Genetics (MG)**. Applications that address these processes in bacteria as model organisms of eukaryotes or emphasize fundamental principles of DNA/ RNA metabolism may be reviewed in **MG**. Applications that focus on molecular mechanisms of DNA/RNA metabolism to understand prokaryote biology and physiology may be reviewed in **PCMB**.

There are shared interests in microbial genomics with **Genomics, Computational Biology and Technology Study Section (GCAT)**. Applications that emphasize development of metagenomic analysis methods may be reviewed in **GCAT**. Applications that emphasize fundamental processes of microbial communities may be reviewed in **PCMB**.

There are shared interests with **Interspecies Microbial Interactions and Infections (IMII)** for applications investigating the interactions of bacteria, viruses, and parasites. Poly-bacterial research involving both bacteria and other microbes may be reviewed by **IMII**. Applications focused more specifically on inter-bacterial interactions may be reviewed in **PCMB**.

There are shared interests in bacterial physiology with **Transmission of Vector-borne and Zoonotic diseases (TVZ)**. Applications that emphasize the zoonotic or vector-borne life cycles of bacteria may be reviewed in **TVZ**. Applications that are focused on the basic biology of bacteria may be reviewed in **PCMB**.

There are shared interests with **Immunity and Host Defense (IHD)** in responses by immune cells to bacteria. Applications focused on the immune mechanisms associated with the host response to bacterial infections and those utilizing bacteria as tools to stimulate an immune response may be reviewed in **IHD**. Applications that focus on the basic genetics, biochemistry, and fundamental biology of bacterial pathogens may be reviewed in **PCMB**.

There are shared interests in bacterial biology with **Drug Discovery and Molecular Pharmacology A (DMPA)**. Applications that emphasize the development of new anti-bacterial drugs may be reviewed in **DMPA**. Applications that focus on the basic genetics, biochemistry, and fundamental biology of bacterial pathogens using known drugs or molecular probes may be reviewed in **PCMB**.

There are shared interests in bacterial biology with **Anti-Infective Resistance and Targets (AIRT)**. Applications that focus on identifying novel drug targets or resistance mechanisms may be reviewed in **AIRT**. Applications that emphasize bacterial biology may be reviewed in **PCMB**.

There are shared interests with **Etiology, Diagnostic, Intervention and Treatment of Infectious Diseases (EDIT)** in the general area of bacterial pathogens. Applications that emphasize host-immune responses in a population-based studies may be reviewed in **EDIT**. Applications that focus on mechanistic in vitro studies and animal models of bacterial diseases may be reviewed in **PCMB, BV, or BHI**.

There are shared interests in cellular metabolism and metallo-biochemistry with **Macromolecular Structure and Function A (MSFA)**. Applications involving biophysical and biochemical analysis of metal ion containing proteins, transport proteins, or enzymology of prokaryotic molecules may be reviewed in **MSFA**. Applications that emphasize bacterial processes that also include structural methods may be reviewed in **PCMB**.

There are shared interests in prokaryotic structural biology and molecular mechanisms of proteins and nucleic acids in larger multi-protein complexes and molecular machines with **Macromolecular Structure and Function C (MSFC)**. Applications involving principally structure-function studies of prokaryotic molecules and complexes may be reviewed in **MSFC**. Applications that emphasize bacterial processes but also include structural methods may be reviewed in **PCMB**.

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## **BV – Bacterial Virulence**

The Bacterial Virulence (BV) study section reviews applications addressing determinants of bacterial virulence and pathogenicity from the perspective of the bacteria in mammalian host-pathogen interactions. Studies may use in vitro, ex vivo, and in vivo animal models to assess virulence.

### **Topics:**

- Discovery of virulence determinants
- In vivo dynamics and functional characterization of virulence determinants, including genetic, biochemical, and structural approaches
- Effects of virulence factors on host cells and organisms
- Virulence regulation as it relates to host cells and organisms
- Studies of inhibitors of virulence determinants
- Characterization of microbial toxins
- Structural studies that inform host-pathogen relationships

### **Shared interests and overlaps:**

There are shared interests with **Prokaryotic Cell and Molecular Biology (PCMB)**. Applications that focus on the basic genetics, biochemistry, and fundamental biology of bacterial pathogens may be reviewed in **PCMB**. Applications that emphasize pathogenesis studies associated with bacterial infections may be reviewed in **BV**.

There are shared interests with **Bacterial-Host Interactions (BHI)**. Applications that focus on the host in the host-pathogen relationship may be reviewed by **BHI**, whereas applications that focus on the bacteria may be reviewed in **BV**. Applications that use animal models of infection to identify and characterize bacterial virulence determinants may be appropriate for **BV**, whereas applications that use such models to investigate host responses or the host factors that contribute to the pathogenesis may be more appropriate for **BHI**.

There are shared interests with **Interspecies Microbial Interactions and Infections (IMII)** for studies that investigate the interactions of bacteria with other bacteria, viruses, and parasites. Applications emphasizing the interspecies microbial interactions or within microbial communities or polymicrobial research may be reviewed by **IMII**. Applications focused more specifically on the bacterial contribution virulence and pathogenicity may be reviewed in **BV**. Applications that focus on bacterial-phage interactions may be reviewed in **PCMB**.

There are shared interests in bacterial virulence with **Transmission of Vector-borne and Zoonotic diseases (TVZ)**. Applications that emphasize the zoonotic or vector-associated life cycles or transmission of vector-borne bacteria may be reviewed in **TVZ**. Applications that are focused on the general mechanisms by which vector-borne bacteria cause disease in humans may be reviewed by **BV**.

There are shared interests with **Immunity and Host Defense (IHD)** in the investigations of the immunologic process of bacterial infections. Applications focused on the innate and acquired immune mechanisms associated with the host response to bacterial infections and those utilizing bacteria as tools to stimulate an immune response may be reviewed in **IHD**. Applications involving, but not exclusively focused on the immune responses in the context of pathogenesis associated with specific bacteria, may be reviewed in **BV** or **BHI**.

