

## ENQUIRE Cluster 7 Molecular and Cellular Basic Sciences – New Study Sections formed

### **Biochemistry and Biophysics of Membranes (BBM)**

The Biochemistry and Biophysics of Membranes (BBM) Study Section reviews research applications concerned with all biochemical and biophysical aspects of structure and function of biological membranes and of their constituent lipid and protein components. Coverage includes studies deploying varied biophysical techniques such as NMR, cryo-EM/ET, diffraction studies and theoretical and computational modeling to characterize membrane architectures and folding, assembly, and dynamics of associated proteins at multiple spatiotemporal scales of resolution. Coverage includes molecular mechanisms of neurotransmission and other signaling pathways in cells of excitable tissues. It may review studies that bridge molecular aspects of signaling complex activation, inactivation, pharmacology, and molecular regulation to whole-cell electrophysiology.

#### *Topics:*

- Membrane architecture: lipid-protein interactions, membrane protein folding, assembly, structure, and dynamics.
- Molecular biophysics of membrane interfaces and membrane fusion mechanisms.
- Membrane protein structure determination.
- Computational modeling and theoretical analysis of membrane environments and membrane protein functioning.
- Molecular mechanisms of receptor-based signaling complexes, including GPCRs, 7 transmembrane receptors.
- Transporter and ion channel structure and mechanisms including voltage-dependence, ligand-gating, and ion selectivity properties. Molecular mechanisms of signaling in cells of excitable tissues, including neurotransmission activity.
- Catalysis by integral membrane and membrane surface proteins; membrane-based energy transduction mechanisms. Lipid biochemistry.

#### *Shared Interests and Overlaps:*

- There are shared interests for applications involving macromolecular biophysics and structural biology with Macromolecular Structure and Function A (MSFA) B (MSFB) and C (MSFC). Applications where protein and/or nucleic acid function is heavily dependent upon details of membrane association and membrane molecular properties are reviewed in BBM.
- There are shared interests in signal transduction mechanisms with and Receptor Biology and Signal Transduction (RBST). Applications that emphasize the investigation of structure-function relationships and biophysical mechanisms of receptors and other transmembrane signaling complexes and second-messenger system components are reviewed in BBM. Applications mainly directed toward cellular, pharmacological, and physiological studies are reviewed in RBST.
- There are shared interests in membrane biology with Cellular Structure and Function-2 (CSF-2). Application that emphasize structural and functional analysis of membranes and membrane fusion using biophysical and computational approaches are reviewed in BBM. Applications that

emphasize the chemistry, organization and interaction of proteins, carbohydrates and lipids in membrane biogenesis or membrane fusion processes are reviewed in CSF-2.

- There are shared interests in ion channels, transporters and receptors with Neuronal Communication (NC). Applications that emphasize structure-function and biophysical properties dictating mechanisms of these components are reviewed in BBM. Applications directed toward the role of these components in neuronal communication and neuronal circuitry are reviewed in NC.

### **Cell Structure and Function-1 (CSF-1)**

The Cell Structure and Function-1 (CSF-1) Study Section reviews applications that are mainly focused on protein function, processing, maturation, and degradation. Applications studying cell shape and motility, and cellular mechanisms of cell division are also reviewed here. These topics are investigated using cell biological, molecular, biochemical, and morphologic approaches and employing various model systems including but not limited to different cell types, yeast, flies, worms, frogs, plants, cultured cells, and mice.

#### *Topics:*

- Mechanisms and regulation of protein, function, processing, assembly, folding, misfolding/aggregation, quality control (chaperones), targeting and degradation.
- Post-translational modifications associated with protein processing with an emphasis on glycosylation, ubiquitination, lipidation, sumoylation, and phosphorylation.
- Transport of small molecules/ions across cell membrane via channels and transporters; maintenance of ionic and electrochemical gradients across membranes.
- Cell surface and extracellular matrix proteins, transmembrane components, and their function.
- Synthesis, genetic regulation, transcription/translation of channels, receptors, transporters, sensory transduction machinery, and second messenger system components.
- Cellular and molecular mechanism of autophagy.
- Mechanisms of Cell Division; Mitosis, Meiosis and Cytokinesis, Centromere, Centrosome, Centriole, Basal body, Mitotic spindle assembly, Kinetochore, Microtubules, Motor proteins, Chromatin organization and dynamics, Chromosome movement, Cohesion, Chromosomal crossover, Synaptonemal complex, Aneuploidy.
- Cell Shape and Motility; mechanical properties and forces of cells, Cell polarity, Cell motility, Cell adhesion, extracellular matrix interactions with the cytoskeleton, adhesions, Cilia, Podosomes, Flagella, intraflagellar transport.
- Regulation, functions and mechanisms of the ubiquitin/proteasome system.

#### *Shared Interests and Overlaps:*

- There are shared interests in protein and membrane biology with Cell Structure and Function-2 (CSF-2). Applications that emphasize protein processing and function are reviewed in CSF-1. Applications that emphasize organization and interaction of proteins in membrane biogenesis are reviewed in CSF-2.