There are shared interests with **Digestive System Host Defense, Microbial Interactions and Immune and Inflammatory Diseases (DHMI), Clinical Neuroimmunology and Brain Tumors (CNBT), Lung Cellular, Molecular, and Immunobiology (LCMI), and Hepatobiliary Pathophysiology (HBPP)**. Applications addressing bacterial-host immune or inflammatory interactions relevant to the diseases or disorders of the gastrointestinal tract (**DHMI**), nervous system (**CNBT**), respiratory tract (**LCMI**), and hepatobiliary system (**HBPP**) due to bacterial infection may be reviewed in the respective study section noted. Applications focused on molecular

mechanistic models of bacterial infection or pathogenesis and immunity emphasizing the bacterial perspective may be reviewed in **BV** or **BHI**.

There are shared interests in bacterial pathogen physiology with **Drug Discovery and Molecular Pharmacology A (DMPA)**. Applications that emphasize the development of new anti-bacterial drugs may be reviewed in **DMPA**. Applications that focus on the pathogenesis of bacteria and virulence using known drugs or molecular probes may be reviewed in **BV**.

There are shared interests in bacterial pathogen physiology with **Anti-Infective Resistance and Targets (AIRT)**. Applications that focus on identifying novel drug targets, drug resistance mechanisms, or on evolution of drug resistance may be reviewed in **AIRT**. Applications that focus on the pathogenesis of bacteria and virulence may be reviewed in **BV**.

There are shared interests with **Etiology, Diagnostic, Intervention and Treatment of Infectious Diseases (EDIT)** in the general area of bacterial pathogens. Applications that emphasize human or host population-based studies involving bacterial pathogenesis and host immune responses may be reviewed in **EDIT**. Applications that focus on mechanistic in vitro studies and animal models of bacterial diseases may be reviewed **PCMB, BV, or BHI**.

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## BHI – Bacterial-Host Interactions

The Bacterial-Host Interactions (BHI) study section reviews applications focused on bacterial factors that alter/affect host cells, or the host aspect of the host-bacterium interaction including host defense strategies. In vitro studies and in vivo animal model studies may be at the genetic, biochemical or cell biological level.

### Topics:

- Molecular basis for bacteria-host interactions including colonization and tissue invasion, intra- and extracellular survival, replication, dissemination, intercellular spread, persistence
- Bacteria modulators and effector molecules in the manipulation and evasion of host defense
- Interplay between bacteria and host cell components and processes, subversion and manipulation of normal host cell processes as part of the bacterial adaptation
- Development and use of animal infection, disease, and symbiosis models to investigate host determinants of susceptibility and resistance and surrogate hosts
- Identification and initial characterization of potential vaccine targets for early- and mid-stage vaccine development

### Shared interests and overlaps:

There are shared interests with **Bacterial Virulence (BV)**. Applications that focus on the bacterial side of the host-pathogen relationship may be reviewed in **BV**, whereas applications that focus on the host side of the host-pathogen relationship may be reviewed by **BHI**. Applications that use animal models of infection to assess levels of virulence may be appropriate for **BV**, whereas applications that use such models to investigate mechanisms of pathogenesis may be more appropriate for **BHI**.

There are shared interests with **Interspecies Microbial Interactions and Infections (IMII)** for studies that investigate the interactions of bacteria with other bacteria, viruses, and parasites. Applications emphasizing the interspecies interactions with other microbes or within microbial communities or polymicrobial research involving both bacteria and other microbes may be reviewed by **IMII**. Applications focused on bacterial factors that alter/affect host cells, or the host responses due to host-bacterium interaction may be reviewed in **BHI**.

There are shared interests in bacteria-host interactions with **Transmission of Vector-borne and Zoonotic diseases (TVZ)**.

Applications that emphasize the zoonotic or vector-borne life cycles of bacteria may be reviewed in **TVZ**. Applications that are focused on the general mechanisms by which the bacteria cause disease persistence may be reviewed by **BHI**.

There are shared interests with **Immunity and Host Defense (IHD)** in the investigations of the immunologic process of bacterial infections. Applications focused on the immune mechanisms associated with the host response to bacterial infections and those utilizing bacteria as tools to stimulate an immune response may be reviewed in **IHD**. Applications that focus on the bacterial pathogenesis process, including elements of host defense and evasion of host defense may be reviewed in **BHI**.

There are shared interests in vaccine development with **Vaccines Against Infectious Diseases (VID)**. Applications that emphasize measurement of vaccine efficacy or vaccine-induced immune responses as the endpoint may be reviewed in **VID**. Applications that emphasize early- and mid-stages of vaccine development, such as the identification and initial characterization of protective pathogenic antigens, their cloning and development of vector systems, and the development and immunologic evaluation of the adjuvant systems may be reviewed in **BHI**.

There are shared interests with **Digestive System Host Defense, Microbial Interactions and Immune and Inflammatory Diseases (DHMI), Clinical Neuroimmunology and Brain Tumors (CNBT), Lung Cellular, Molecular, and Immunobiology (LCMI), and Hepatobiliary Pathophysiology (HBPP)**. Applications addressing bacterial-host immune or inflammatory interactions relevant to the diseases or disorders of the gastrointestinal tract (**DHMI**), nervous system (**CNBT**), respiratory tract (**LCMI**), and hepatobiliary system (**HBPP**) due to bacterial infection may be reviewed in the respective study section noted. Applications focused on molecular mechanistic models of bacterial infection or pathogenesis and immunity emphasizing the bacterial perspective may be reviewed in **BV** or **BHI**.