- There are shared interests in autophagy and ubiquitination with Cellular Signaling and Regulatory Systems (CSRS). Applications that emphasize cellular mechanisms of autophagy are reviewed in CSF-1. Applications that emphasize studying programmed cell death and cell survival are reviewed in CSRS. Ubiquitination mechanisms as post-translational protein modification and a role in protein-trafficking, protein degradation, and proteostasis are reviewed in CSF-1 whereas applications with a focus on role of ubiquitination in cell regulation are reviewed in CSRS.
- There are shared interests in protein folding/misfolding/aggregation, autophagy with Cellular Mechanisms in Aging and Development (CMAD). Applications that emphasize understanding basic mechanisms of these biological processes are reviewed in CSF-1. Applications that emphasize role of these processes in aging are reviewed in CMAD.
- There are shared interests in mechanobiology, cell motility, adhesion and migration with Intercellular Interactions (ICI). Applications that emphasize the glycosylation of proteins as post-translational modifications as well as glycoprotein function in intracellular processes are reviewed in CSF-1. Applications that emphasize carbohydrates and proteoglycans in cell adhesion/migration are reviewed in ICI.
- There are shared interests in post-translational modifications with Receptor Biology and Signal Transduction (RBST). Application focused on post-translational modifications in protein processing are reviewed in CSF-1. Applications focused on role of post-translational modifications in signal transduction cascades are reviewed in RBST.
- There are shared interests in the areas of RNA biology and protein synthesis with the Molecular Genetics (MG). Applications that emphasize ribosome membrane association to understand protein trafficking are reviewed in CSF-1. Applications that emphasize genetic and molecular biology aspects of RNA metabolism, ribosome biogenesis, and mRNA translation are reviewed in MG.
- There are shared interests in studies of protein folding/misfolding with Macromolecular Structure and Function B (MSFB). Applications using cell biological approaches to study basic principles and regulation of protein folding/misfolding and its role in cell biological processes are reviewed in CSF-1. Applications using mainly molecular and biophysical approaches are reviewed in MSFB.
- There are shared interests in studies of motor proteins with Macromolecular Structure and Function C (MSFC). Applications studying these proteins in cellular processes such as cell division are reviewed in CSF-1. Applications that emphasize structure-function and biophysical properties of motor proteins are reviewed in MSFC.

### **Cell Structure and Function-2 (CSF-2)**

The Cell Structure and Function-2 (CSF-2) Study Section reviews applications that are primarily focused on mechanisms of protein targeting/trafficking; membrane biogenesis, function and trafficking/recycling; organelle biogenesis, inter-organelle communications and metabolism. Applications studying cytoskeletal organization/dynamics, and intracellular transport are also reviewed here. These topics are investigated using cell biological, molecular, biochemical, and morphologic

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approaches and employing various model systems including but not limited to different cell types, yeast, flies, worms, frogs, plants, cultured cells, and mice.

*Topics:*

- Mechanisms and regulation of vesicle-mediated trafficking along the secretory, endocytic and recycling pathways with an emphasis on the mechanisms of cargo sorting as well as vesicle formation, targeting and fusion.
- Membrane biogenesis, structure, function, dynamics and metabolism with an emphasis on the Endoplasmic reticulum (ER), organization and interactions of proteins, carbohydrates, and lipids in cell membranes; metabolism and trafficking of lipids; membrane microdomains; membrane fusion.
- Organelle biogenesis, structure, function and dynamics with an emphasis on chloroplasts, mitochondria, peroxisomes, autophagosomes, vacuoles, lysosomes, golgi apparatus; Inter-organelle communication, organelle-based control of metabolism.
- Cellular and Molecular mechanisms of endocytosis, exocytosis and membrane recycling.
- Localization, assembly, trafficking, turnover, and degradation of channels, receptors, transporters, sensory transduction machinery, and second messenger system components.
- Cytoskeletal Organization and Dynamics; Structure, function, modification, assembly, and regulation of cytoskeletal proteins.
- Nuclear organelles, Nuclear envelope, Lamins, Nuclear pore complex (NPC), nucleocytoplasmic transport; targeting, translocation, and processing of newly synthesized proteins and cargos, mRNA and ribosome trafficking.

*Shared Interests and Overlaps:*

- There are shared interests in protein and membrane biology with Cell Structure and Function-1 (CSF-1). Applications that emphasize organization and interaction of proteins in membrane biogenesis are reviewed in CSF-2. Applications that emphasize protein function and processing are reviewed in CSF-1.
- There are shared interests in mitochondrial biology with Cellular Mechanisms of Aging (CMAD) and Cellular Signaling and Regulatory Systems (CSRS) study section. Applications that emphasize biogenesis and structure/function of mitochondria are reviewed in CSF-2. Applications that emphasize mitochondrial dysfunction in aging are reviewed in CMAD. Applications that emphasize mitochondrial involvement in cellular metabolism, oxidative stress, apoptosis, and cell death are reviewed in CSRS.
- There are shared interests in channels, receptors, transporter and second messenger components with Receptor Biology and Signal Transduction (RBST). Applications that emphasize protein targeting, trafficking, and cellular metabolism are reviewed in CSF-2. Applications that emphasize cell signal transduction mechanisms are reviewed in RBST.
- There are shared interests in membrane biology with Biochemistry and Biophysics of Membranes (BBM). Applications that emphasize organization and interaction of proteins, carbohydrate and lipids in membrane biogenesis or membrane fusion are reviewed in CSF-2. Application that emphasize structural and functional analysis of membranes and membrane fusion using biophysical and computational approaches are reviewed in BBM.

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- There are shared interests in the studies of cytoskeletal proteins with Macromolecular Structure and Function C (MSFC). Applications that emphasize organization, assembly, and regulation of these proteins in intracellular organization and function are reviewed in CSF-2. Applications that emphasize structure-function relationships and biophysical properties of cytoskeletal proteins are reviewed in MSFC.
- There are shared interests in endocytosis, exocytosis, membrane recycling, and second messenger systems with Neuronal Communication (NC). Applications studying cell biology of protein targeting, trafficking, and cellular metabolism are reviewed in CSF-2. Applications that emphasize role of these in neuronal communication and neural circuitry are reviewed in NC.

### **Cellular Signaling and Regulatory Systems (CSRS)**

The Cellular Signaling and Regulatory Systems (CSRS) Study Section reviews applications that focus on a fundamental understanding of cellular information processing, cellular homeostasis, and cellular physiology. A distinguishing characteristic of these applications is an emphasis on signaling networks and the coordination of processes, including those regulating cell growth, proliferation, differentiation, and death. These topics are investigated using cell biological, molecular, biochemical, and morphologic approaches and employing various model systems including but not limited to different cell types, yeast, flies, worms, frogs, plants, cultured cells, and mice.

#### *Topics:*

- Cell cycle control, replication, mitosis, meiosis, and checkpoint controls.
- Programmed cell death and apoptosis.
- Regulation of cell growth, proliferation, and survival, particularly in the context of stress or transformation.
- Signaling pathways regulating transcription and other cellular processes.
- Integrative cell physiology, including stress responses, circadian rhythms, and circadian clock networks.
- Cellular controls that ensure the stability of the genome.
- Basic signaling mechanisms that regulate immune responses and tumorigenesis.
- Proteomics and systems biology approaches to understanding interactions and regulation of signaling pathways and networks.
- Signal transduction mechanisms, regulatory pathways employing ubiquitination and proteolysis.

#### *Shared Interests and Overlaps:*

- There are shared interests in cell signaling pathways with Receptor Biology and Signal Transduction (RBST). Applications that emphasize signaling pathways in cellular physiology are reviewed in CSRS. Applications that emphasize the biochemical and molecular mechanisms associated with signal transduction as well as crosstalk with other pathways are reviewed in RBST.
- There are shared interests in ubiquitination and autophagy with Cell Structure and Function-1 (CSF-1). Applications that emphasize studying programmed cell death and cell survival are reviewed in CSRS. Applications that emphasize cellular mechanisms of autophagy are reviewed

in CSF-1. Applications that emphasize role of ubiquitination in cell regulation are reviewed in CSRS. Applications that emphasize ubiquitination mechanisms as post-translational protein modification and a role in protein-trafficking, protein degradation, and proteostasis are reviewed in CSF-1.

- There are shared interests in cell division (mitosis and meiosis) with CSF-1. Applications that emphasize regulation of cell division such as cell cycle and checkpoints are reviewed in CSRS. Applications that emphasize dynamics of cellular structures in mechanism involved in cell division are reviewed in CSF-1.
- There are shared interests in basic cellular processes such as cell proliferation and senescence, cell death, genomic stability, DNA replication and repair with Cellular Mechanisms of Aging and Development (CMAD). Applications about basic science of these process are reviewed in CSRS. Applications that emphasize involvement of these processes in aging is the focus are reviewed in CMAD.
- There are shared interests in mechanisms that regulate immune responses with Cellular and Molecular Immunology Study Section B (CMIB). Applications that emphasize intracellular signaling mechanisms related to propagation and attenuation of immune responses with respect to cellular physiology are reviewed in CSRS. Applications that emphasize the immunological outcomes are reviewed in CMIB.
- There are shared interests in DNA replication, damage, repair, and cell cycle with Molecular Genetics (MG). Applications studying checkpoint control as a mechanism for cell cycle regulation are reviewed in CSRS. Applications studying molecular mechanism of DNA replication or repair are reviewed in MG.
- There are shared interests in circadian rhythms with Neurodifferentiation, Plasticity, Regeneration and Rhythmicity (NDPR). Applications that emphasize molecular and cellular biology of circadian rhythms are reviewed in CSRS. Applications that emphasize on neurobiology of circadian rhythm regulation are reviewed in NDPR.
- There are shared interests in proteomic/metabolomic approaches and systems biology of regulatory networks with Modeling and Analysis of Biological Systems Study Section (MABS). Applications that emphasize the underlying molecular biology, and quantitative or analytical aspects are reviewed in CSRS. Applications that emphasize mathematical models of cell signaling and regulatory networks are reviewed in MABS.
- There are shared interests in cell cycle, cell death, and signaling pathways with Molecular Oncogenesis (MONC), Cancer Molecular Pathobiology (CAMP), and Tumor Cell Biology (TCB) in OBT IRG. Applications that use normal, or cancer cells as a model to understand basic mechanisms underlying these processes are reviewed in CSRS. Applications that emphasize oncogenic transformation, tumorigenesis, or mechanisms that lead to cancer cell phenotypes are reviewed in OBT IRG.

### **Molecular Cellular Neuropharmacology (MCNP)**

The Molecular and Cellular Neuropharmacology (MCNP) Study Section reviews applications related to the neurophysiology, neuropharmacology and neurochemistry of neuronal function and dysfunction with a focus on understanding addiction, stress effects and neuropsychiatric disorders at the cellular and

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molecular level. Studies involve molecular and cellular mechanisms, circuit analyses, experimental and therapeutic approaches, and drugs of abuse. Both hypothesis-generating and hypothesis-driven research are considered. Studies employ molecular, cellular, biochemical, pharmacological, electrophysical, optogenetic, chemogenetic, viral, transgenic, and imaging techniques and utilize a wide range of model systems.

*Topics:*

- Molecular, cellular and circuit analysis of addiction, stress effects, neuropsychiatric disorders
- The neuropharmacology and neurochemistry of neurotransmitter, neuropeptide, neuroendocrine and neuromodulator regulation as they relate to normal neuronal function and dysfunction and drugs of abuse
- Neurotransmitter and neuropeptide synthesis and regulation
- Screening for modulators of neuropsychiatric drugs and drugs of abuse
- Epigenetic regulation of gene expression and-omics analysis relevant to addiction and neuropsychiatric disorders
- Molecular and cellular mechanisms underlying experimental and therapeutic approaches to addiction and neuropsychiatric disorders
- Integration and propagation of electrical signals within the context of normal neuronal physiology and in simple circuit function and dysfunction