There are shared interests in bacterial pathogen physiology with **Drug Discovery and Molecular Pharmacology A (DMPA)**. Applications that emphasize the development of new anti-bacterial drugs may be reviewed in **DMPA**. Applications focused on bacterial factors that alter/affect host cells, or the host responses due to host-bacterium interaction using known drugs or molecular probes may be reviewed in **BHI**.

There are shared interests in bacterial pathogen physiology with **Anti-Infective Resistance and Targets (AIRT)**. Applications that focus on identifying novel drug targets or resistance mechanisms may be reviewed in **AIRT**. Applications focused on bacterial factors that alter/affect host cells, or the host responses due to host-bacterium interaction may be reviewed in **BHI**.

There are shared interests with **Etiology, Diagnostic, Intervention and Treatment of Infectious Diseases (EDIT)** in the general area of bacterial pathogens. Applications that emphasize bacterial pathogenesis and host immune responses in population-based studies may be reviewed in **EDIT**. Applications that focus on mechanistic in vitro studies and animal models of bacterial diseases may be reviewed in one of the bacterial-focused study sections, **PCMB**, **BV**, or **BHI**.

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## Viral Pathogen Group

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### MCV – Molecular and Cellular Biology of Virus Infection

The Molecular and Cellular Biology of Virus Infection (MCV) study section reviews applications addressing fundamental molecular or cellular aspects of virus infection, molecular genetics and evolution, molecular pathogenesis, and virus-host interactions using approaches in structural biology, biochemistry, biophysics, cell biology, and systems biology.

Note: HIV/AIDS-related applications are reviewed on an expedited cycle (as mandated by Congress) by one of the **HIV/AIDS Research** study sections.

#### Topics:

- Molecular and cellular biology of virus infection mechanisms; attachment, entry, and uncoating; gene expression regulation; viral genome replication, recombination, and mutation; virus assembly, maturation, and egress
- Virus-host interactions: viral effects on signal transduction, transport, host gene expression, cell physiology, development, differentiation, and metabolism, establishment of latency and persistence
- Biochemistry/Biophysics of viral complexes and assemblies
- Systems biology (e.g., genomics, proteomics, lipidomics)
- Cell biology of viral replication (e.g., formation of replication organelles, secretory pathway transport, intracellular trafficking)

#### Shared interests and overlaps:

There are shared interests with **Viral Pathogenesis and Immunity (VPI)** in mechanisms regulating host-virus interactions.

Applications focused on addressing host immune pathways during host-virus interactions may be reviewed in **VPI**. Applications focused on the molecular and cellular mechanisms involving these host-viral immune interactions or cell intrinsic responses may be reviewed in **MCV**.

There are shared interests in molecular mechanisms of virus-host interactions with **Transmission of Vector-borne and Zoonotic diseases (TVZ)**. Applications that emphasize the complex zoonotic or vector-borne life cycles of viruses may be reviewed in **TVZ**. Applications that are focused on viral biology and molecular mechanistic models of virus infection, pathogenesis, or immunity from the virus perspective may be reviewed in **MCV**, **VPI**, or **VDT**.

There are shared interests with **Immunity and Host Defense (IHD)**, **Cell and Molecular Immunology (CMIA and CMIB)**, and **Innate Immunity and Inflammation (III)** in the investigations of the immunologic responses to viral infections. Applications focused on the immune mechanisms associated with the host response to viral infections and those utilizing viruses as tools to stimulate an immune response may be reviewed in **IHD**, **CMIA**, **CMIB**, or **III**. Applications involving the immune responses in the context of pathogenesis associated with specific viruses may be reviewed in **MCV**, **VPI**, or **VDT**.

There are shared interests in viral biology with **Drug Discovery and Molecular Pharmacology B (DMPB)**. Applications that emphasize the development of new anti-viral drugs may be reviewed in **DMPB**. Applications that are focused on viral biology using known drugs, compounds as tool or molecular probes may be reviewed in **MCV**.

There are shared interests in molecular studies of viral functions with **Anti-Infective Resistance and Targets (AIRT)**. Applications that focus on identifying novel drug targets or resistance mechanisms may be reviewed in **AIRT**. Applications that emphasize viral molecular and cellular biology may be reviewed in **MCV**.

There are shared interests with **Digestive System Host Defense, Microbial Interactions and Immune and Inflammatory Diseases (DHMI)**, **Clinical Neuroimmunology and Brain Tumors (CNBT)**, **Lung Cellular, Molecular, and Immunobiology (LCMI)**, and **Hepatobiliary Pathophysiology (HBBP)**. Applications addressing virus-host immune or inflammatory interactions relevant to the diseases or disorders of the gastrointestinal tract (**DHMI**), nervous system (**CNBT**), respiratory tract (**LCMI**), and hepatobiliary system

**(HBPP)** due to virus infection may be reviewed in the respective study section noted. Applications focused on molecular mechanistic models of virus infection or pathogenesis and immunity emphasizing the virology perspective may be reviewed in **MCV, VPI, or VDT**.

There are shared interests with **Macromolecular Structure and Function** study sections **A (MSFA), B (MSFB), C (MSFC), D (MSFD)**. Applications focused on structure-function relationships or molecular interactions, assemblies or biochemistry using biophysical methods and/or computational modeling may be reviewed in an **MSF**. Applications integrating those analyses with complementary studies of molecular mechanisms of virus infection, host-virus interactions, or viral pathogenesis and immunity may be reviewed in **MCV**.

There are shared interests with **Genetic Variation and Evolution Study Section (GVE)** and **Modeling and Analysis of Biological Systems (MABS)**. Applications focused on virus genetic variation and evolution or molecular epidemiology using mathematical models or computer simulations of virus infections may be reviewed in **GVE** or **MABS**.