*Shared Interests and Overlap:*

- There are shared interests in addiction and psychiatric disorders with Pathophysiological Basis of Mental Disorders and Addictions (PMDA). Applications involving mechanisms of addiction and psychiatric disorders at the cellular and molecular level – including “-omics” data analysis are reviewed in MCNP. Applications that emphasize the broad spectrum of issues related to addiction and mental disorders using in vitro and in vivo approaches and a variety of methods, including cellular and molecular techniques are reviewed in PMDA.
- There are shared interests in the molecular mechanisms of complex brain disorders with Molecular and Cellular Biology of Complex Brain Disorders Special Emphasis Panel (ZRG1 MDCN-P 57). Applications that emphasize pain, epilepsy and mood disorders or the mechanisms of action of the psychotherapeutic agents involved are reviewed in MCNP. Applications that emphasize the molecular and cellular mechanisms of such disorders, particularly autism and schizophrenia are reviewed in ZRG1 MDCN-P (57).
- There are shared interests in the neurobiological actions of psychoactive and psychotherapeutic agents with Neurobiology of Motivated Behavior (NMB). Applications that primarily emphasize basic molecular and cellular mechanisms of such agents are reviewed in MCNP. Applications that emphasize the action of such agents on behavior and at the system level and the use of molecular, cellular, anatomical and behavioral techniques are reviewed in NMB.
- There are shared interests in neuroendocrinology with Behavioral Neuroendocrinology, Neuroimmunology, Rhythms, and Sleep (BNRS). Applications that emphasize the molecular and cellular mechanisms of neuroendocrinology are reviewed in MCNP. Applications involving the neurobiological basis of behavior with a focus on neuroendocrinological processes are reviewed in BNRS.

- There are shared interests in the role of addiction and drug abuse on normal and disordered cognitive processes with Biobehavioral Regulation, Learning and Ethology Study Section (BRLE). Applications that emphasize the underlying cellular or molecular mechanisms of addiction or abuse are reviewed in MCNP. Applications that emphasize the behavioral aspect are reviewed in BRLE.
- There are shared interests in the neurobiology of pain with Neurobiology of Pain and Itch (NPI). Application that emphasize cellular and molecular mechanisms of substances used to treat these disorders are reviewed in MCNP. Applications that emphasize the neurobiology of pain, analgesia and itch are reviewed in NPI.
- There are shared interests in neuropharmacology and neurochemistry with Drug Discovery for the Nervous System (DDNS). Applications that emphasize the molecular and cellular action of neuroactive drugs are reviewed in MCNP. Applications that emphasize the synthesis of such drugs are reviewed in DDNS.
- There are shared interests in the pharmacology, physiological and chemical studies of neurotransmitters and neurotransmitters at the cellular and molecular level with Receptor Biology and Signal Transduction Study Section (RBST). Applications focused on the role of these in understanding normal neuronal function and dysfunction involving addiction, stress, neuropsychiatric disorders and drugs of abuse are reviewed in MCNP. Applications focused on neurotransmitter or drug interactions with receptors or neurotransmitters to study signal transduction and cell biological responses are reviewed in RBST.
- There are shared interests in electrical coupling and neurophysiology with Neuronal Communications (NC). Applications focused on their role in normal neuronal physiology and circuit function and dysfunction are reviewed in MCNP. Applications focused on the role of these in neuronal communication and neural circuitry are reviewed in NC.

### **Molecular Genetics (MG)**

The Molecular Genetics (MG) Study Section reviews applications involving molecular mechanisms of genome replication and maintenance, epigenetics, genome organization, gene expression, RNA metabolism, and protein synthesis. Any experimental or model system is appropriate if the focus on understanding fundamental principles and molecular biology associated with these research topics. Experimental approaches include the use of whole organisms, transgenic organisms, stem cells, differentiation, development and disease models, cell free systems, genetics, and genomics.

#### *Topics:*

- Molecular mechanisms of assembly, functions, silencing, and activation of chromosomes, centromeres, euchromatin, heterochromatin and telomeres.
- Molecular mechanisms of chromatin assembly, structure, function, domains, remodeling, chromatin regulators, epigenetic controls, epigenetic inheritance processes, and DNA and histone modifications.
- Genome organization: higher order chromatin assembly and structure, long-range chromatin interactions, chromatin dynamics, epigenetic regulation of chromatin structure.



- DNA Metabolism, including mechanisms of DNA replication, recombination, DNA damage and repair, checkpoint regulation; maintenance of genome stability; mobile genetic elements.
- RNA metabolism, including RNA functions, modifications, processing, decay and turnover as well as RNA splicing, alternative splicing, non-coding RNA synthesis and functions (cellular and extracellular RNA), tRNA functions, and ribonucleoproteins.
- Mechanisms of translation and protein synthesis, including ribosome biogenesis, function, localization, trafficking, skipping, pausing, stalling, and mRNA modification.
- Mechanisms of transcription, including regulatory DNA sequences, transcription factors (protein, RNA and nucleoprotein complexes and including steroid nuclear receptors) and chromatin modulation.

*Shared Interests and Overlaps:*

- There are shared interests in bacterial molecular biology with Prokaryotic Cell and Molecular Biology (PCMB). Applications that address these processes in bacteria as model organisms of eukaryotes or emphasize fundamental principles of DNA/RNA metabolism are reviewed in MG. Applications that focus on molecular mechanisms of DNA/RNA metabolism to understand prokaryote biology and physiology are reviewed by PCMB.
- There are shared interests in the genomic-scale analysis of processes related to transcription, splicing, epigenetics, DNA replication and repair, and translation with Genomics, Computational Biology and Technology (GCAT). Applications that focus on elucidating the molecular mechanism of these processes are reviewed in MG. Applications that develop and apply novel and emerging technologies to study and catalog these processes at a genomic scale are reviewed in GCAT.
- There are shared interests in genome stability and molecular mechanisms of DNA damage and repair with Cancer Etiology (CE). Applications that use cancer-associated alterations to understand normal noncarcinogenic molecular genetic mechanisms are reviewed in MG. Applications that emphasize the study of aberrant molecular genetic mechanisms to understand the process of carcinogenesis are reviewed in CE.
- There are shared interests in the areas of RNA biology and protein synthesis with the Cell Structure and Function-1 (CSF-1). Applications that emphasize genetic and molecular biology aspects of RNA metabolism, ribosome biogenesis, and mRNA translation are reviewed in MG. Applications that focus on ribosome membrane association to understand protein trafficking are reviewed in CSF-1.
- There are shared interests in DNA replication, repair and cell cycle with Cellular Signaling and Regulatory Systems (CSRS). Applications that emphasize molecular mechanism of DNA replication or repair are reviewed in MG. Applications studying checkpoint control as a mechanism for cell cycle regulation are reviewed in CSRS.
- There are shared interests in DNA damage/repair with Radiation Therapeutics and Biology (RTB). Applications that emphasize fundamental aspects of DNA repair with no direct studies of cancer are reviewed in MG. Applications that emphasize investigations of mechanisms of DNA damage/repair and combination of radiation with novel agents, such as targeting growth factors, signaling pathways, DNA repair, and tumor angiogenesis, are reviewed in RTB.
- There are shared interests in mechanisms of genetic regulation with Macromolecular Structure and Function B (MSFB). Applications that emphasize biological mechanisms and implications of these for cellular processes are reviewed in MG. Applications involving studies of RNA, DNA and

smaller component protein-nucleic acid complexes where the focus is primarily directed toward structure-function properties and biophysical interactions of components that establish molecular bases for DNA- and RNA-driven cellular processes are reviewed in MSFB.