There are shared interests with **Etiology, Diagnostic, Intervention and Treatment of Infectious Diseases (EDIT)** in the general area of viral pathogens. Applications that focus on population-based studies examining human-virus interactions, epidemiology, therapeutics, prophylactics, or diagnostics of virus infections may be reviewed in **EDIT**. Applications that focus on mechanistic in vitro studies and animal models of viral diseases may be reviewed in **MCV, VPI, or VDT**.

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## VPI – Viral Pathogenesis and Immunity

The Viral Pathogenesis and Immunity (VPI) study section reviews applications pertaining to eukaryotic virus infections focused on elucidating virus-host interactions and mechanisms of antiviral immunity using innovative approaches that include in vitro, cell-based and animal models.

Note: HIV/AIDS-related applications are reviewed on an expedited cycle (as mandated by Congress) by one of the **HIV/AIDS Research** study sections.

### Topics:

- Immune-virus interface: host innate and adaptive immunity to viral infection which regulates disease outcomes, pathogenesis, dissemination, tropism, fitness, diversity, and evolution, and/or transmission
- Identification of host determinants of susceptibility and resistance; mechanisms of viral clearance and immune evasion
- Mechanisms of viral pathogenesis and determinants of disease outcomes including oncogenesis, latency, reactivation, and persistence
- Animal models of pathogenesis
- Early-stage vaccine development that include identification, extraction and cloning of anti-pathogen protective antigens; development of vector systems; and development and immunologic evaluation of adjuvant systems

### Shared interests and overlaps:

There are shared interests with **Molecular and Cellular Biology of Virus Infection (MCV)** in mechanisms of establishment of viral latency and persistence. Applications focused on the molecular and cellular mechanisms involving these processes may be reviewed by **MCV**. Applications focused on enumerating host immune pathways influencing these processes may be reviewed by **VPI**.

There are shared interests with **Viral Dynamics and Transmission (VDT)** in studies of viral infection. Applications focused on the in vivo and/or ex vivo models of viral infection to understand the establishment and dissemination of infection, tropism, evolution, competitive fitness, and transmission between hosts may be reviewed in **VDT**. Host immune aspects of viral infection and transmission may be reviewed in **VPI**.

There are shared interests in virus-host interactions with **Transmission of Vector-borne and Zoonotic diseases (TVZ)**. Applications that emphasize the complex zoonotic or vector-borne life cycles of viruses may be reviewed in **TVZ**. Applications that are focused on viral-host interactions may be reviewed in **VPI**.

There are shared interests with **Immunity and Host Defense (IHD)**, **Cell and Molecular Immunology (CMIA and CMIB)**, and **Innate Immunity and Inflammation (III)** in the investigations of the immunologic responses to viral infections. Applications focused on the immune mechanisms associated with the host response to viral infections and those utilizing viruses as tools to stimulate an immune response may be reviewed in **IHD**, **CMIA**, **CMIB**, or **III**. Applications involving the immune responses in the context of pathogenesis associated with specific viruses may be reviewed in **MCV**, **VPI**, or **VDT**.

There are shared interests in vaccine development with **Vaccines Against Infectious Diseases (VID)**. Applications that emphasize measurement of vaccine efficacy or vaccine-induced immune responses as the end-point may be reviewed in **VID**. Applications that emphasize early stages of vaccine development, such as the identification and initial characterization of anti-pathogen protective pathogenic antigens, their cloning and development of vector systems, and the development and immunologic evaluation of the adjuvant systems, may be reviewed in **VPI**.

There are shared interests in viral pathogen physiology with **Drug Discovery and Molecular Pharmacology B (DMPB)**. Applications that emphasize the development of new anti-viral drugs may be reviewed in **DMPB**. Applications that are focused on viral pathogenesis using known drugs or molecular probes may be reviewed in **VPI**.

There are shared interests in viral pathogen physiology with **Anti-Infective Resistance and Targets (AIRT)**. Applications that focus on identifying novel drug targets or resistance mechanisms may be reviewed in **AIRT**. Applications that emphasize viral pathogenesis may be reviewed in **VPI**.

There are shared interests with **Etiology, Diagnostic, Intervention and Treatment of Infectious Diseases (EDIT)** in the general area of viral pathogenesis and immunity. Applications that focus on population-based studies examining human-virus interactions, epidemiology, therapeutics, prophylactics, or diagnostics of viruses may be reviewed in **EDIT**. Applications that focus on mechanistic in vitro studies and animal models of viral diseases may be reviewed in one of the viral-focused study sections, **MCV, VPI, or VDT**.

There are shared interests with **Digestive System Host Defense, Microbial Interactions and Immune and Inflammatory Diseases (DHMI), Clinical Neuroimmunology and Brain Tumors (CNBT), Lung Cellular, Molecular, and Immunobiology (LCMI), and Hepatobiliary Pathophysiology (HBPP)**. Applications addressing virus-host immune or inflammatory interactions relevant to the diseases or disorders of the gastrointestinal tract (**DHMI**), nervous system (**CNBT**), respiratory tract (**LCMI**), and hepatobiliary system (**HBPP**) due to virus infection may be reviewed in the respective study section noted. Applications focused on molecular mechanistic models of virus infection or pathogenesis and immunity emphasizing the virology perspective may be reviewed in **MCV, VPI, or VDT**.

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## VDT – Viral Dynamics and Transmission

The Viral Dynamics and Transmission (VDT) study section reviews non-HIV applications addressing the molecular patterns, genetics, and mechanisms which regulate virus infection, pathogenesis and immunity, diversity, tropism, emergence, evolution, transmission, and dissemination of infection using approaches which include advanced analytical technologies, omics system biology, and innovative in vitro, ex vivo, and in vivo models.

Note: HIV/AIDS-related applications are reviewed on an expedited cycle (as mandated by Congress) by one of the **HIV/AIDS Research** study sections.

### Topics:

- In vivo and ex vivo infection dynamics and tropism (e.g., studies of virus dissemination within the host from one organ to another, understanding the correlation between routes of infection and virus dissemination and/or tropism)
- Modeling of viral infection dynamics; development of in vivo and ex vivo models of viral infections
- Viral genetic diversity and evolution. (e.g., understanding the consequences of diversity on fitness, understanding differences between selection of variants with resistant phenotypes in complex model systems and cell-culture models)
- Application of emerging model systems (e.g., novel in vivo models, ex vivo models)

### Shared interests and overlaps:

There are shared interests with **Viral Pathogenesis and Immunity (VPI)** in studies of viral infection. Host immune aspects of viral infection and transmission may be reviewed in **VPI**. Applications focused on the in vivo and/or ex vivo models of viral infection to understand the establishment and dissemination of infection, tropism, evolution, competitive fitness, and transmission between hosts may be reviewed in **VDT**.

There are shared interests in viral transmission between hosts with **Transmission of Vector-borne and Zoonotic diseases (TVZ)**. Applications that emphasize the complex zoonotic or vector-borne life cycles of viruses may be reviewed in **TVZ**. Applications that are focused on molecular mechanistic models of virus infection, transmission between hosts, pathogenesis and immunity from the virus perspective may be reviewed in **VDT**.

There are shared interests with **Immunity and Host Defense (IHD)**, **Cell and Molecular Immunology (CMIA and CMIB)**, and **Innate Immunity and Inflammation (III)** in the investigations of the immunologic responses to viral infections. Applications focused on the immune mechanisms associated with the host response to viral infections and those utilizing viruses as tools to stimulate an immune response may be reviewed in **IHD**, **CMIA**, **CMIB**, or **III**. Applications involving the immune responses in the context of pathogenesis associated with specific viruses may be reviewed in **MCV**, **VPI**, or **VDT**.

There are shared interests with **Genetic Variation and Evolution (GVE)** in viral genetic diversity and evolution. Applications emphasizing genetic variation, population genetics and evolution using genomic approaches, mathematical models or computer simulations of virus infections may be reviewed in **GVE**. Applications that focus more on genetic factors involved host-pathogen interactions may be reviewed **VDT**.

There are shared interests with **Etiology, Diagnostic, Intervention and Treatment of Infectious Diseases (EDIT)** in the general area of viral pathogenesis and immunity. Applications that focus on population-based studies examining human-virus interactions, epidemiology, therapeutics, prophylactics, or diagnostics of viruses may be reviewed in **EDIT**. Applications that focus on mechanistic in vitro studies and animal models of viral diseases may be reviewed in one of the viral-focused study sections, **MCV**, **VPI**, or **VDT**.

There are shared interests with **Digestive System Host Defense, Microbial Interactions and Immune and Inflammatory Diseases (DHMI)**, **Clinical Neuroimmunology and Brain Tumors (CNBT)**, **Lung Cellular, Molecular, and Immunobiology (LCMI)**, and **Hepatobiliary Pathophysiology (HBPP)**. Applications addressing virus-host immune or inflammatory interactions relevant to the diseases or disorders of the gastrointestinal tract (**DHMI**), nervous system (**CNBT**), respiratory tract (**LCMI**), and hepatobiliary system (**HBPP**) due to virus infection may be reviewed in the respective study section noted. Applications focused on molecular mechanistic models of virus infection or pathogenesis and immunity emphasizing the virology perspective may be reviewed in **MCV**, **VPI**, or **VDT**.



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## Eukaryote Pathogen Group

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### PTHE – Pathogenic Eukaryotes

The Pathogenic Eukaryotes (PTHE) study section reviews applications focused on the biology of pathogenic eukaryotes (protozoal, helminthic, and medically important fungal pathogens) in humans and animal models. Applications may address a wide variety of biological issues related to eukaryotic pathogens including cell biology, biochemistry, immunology, physiology, and genetics.

#### Topics:

- Mechanisms of pathogenesis, including pathogen-host interactions, signaling pathways in both host cell and pathogen, molecular mechanisms of virulence, manipulation of host cell biological pathways, and factors associated with asymptomatic infection and/or commensalism
- Host-microbe interaction mechanisms including innate host immune responses to eukaryotic pathogens, genetic resistance and susceptibility to infection and disease, induction and regulation of innate immunity, immunopathology, and evasion of host immune responses
- Medically important fungal biology, including pathogenesis, quorum sensing, biofilm formation, host response, and immunity that influence microbial fitness/disease pathogenesis and/or identifying molecular and cellular targets that could be manipulated for disease control and/or host infection models that elucidate mechanisms of host defense, subversion, pathophysiology, and protective immunity (innate and acquired)
- Eukaryotic pathogen cell and molecular biology including metabolism, enzymology, organelle function, secretory processes, motility, host cell invasion, and the establishment of intracellular infection and replication
- Eukaryotic pathogen physiology, morphology, differentiation, morphogenesis, and developmental processes required for the infectious cycle including transmission, dissemination, latency and persistence
- Eukaryotic pathogen genetic processes (gene structure, regulation of gene expression, molecular evolution, genetic diversity, and improved genetic methodology) as well as functional genomics, comparative genomics, proteomics, and other broad-based technologies for studying eukaryotic pathogen genomes
- Improved or novel models of infectious cycles, diseases, and commensalism
- Identification and initial characterization of potential vaccine targets for early- and mid-stage vaccine development

#### Shared interests and overlaps:

There are shared interests with **Interspecies Microbial Interactions and Infections (IMII)** in the investigation of the biology, pathogenesis, host response, and immunity of fungal and eukaryotic pathogens. Applications focused on interspecies interactions with other microbes or within microbial communities or polymicrobial research involving both eukaryotic pathogens and other microbes may be reviewed by **IMII**. Applications focused on a single eukaryotic pathogen may be reviewed in **PTHE**.