### **Macromolecular Structure and Function A (MSFA)**

The Macromolecular Structure and Function A (MSFA) Study Section reviews applications that focus on the structure-function relationships of proteins and polynucleic acids with particular focus on catalytic and other functional properties including interactions between enzymes and their effectors and substrates, the biochemistry and biophysics of metal center containing proteins, biochemistry and metabolism of reactive oxygen and nitrogen species, elaboration of biochemical mechanism and structure-based drug development. Deployment of a broad range of physical, chemical, genetic, kinetic, mechanistic, and thermodynamic experimental tools is covered, along with extensive depth and range in theoretical and computational approaches to molecular biophysics. Commonly engaged experimental methods include NMR, EPR, crystallography, optical spectroscopies and electron microscopy.

#### *Topics:*

- Mechanistic enzymology of protein and nucleic acid catalysts.
- Kinetic studies of catalytic reactions.
- Structural bioinformatics including mechanistic strategies of enzyme superfamilies.
- Macromolecular studies of metabolic pathways and networks.
- Models of metallo-active sites: small molecule complexes and peptides mimetics of enzyme active site reactivity or metal center specificity, including redox catalysis and studies of oxygen/nitrogen species.
- Biophysical theory and computational simulation of macromolecular structure, function and dynamics; and prediction of macromolecular interactions at varying spatial resolutions and timescales.
- Computational docking and experimental studies of protein-ligand interactions and dynamics.
- Discovery or design and evaluation of enzyme inhibitors or allosteric modulators. Structure-based drug design.
- Analysis of and prediction of properties of intrinsically disordered proteins and protein domains.

#### *Shared Interests and Overlaps:*

- There are shared interests for applications involving macromolecular biophysics and structural biology with Macromolecular Structure and Function B (MSFB), Macromolecular Structure and Function C (MSFC) and Biochemistry and Biophysical of Membranes (BBM).
  - Applications involving computational or theoretical prediction of protein folding/misfolding pathways or properties of intrinsically disordered proteins and domains are reviewed in MSFA. Applications making primarily experimental exploration of the same issues are reviewed in MSFB.
  - Applications that emphasize integration of structure and catalytic mechanisms of enzymes or ribozymes are reviewed in MSFA. Applications studying structure-function of

large cellular signaling complexes, motors and cytoskeletal components are reviewed in MSFC.

- Applications focused on details of enzyme mechanisms, redox chemistry, metalloenzymes and metal binding proteins, or protein-ligand interactions are reviewed in MSFA. Applications focused on roles of lipids and membrane structures in mechanisms are reviewed in BBM.
- Applications involving extensive development and/or deployment of biomolecular theory and computational simulation methods may be assigned to MSFA. Applications with context that is heavily dependent upon details of membrane environments are reviewed in BBM.
- There are shared interests in natural product biosynthesis with Synthetic and Biochemistry A (SBCA). Applications linking metallo-centers to enzymatic catalysis and those examining molecular mechanisms of metal homeostasis are reviewed in MSFA. Applications using synthetic and coordination chemistry to design new metallo-reagents are reviewed in SBCA.
- There are shared interests in natural product biosynthesis with Synthetic and Biochemistry B (SBCB). Applications that emphasize enzyme mechanisms of biosynthetic pathway components are reviewed in MSFA. Applications focused on overall chemistry of end products or their derivatives are reviewed in SBCB.
- There are shared interests in prokaryotic cellular processes with Prokaryotic Cell and Molecular Biology (PCMB). Applications involving extensive biophysical and biochemical analysis of metal ion containing proteins, enzymology of prokaryotic molecules, and proteins regulating metal influx, efflux and transport are reviewed in MSFA. Applications that emphasize bacterial processes but also include some use of structural or biophysical methods are reviewed in PCMB.
- There are shared interests in cytochrome P450 chemistry with the Xenobiotic and Nutrient Disposition and Action (XNDA). Applications involving primarily structure, function and mechanism of P450 enzymes are reviewed in MSFA. Applications involving xenobiotic/drug metabolism are reviewed in XNDA.

### **Macromolecular Structure and Function B (MSFB)**

The Macromolecular Structure and Function B (MSFB) Study Section reviews applications that involve a broad range of biochemical, biophysical, and computational modeling approaches to address basic structure-function relationships in a variety of biological systems. The emphasis is on elucidating characteristics of individual proteins, nucleic acids, carbohydrates and their complexes, and how their properties affect biological function of the molecules. Commonly engaged experimental approaches include development and application of NMR, x-ray scattering and diffraction, and optical and microwave spectroscopic methods to macromolecular structure and dynamic studies.

#### *Topics:*

- Biophysical properties of proteins: structural dynamics, folding and misfolding processes; engineering proteins to targeted function; allostery and cooperativity in mechanism and control; thermodynamic and electrostatic features of protein stability, protein-protein interactions and function; folding and chaperone mechanisms.

- Pathogenic protein misfolding and aggregation properties, including those associated with neurodegenerative disorders.
- Biophysical and functional characterization of intrinsically disordered proteins and protein domains.
- Effects of protein post-translational modifications on structure and regulation of function.
- Structure and dynamics of DNA including effects of chemical modification. Protein-DNA interactions.
- Effects of protein post-translational modification and epigenetic marks on protein-DNA interactions.
- RNA species structure and dynamics; RNA-protein interactions; RNA catalysis, folding and splicing; ribozyme-based therapeutics.
- Structure-function analysis of component protein-nucleic acid complexes of DNA replication, transcription, and repair processes and of DNA- or RNA- based genome editing systems. Aspects of ribosomal structure and function.
- Physical properties and functional characterization of carbohydrates and glycoproteins.
- Soluble component elements of signal transduction including circadian rhythm proteins, cytokines and chemokines and their receptors, kinases and phosphatases.

*Shared Interests and Overlaps:*

- There are shared interests in macromolecular biophysics and structural biology with Macromolecular Structure and Function A (MSFA), Macromolecular Structure and Function C (MSFC), and Biochemistry and Biophysics of Membranes (BBM). Applications focused on structural or biophysical analyses of RNA molecules, complexes or ribozymes, protein-nucleic acid complexes, biophysical properties of proteins, misfolded or unstructured proteins, or post-translational modifications of proteins are reviewed in MSFB.
  - Applications intensively deploying computational or theoretical approaches are reviewed in MSFA. Structure-function applications of larger macromolecular assemblies of cell signaling, DNA-replication and repair, and RNA translational processes are reviewed in MSFC. Applications involving extensive development and deployment of single-molecule detection or manipulation technology and of cryo-EM/ET methodology are reviewed in MSFC. Applications to systems with essential membrane interactions are reviewed in BBM.
- There are shared interests in the areas of protein folding /misfolding with Cell Structure and Function-1 CSF-1. Applications that emphasize protein folding/misfolding at molecular detail using biophysical and biochemical tools are reviewed in MSFB. Applications using cell biological approaches to study basic principles and regulation of in vivo folding with implications for cell biological processes are reviewed in CSF-1.
- There are shared interests in mechanisms of genetic regulation with Molecular Genetics (MG). Applications involving studies of RNA, DNA and smaller component protein-nucleic acid complexes where the focus is primarily directed toward structure-function properties and biophysical interactions of components that establish molecular bases for DNA- and RNA-driven cellular processes are reviewed in MSFB. Applications that emphasize biological mechanisms and implications of these for cellular processes are reviewed in MG.

### **Macromolecular Structure and Function C Study Section (MSFC)**

The Macromolecular Structure and Function C (MSFC) Study Section reviews applications concerned with the structural biology and molecular mechanisms of proteins and nucleic acids in larger multi-protein complexes and molecular machines, deploying a broad range of biochemical, biophysical, and visualization approaches at atomic- to supramolecular-level resolution to elucidate molecular interactions key to biological function.

#### *Topics:*

- Protein-protein and protein-nucleic acid interactions in larger assemblies including those responsible for various DNA or RNA transactions in replication, transcription, repair, and translation and mechanisms of allostery.
- Structure Function studies of molecules involved in cell-cell interactions including those driving processes of adhesion, migration, signal transduction and mechano-transduction.
- Molecular motors and systems driven by energy-dependent conformational changes including ATPases.
- Structure-function characteristics of cytoskeletal protein elements including actin, myosins, microtubules, and intermediate filaments.
- Molecular biophysical studies of muscle structure and function.
- Structural and biophysical studies of viral assemblies.
- Biophysical studies of liquid-liquid phase separation of biomolecular species and formation of membraneless organelles.
- Methods of single-molecule imaging and mechanical manipulation of signaling, motor, and nucleoprotein complexes.
- Cryo-electron microscopy, cryo-electron tomography, NMR, electron diffraction and other biophysical studies of macromolecular assemblies. Computational methods for processing of data and for construction, refinement and visualization of structural models derived from these empirical sources.

#### *Shared Interests and Overlaps:*

- There are shared interests for applications involving macromolecular biophysics and structural biology with Macromolecular Structure and Function A (MSFA), Macromolecular Structure and Function B (MSFB), and Biochemistry and Biophysics of Membranes (BBM) study sections. Applications focused on larger membrane-free protein and ribonuclear protein assemblies serving as molecular machines, ATP-dependent molecular motors including muscle proteins, components of intracellular signaling cascades, and intercellular interaction and signaling mediators are reviewed in MSFC. Applications involving extensive development and deployment of single-molecule methods or cryo-EM/ET are reviewed in MSFC.
- There are shared interests in molecular motors and proteins of the cytoskeleton and extracellular matrix with Cell Structure, Function -1 and -2 (CSF-1, CSF-2). Applications that emphasize structure-function relationships and biophysical properties of these molecules are reviewed in MSFC. Applications that emphasize roles of organization, assembly, and regulation in mechanisms of cell biology are reviewed in CSF-1 or CSF-2.

- There are shared interests in DNA, RNA and protein-nucleic acid complexes driving cellular processes including replication, repair, transcription, translation and protein synthesis, and genome organization with Molecular Genetics (MG). Applications that primarily focus on structure-function and biophysical properties are reviewed in MSFC. Applications that focus on understanding fundamental principles of cell and molecular biology associated with these are reviewed in MG.
- There are shared interests in molecular mechanisms of prokaryotic cellular processes with Prokaryotic Cell and Molecular Biology (PCMB). Applications involving principally structure-function studies of prokaryotic proteins, nucleic acid species, and protein-nucleic acid complexes are reviewed in MSFC. Applications that emphasize bacterial processes but also include moderate deployment of structural methods are reviewed in PCMB.

### **Neuronal Communications (NC)**

The Neuronal Communications (NC) Study Section reviews neuroscience applications on the cell biology of neuronal communication and circuits. Specific areas include synaptic structure, function, modulation and mechanisms underlying synaptic plasticity. Emphasis is on fundamental mechanisms of neuronal function and communication including those relevant to disease processes involving central and peripheral nervous system disorders. Studies include protein and organelle trafficking, cell surface and extracellular matrix molecules in cell recognition and function, and cytoskeletal functions across the life span as they relate to neural circuits. Also considered are studies on electrical coupling, signal transduction and quantitative modeling of synaptic integration. Both hypothesis- and non-hypothesis-driven research are considered, as well as a wide range of techniques and model systems including vertebrates and invertebrates.