There are shared interests in eukaryotic pathogen physiology with **Transmission of Vector-borne and Zoonotic diseases (TVZ)**. Applications that emphasize the complex zoonotic or vector-borne life cycles of eukaryotic pathogens may be reviewed in **TVZ**. Applications that focus on biology of the eukaryotic pathogen may be reviewed in **PTHE**.

There are shared interests with **Immunity and Host Defense (IHD)** in the investigations of the process of infections by eukaryotic pathogens. Applications that focus on the innate and acquired immune responses to eukaryotic pathogens may be reviewed in **IHD**. Applications that emphasize the interactions between the host and the eukaryotic pathogen may be reviewed in **PTHE**.

There are shared interests in vaccine development with **Vaccines Against Infectious Diseases (VID)**. Applications that emphasize measurement of vaccine efficacy or vaccine-induced immune responses as the end-point may be reviewed in **VID**. Applications that emphasize early stages of vaccine development, such as the identification and initial characterization of anti-pathogen protective

pathogenic antigens, their cloning and development of vector systems, and the development and immunologic evaluation of the adjuvant systems may be reviewed in **PTHE**.

There are shared interests with **Drug Discovery and Molecular Pharmacology A (DMPA)** in pathogen physiology. Applications that emphasize the development of new drugs may be reviewed in **DMPA**. Applications that focus on a eukaryotic pathogen using known drugs or molecular probes may be reviewed in **PTHE**.

There are shared interests in eukaryotic pathogen physiology with **Anti-Infective Resistance and Targets (AIRT)**. Applications that focus on identifying novel drug targets or resistance mechanisms may be reviewed in **AIRT**. Applications that are focused on a eukaryotic pathogen may be reviewed in **PTHE**.

There are shared interests with **Genetic Variation and Evolution (GVE)** in pathogen-host interactions. Applications that focus on such interactions as a coevolution process using genomic, genetic or computational methods may be reviewed in **GVE**. Applications that focus on genetic factors involved in the molecular mechanisms of such interactions may be reviewed in **PTHE**.

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## Interspecies and Complex Life Cycle Group

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### IMII – Interspecies Microbial Interactions and Infections

The Interspecies Microbial Interactions and Infections (IMII) study section reviews grant applications focused on investigation of interspecies interactions among microbes and within microbial communities including bacteria, bacteriophages, fungi, viruses (except HIV), and parasites. Areas of interest include the cellular and molecular mechanisms underlying the virulence of polymicrobial infections.

#### Topics:

- Mixed species biofilm and microbial community (e.g., microbiome, virome, mycobiome), dynamics, structure, communication, and host response
- Cross-species metabolism, including interactions with the host
- Interspecies communication, including mechanisms of quorum sensing and metabolite secretion
- Competition and synergy between microbes (in vitro or in vivo)
- Polymicrobial infection dynamics: microbe-microbe interactions and polymicrobial infection-host responses and host defense/subversion
- Environmental and climate change pressures on microbial communities
- Influence of host environment on polymicrobial systems

#### Shared interests and overlaps:

There are shared interests with the bacterial study sections, namely **Prokaryotic Cell and Molecular Biology (PCMB)**, **Bacterial Virulence (BV)**, and **Bacterial-Host Interactions (BHI)**. Applications focused largely on a single bacterial species may be reviewed in the relevant bacterial-focused study section. Interspecies interactions with other microbes or within microbial communities or polymicrobial research involving both bacterial and other microbes may be reviewed by **IMII**.

There are shared interests with viral study sections, namely **Molecular and Cellular Biology of Virus Infection (MCV)**, **Viral Dynamics and Transmission (VDT)**, and **Viral Pathogenesis and Immunity (VPI)**. Applications focused largely on a single virus may be reviewed in the relevant viral-focused study section. Interspecies interactions with other microbes or within microbial communities or polymicrobial research involving both viruses and other microbes may be reviewed by **IMII**.

There are shared interests with **Pathogenic Eukaryotes (PTHE)** in the investigation of the biology, pathogenesis, host response, and immunity of eukaryotic pathogens (protozoal, helminthic, and fungal pathogens). Applications focused largely on a single eukaryotic pathogen may be reviewed in **PTHE**. Interspecies interactions with other microbes or within microbial communities or polymicrobial research involving both eukaryotic pathogens and other microbes may be reviewed by **IMII**.

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## TVZ – Transmission of Vector-Borne and Zoonotic Diseases

The Transmission of Vector-borne and Zoonotic diseases (TVZ) study section reviews grant applications focused on the complex life cycles of vector-borne and zoonotic pathogens. All aspects of vector-borne and zoonotic pathogen transmission, from basic biology to community-level studies, including disease control strategies, are reviewed here. The study section considers all infectious disease agents, including bacteria, viruses, fungi, helminths, and parasites.

### Topics:

- Biology of vector-borne and zoonotic pathogens, including biochemistry, physiology, immunology, genetics, genomics, cell and molecular biology
- Inter-organismal interactions and mechanisms relevant to vector-borne and zoonotic disease transmission, including host physiology and novel model systems for the study complex life cycles
- Strategies to block transmission or manage resistance, including lab and field-based approaches that focus on the pathogen, host, or environment
- Population-level studies of the adaptation and evolution of pathogens and the interactions with their hosts and environment with a OneHealth approach
- Application of novel tools in the lab or the field for the interpretation and prediction of changes in complex life cycles, including modeling, landscape genetics and genomics, and disease ecology
- Identification of biological, anthropogenic, and environmental factors that drive persistence, invasion, and emergence of vector-borne and zoonotic pathogens

### Shared interests and overlaps:

There are shared interests in pathogen biology with **Pathogenic Eukaryotes (PHE)**, **Prokaryotic Cell and Molecular Biology (PCMB)**, **Bacterial Virulence (BV)**, **Bacterial-Host Interactions (BHI)**, **Molecular and Cellular Biology of Virus Infection (MCV)**, **Viral Dynamics and Transmission (VDT)**, and **Viral Pathogenesis and Immunity (VPI)**. Applications that are focused predominantly on pathogen biology may be reviewed in the relevant pathogen-focused study section. Applications that emphasize the pathogen's complex zoonotic or vector-borne life cycle may be reviewed in **TVZ**.