#### *Topics:*

- Synaptic assembly and function, mechanisms of endocytosis, exocytosis, membrane recycling, axonal and dendritic transport, neuronal polarity, growth cones, structural plasticity, homeostasis, and mRNA localization in the central and peripheral nervous systems.
- Alterations of synaptic integrity and function associated with central and peripheral nervous system disorders; cytoskeletal pathology as it relates to neurodegenerative diseases, disruption of transport
- Studies that incorporate emerging ‘-omics’ data as they relate to synaptic structure, function and plasticity
- Molecular mechanisms underlying synaptic plasticity such as long-term potentiation (LTP), long-term depression (LTD) and paired pulse facilitation; modulation of neuronal excitability
- Signal transduction molecules in neurons, glia, muscle and excitable cells including sensory transducers and modulators
- Modulators of synaptic function including growth factors, neurotrophins, neuropeptides and neurosteroids.
- The neurophysiology of neurotransmitter, neuropeptide, and neuromodulator signaling, and regulation as they relate to neuronal communication and circuits.

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- Electrical coupling and calcium as a second messenger, including calcium storage, homeostasis and buffering in the context of neuronal communication and circuits.
- The regulation and modulation of ion channels, transporters and receptors, sensory transduction machinery, and second messenger systems, including localization, assembly, trafficking, turnover and degradation in the context of neuronal communication and circuits.
- Biophysical integration of neural function including quantitative modeling of neural function such as synaptic integration and spike coding.

*Shared Interests and Overlaps:*

- There are shared interests in synapse formation and plasticity with Neurodifferentiation, Plasticity, and Regeneration (NDPR). Applications with a greater emphasis on adult synaptic function and underlying mechanisms such as vesicular trafficking, exocytosis or cytoskeletal dynamics are reviewed in NC. Applications with an emphasis on development, regeneration, or circadian rhythms are reviewed in NDPR.
- There are shared interests in neurodegenerative processes with Cellular and Molecular Biology of Neurodegeneration (CMND). Neurodegenerative applications with a significant emphasis on synaptic mechanisms, cytoskeleton regulation, or intracellular trafficking machinery are reviewed in NC. Applications involving synapses, the cytoskeleton or trafficking but focused on the neurodegenerative processes are reviewed in CMND.
- There are shared interests in the use of the molecular biological and genetic tools in studies of the nervous system with Molecular Neurogenetics (MNG). Applications using molecular biology and genetic techniques with a focus on synaptic plasticity are reviewed in NC. Applications focused on the genetics, genetic tools or genetic discovery are reviewed in MNG.
- There are shared interests in neurobiological mechanisms and neural plasticity with Learning, Memory and Decision Neuroscience (LMDN). Applications that emphasize the cellular level of neuronal communications and plasticity are reviewed in NC. Applications that emphasize organismal/systems level of plasticity, learning, memory, and decision making are reviewed in LMDN.
- There are shared interests in molecular mechanisms of endocytosis, exocytosis and membrane recycling, cytoskeleton, and second messenger systems with Cell Structure and Function-2 (CSF-2). Applications that emphasize the role of these in neuronal communications and neural circuitry are reviewed in NC. Applications that emphasize cellular and molecular mechanisms of receptor mediated and intracellular signaling are reviewed in CSF-2.
- There are shared interests in signaling molecules and signal transduction mechanisms, neuromodulation, sensory transduction, and second messengers in neural cell types with Receptor Biology and Signal Transduction (RBST). Applications that emphasize the role of these in neuronal communications and neural circuitry are reviewed in NC. Applications that emphasize cellular and molecular mechanisms of receptor mediated and intracellular signaling are reviewed in RBST.
- There are shared interests in electrical coupling and neurophysiology with Molecular Cellular Neuropharmacology (MCNP). Applications that emphasize the role of these in neuronal communication and neural circuitry are reviewed in NC. Applications that emphasize the role of these in normal neuronal physiology and circuit function and dysfunction are reviewed in MCNP.

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- There are shared interests in ion channels, transporters and receptors with Biochemistry and Biophysics of Membranes (BBM). Applications directed toward the role of these components in neuronal communication and neural circuitry are reviewed in NC. Applications focused on structure-function and biophysical properties dictating the mechanisms of these components are reviewed in BBM.

### **Prokaryotic Cell and Molecular Biology (PCMB)**

The Prokaryotic Cell and Molecular Biology (PCMB) Study Section reviews applications addressing the genetics, genomics, biochemistry, structure, physiology and behavior of bacteria, archaea, and their phages. The focus of the study section is on research projects with outcomes applicable principally to microbial organisms. Studies may use pathogenic or nonpathogenic organisms and be at the genetic, molecular, biochemical, cellular, or community level and may also include computational approaches.

#### *Topics:*

- Transcription, RNA processing, gene expression and regulation, regulatory networks and dynamics.
- Replication, recombination, mutation, repair, mobile genetic elements and gene transfer
- Protein synthesis and modification.
- Intermediary metabolism and energetics, including mechanisms of metal ion homeostasis, toxicity, and bacterial resistance.
- Microbial development, differentiation, morphogenesis, cell division, export, secretion, extracellular structures and intracellular localization.
- Intercellular signaling, environmental interactions, symbiosis, chemotaxis and motility.
- Stress response, survival, and death.
- Assembly of supramolecular structures.
- Modeling of microbial cell processes, functional genomics and proteomics.
- Molecular and cellular studies of microbiomes and biofilms.
- Bacterial defense systems including CRISPR biology.