There are shared interests in immune responses to pathogens with complex life cycles with **Immunity and Host Defense (IHD)**. Applications that emphasize fundamental mechanisms of immunological responses to pathogens or disease persistence may be reviewed in **IHD**. Applications that emphasize non-human reservoirs of infection or aim to perturb transmission across organisms may be reviewed in **TVZ**.

There are shared interests in infection control strategies with **Vaccines against Infectious Diseases (VID)**. Applications that emphasize vaccine design and efficacy may be reviewed in **VID**. Applications that emphasize strategies that disrupt the pathogen's complex life cycle, such as manipulation of the pathogen, host, or environment may be reviewed in **TVZ**.

There are shared interests in infectious disease control surveillance and prevention with **Etiology, Diagnostic, Intervention and Treatment of Infectious Diseases (EDIT)**. Applications that focus primarily on vector-borne and zoonotic pathogens may be reviewed in **TVZ**. Applications that emphasize all other pathogens may be reviewed in **EDIT**.

There are shared interests in the transmission of zoonotic and vector-borne diseases with **Population-based Research in Infectious Disease Study Section (PRID)**. Applications that emphasize the transmission of zoonotic and vector-borne diseases between human populations may be reviewed in **PRID**. Applications that emphasize the pathogen life cycle, host-pathogen interactions at the individual level, or zoonotic transmission of pathogens may be reviewed in **TVZ**.

There are shared interests in infectious disease transmission modeling with **Analytics and Statistics for Population Research Panel B (ASPB)**. Applications that development and validation of infectious disease transmission modeling methodology focused on transmission between human populations may be reviewed in **ASPB**. Applications that emphasize disease ecology and modelling the interactions between pathogens, non-human hosts, and their environment may be reviewed in **TVZ**.

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There are shared interests in insect vector chemosensation with **Neuroscience of Interoception and Chemosensation (NIC)**. Applications that emphasize normal insect physiology may be reviewed in **NIC**. Applications that emphasize perturbations to the olfactory system as a strategy to reduce vector-borne disease transmission may be reviewed in **TZV**.

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## Host-Focused and Vaccine Group

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### IHD - Immunity and Host Defense

The Immunity and Host Defense (IHD) study section reviews applications that focus primarily on the host innate and adaptive immune responses to a wide variety of infectious disease microbes and microbiome communities, including viruses (except HIV), bacteria, fungi, and parasites.

#### Topics:

- Mechanistic investigations of innate and adaptive immune responses, which include but are not limited to the characterization of systemic and tissue-localized immune cells, receptors, and host factors in response to pathogenic microbes
- Mucosal immunity to microbes: host immune responses at mucosal sites to microbes and immune regulation by the microbiomes; induction and modulation of mucosal immune responses; comparison of mucosal immunity to systemic immunity, differentiation of immune responses at the mucosa and peripheral lymphoid tissues; immune cell migration to mucosal sites, including inductive and effector sites
- Modulation of immune response by microbes as model systems to study the host immune system
- Maternal/neonatal immune responses to microbes

#### Shared interests and overlaps:

There are shared interests with bacterial study sections, namely **Bacterial Virulence (BV)** and **Bacterial Host Interactions (BHI)** in responses by immune cells to bacteria. Applications focused on the bacterium or pathogenic mechanism may be reviewed in **PCMB**, **BV**, or **BHI**. Applications focused on the immune mechanisms associated with the host response to bacterial infections and those utilizing bacteria as tools to stimulate an immune response may be reviewed in **IHD**.

There are shared interests with viral study sections, namely **Molecular and Cellular Biology of Virus Infection (MCV)**, **Viral Pathogenesis and Immunity (VPI)**, and **Viral Dynamics and Transmission (VDT)** in the response by immune cells to viruses. Mechanisms of viral host evasion and identification of determinants of susceptibility or resistance may be reviewed by **MCV**, **VPI**, or **VDT**. The general mechanisms by which the immune system responds to viral persistence may be reviewed by **IHD**.

There are shared interests with **Pathogenic Eukaryotes (PTHE)** in the response by immune cells to eukaryotic pathogens. Applications where the focus is on the eukaryotic pathogen may be reviewed by **PTHE**. Applications with a focus on the immune response to a eukaryotic pathogen trigger may be reviewed in **IHD**.

There are shared interests in immune responses to pathogens with complex life cycles with **Transmission of Vector-borne and Zoonotic Diseases (TVZ)**. Applications that emphasize non-human reservoirs of infection or aim to perturb transmission across organisms may be reviewed in **TVZ**. Applications that emphasize fundamental mechanisms of immunological responses to pathogens or disease persistence may be reviewed in **IHD**.

There are shared interests with **Vaccines against Infectious Diseases (VID)** in immune responses to microbes. Applications that emphasize generation or testing of vaccines or immune responses to vaccines may be reviewed in **VID**. Applications that emphasize basic immunological studies, such as mechanistic studies of the innate, systemic, and mucosal immune responses to microbial organisms, may be reviewed by **IHD**.

There are shared interests with **Innate Immunity and Inflammation (III)** in innate immune responses. Applications focused more strongly on systemic and tissue-specific inflammation and responses may be reviewed by **III**, whereas applications involving effector functions of innate immune cells in response to microbial interactions as the predominant trigger may be reviewed by **IHD**. Genetically tractable animal and non-mammalian models of innate immunity, such as drosophila and zebrafish, may be reviewed by **III**, whereas in vitro and in vivo infectious disease models may be reviewed by **IHD**.

There are shared interests with **Hypersensitivity, Allergies and Mucosal Immunology (HAMI)** in immune responses to microbes. Applications involving innate or adaptive immune responses to environmental factors such as the microbiome and non-pathogenic molecules, in the context of hypersensitivities, allergic and/or mucosal inflammatory diseases may be reviewed by **HAMI**, whereas those involving host responses to infectious agents may be reviewed by **IHD**.

There are shared interests with **Digestive System Host Defense, Microbial Interactions and Immune and Inflammatory Diseases (DHMI), Clinical Neuroimmunology and Brain Tumors (CNBT), Lung Cellular, Molecular, and Immunobiology (LCMI), and Hepatobiliary Pathophysiology (HBPP)**. Applications addressing microbe-host immune or inflammatory interactions relevant to the diseases or disorders of the gastrointestinal tract (**DHMI**), nervous system (**CNBT**), respiratory tract (**LCMI**), and hepatobiliary system (**HBPP**) due to infection may be reviewed in the respective study section noted. Applications with a focus on innate and adaptive response to a wide variety of pathogens may be reviewed in **IHD**.

There are shared interests with **Etiology, Diagnostic, Intervention and Treatment of Infectious Diseases (EDIT)** in consideration of the host response to infectious agents. Applications that emphasize host immune responses in population-based studies may be reviewed in **EDIT**. Applications that emphasize immune responses to infectious agents, including mechanisms of the host response, and the use of mammalian model systems may be reviewed in **IHD**.

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## VID – Vaccines against Infectious Diseases

The Vaccines against Infectious Diseases (VID) Study Section reviews applications concerned with vaccine development against all classes of pathogens (except HIV). A defining feature of applications reviewed in this study section is the measurement of vaccine efficacy or vaccine-induced immune responses. This study section also reviews applications focusing on the efficacy, improvement, and safety of vaccines already approved for human or veterinary use. Applications often involve animal models, human samples, or human subjects. Applications that emphasize foundational vaccine research, such as antigen identification or technological advancements of vaccine platforms or adjuvants, are generally reviewed in the relevant pathogen, immunology, or technology-focused study section.

### Topics:

- Vaccines against pathogens of clinical or veterinary interest, including bacteria, viruses (except HIV), parasites, fungi, bacterial toxins, and pathogenic agents that have biodefense implications
- Pre-clinical and clinical vaccine testing, including protection from disease, immune response characterizations, toxicology, and safety studies
- Vaccine formulation and production for all classes of vaccines (inactivated vaccines, live-attenuated vaccines, mRNA vaccines, toxoid vaccines, viral vector vaccines, and subunit, recombinant, polysaccharide, and conjugate vaccines).
- Adjuvant, platform, and delivery optimization
- Existing vaccine performance, utility, and safety, including population-level studies of vaccine efficacy, limitations, and side effects

### Shared interests and overlaps:

There are shared interests in vaccine development with pathogen-focused study sections, including **Bacterial Host Interactions (BHI)**, **Pathogenic Eukaryotes (PHE)**, and **Viral Pathogenesis and Immunity (VPI)**. Applications that emphasize earlier stages of vaccine development, such as the identification and initial characterization of protective pathogenic antigens, their cloning and development of vector systems, and the development and immunologic evaluation of the adjuvant systems, may be reviewed in the relevant pathogen-focused study section. Applications that emphasize measurement of vaccine efficacy or vaccine-induced immune responses as the endpoint may be reviewed in **VID**.

There are shared interests in infection control strategies with **Transmission of Vector-Borne and Zoonotic Diseases (TVZ)**. Applications that emphasize strategies that disrupt the pathogen's complex life cycle, such as manipulation of the pathogen, host, or environment may be reviewed in **TVZ**. Applications that emphasize vaccine design and efficacy may be reviewed in **VID**.

There are shared interests in immune responses to pathogens with **Immunity and Host Defense (IHD)**. Applications that emphasize basic immunological studies, such as mechanistic studies of the innate, systemic, and mucosal immune responses to microbial organisms may be reviewed by **IHD**. Applications that emphasize generation or testing of vaccines or immune responses to vaccines may be reviewed in **VID**.

There are shared interests in immune mechanisms and responses with **Cellular and Molecular Immunology A (CMIA)**. Applications that emphasize antibody structure, function, engineering, or biochemistry in all other contexts may be reviewed in **CMIA**. Applications focused on immune responses to vaccines may be reviewed in **VID**.

There are shared interests in immune mechanisms and responses with **Cellular and Molecular Immunology B (CMIB)**. Applications that emphasize mechanisms of basic immunobiology and memory T and B cell development may be reviewed in **CMIB**. Applications focused on immune responses to vaccines may be reviewed in **VID**.

There are shared interests in immune response characterization with **Innate Immunity and Inflammation (III)**. Applications that emphasize mechanisms of innate immunity and inflammation, including in response to pathogen infections, may be reviewed in **III**. Applications that emphasize innate immunity in the context of vaccine responses may be reviewed in **VID**.

There are shared interests with **Innovations in Nanosystems and Nanotechnology (INN)** in developing novel vaccine nanomaterials. Applications that emphasize the design, synthesis, and development of nanomaterials may be reviewed in **INN**. Applications that emphasize the use of existing nanomaterials in a vaccine or on testing the efficacy of a vaccine-related nanomaterial may be reviewed in **VID**.

There are shared interests in nucleic acid-based vaccine development with **Drug and Biologic Therapeutic Delivery (DBTD)** and **Nucleic Acid Therapeutic Delivery (NATD)**. Applications that emphasize novel methods for vaccine delivery, with a focus on bioengineering principles, may be reviewed in **DBTD** or **NATD**. Applications that emphasize vaccine testing, efficacy, and immune responses may be reviewed in **VID**.

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