#### *Shared Interests and Overlaps:*

- There are shared interests in molecular biology with Molecular Genetics A (MG). Applications that focus on molecular mechanisms of DNA/RNA metabolism to understand prokaryote biology and physiology are reviewed in PCMB. Applications that address these processes in bacteria as model organisms of eukaryotes or emphasize fundamental principles of DNA/ RNA metabolism are reviewed in MG.
- There are shared interests in microbial genomics with Genomics, Computational Biology and Technology Study Section (GCAT). Applications that emphasize processes of microbial communities are reviewed in PCMB. Applications that emphasize development of metagenomic analysis methods are reviewed in GCAT.
- There are shared interests in the investigations of the process of bacterial infections with Bacterial Pathogenesis (BACP). Applications that focus on the basic genetics, biochemistry and



physiology of bacterial pathogens are reviewed in PCMB. Applications that focus on the pathogenesis associated with bacterial infections are reviewed in BACP.

- There are shared interests in the area of anti-bacterial strategies with Drug Discovery and Mechanisms of Antimicrobial Resistance (DDR). Applications that focus on molecular mechanisms of potential bacterial drug targets are reviewed in PCMB. Applications that focus on the development of anti-bacterial drugs are reviewed in DDR.
- There are shared interests in cellular metabolism and metallo-biochemistry with Macromolecular Structure and Function A (MSFA). Applications that emphasize bacterial processes that also include structural methods are reviewed in PCMB. Applications involving biophysical and biochemical analysis of metal ion containing proteins, transport proteins, or enzymology of prokaryotic molecules are reviewed in MSFA.
- There are shared interests in prokaryotic signaling and cytoskeletal networks with Macromolecular Structure and Function C (MSFC). Applications that emphasize bacterial processes but also include structural methods are reviewed in PCMB. Applications involving principally structure-function studies of prokaryotic molecules and complexes are reviewed in MSFC.

### **Receptor Biology and Signal Transduction (RBST)**

The Receptor Biology and Signal Transduction (RBST) Study Section focuses on basic molecular mechanisms of receptor mediated cellular signaling. The applications involve pharmacological, physiological, and neurochemical studies of cell surface receptors including G-protein coupled receptors (GPCRs), ion channel receptors, and enzyme-linked receptors and their regulation. The study section also reviews post-translational modifications, second messengers, kinases, phosphatases and calcium regulatory mechanisms associated with signal transduction as well as cross-talk with other pathways. The studies may involve a variety of model systems including all cell types, uni- or multi-cellular organisms.

#### *Topics:*

- Pharmacological, physiological, and neurochemical studies of cell surface and intracellular receptors including G protein coupled receptors, ion channels, hormone receptors, pumps, transporters.
- Receptor activation and modulation by interacting proteins and allosteric modulators; signal transduction cascades.
- Post-translational modifications of proteins, channels, receptors, transporters, and their role in signal transduction.
- Signaling molecules associated with signal transduction in various cell types, including neuromodulators and sensory transducers in neurons, glia, muscle, and excitable cells.
- Coupling to second messenger pathways, including G-proteins and other enzymatic effectors; cyclic nucleotides, bioactive lipids, and Ca<sup>2+</sup>; Intracellular calcium storage, homeostasis, and buffering; kinases, phosphatases, phospholipases associated with signal transduction mechanisms.
- Studies of signal transduction and related metabolic pathways.

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- Regulatory mechanisms including scaffolding, selective proteolysis and regulators of G-protein signaling (RGS) proteins.
- Transport of small molecules/ions across membranes via channels and transporters; whole cell-electrophysiology studies of ion channel and receptor function.

*Shared Interests and Overlaps:*

- There are shared interests in cell signaling pathways with Cellular Signaling and Regulatory Systems (CSRS). Applications that focus on the biochemical and molecular studies of signaling cascades are reviewed in RBST. Applications with a focus on signaling pathways in cellular physiology are reviewed in CSRS.
- There are shared interests in post-translational modifications with Cell Structure and Function-1 (CSF-1). Applications focused on role of post-translational modifications in signal transduction cascades are reviewed in RBST. Application focused on post-translational modifications in protein processing are reviewed in CSF-1.
- There are shared interests in channels, receptors, transporter and second messenger components with Cell Structure and Function-2 (CSF-2). Applications with a focus on cellular signal transduction are reviewed in RBST. Applications with a focus on protein targeting, trafficking, and cellular metabolism are reviewed in CSF-2.
- There are shared interests in signal transduction pathways mediated by kinases, phosphatases, and growth factors with Tumor Cell Biology (TCB). Applications studying signal transduction pathways in normal cellular processes are reviewed in RBST. Applications with a focus on tumor cell biology are reviewed in TCB.
- There are shared interests in cytokine signaling with Cellular and Molecular Immunology B (CMIB). Applications focused on cytokine mediated receptor activation and signal transduction pathways are reviewed in RBST. Applications focused on cytokine signaling in mediating immune response are reviewed in CMIB.
- There are shared interests in signal transduction mechanisms with Biochemistry and Biophysics of Membranes (BBM). Applications focused on cellular, pharmacological, and physiological studies are reviewed in RBST. Applications focused on investigating structure-function relationships and biophysical mechanisms of receptors and other transmembrane signaling complexes and second messenger system components are reviewed in BBM.
- There are shared interests in signaling molecules and signal transduction mechanisms, neuromodulation, sensory transduction, and second messengers in neural cell types with Neuronal Communication (NC) study section. Applications focused on cellular and molecular mechanisms of receptor mediated and intracellular signaling are reviewed in RBST. Applications with emphasis on neuronal communication and neural circuitry are reviewed in NC.
- There are shared interests in pharmacology, physiological and chemical studies of neurotransmitters and neurotransmitters at the cellular and molecular level with Molecular Cellular Neuropharmacology (MCNP). Applications focused on neurotransmitter or drug interactions with receptors or neurotransmitters to study signal transduction and cell biological responses are reviewed in RBST. Applications focused on the role of these in understanding normal neuronal function and dysfunction involving addiction, stress, neuropsychiatric disorders and drugs of abuse are reviewed in MCNP.