BIOCHEMISTRY & MOLECULAR BIOLOGY (B)

B 0105 - Metabolic Analyses by GC-MS
Credit(s): 3-6 Credits
The student will participate in the separation and identification of intermediary metabolites or cell membrane lipids by gas chromatography-mass spectrometry. The instrument to be used is one of the most advanced analytical devices available today: the VG Trio-2 Gas Chromatograph-Mass Spectrometer Computer. The student will learn the type of techniques now used to prove, for example, that an athlete has used illicit steroids, a criminal has trafficked in controlled substances, or a newborn infant has a genetic metabolic defect. Specifically, the student will assist in the collection and preparation of clinical or research samples and synthesize appropriate standards relevant to our studies in nutritional assessment and genetic screening.

B 0107 - Mechanisms of Transcription Regulation
Credit(s): 7 Credits
Transcription is one of the important levels of regulation of biological processes at which the level of gene expression can be modulated in response to changing needs of the organism. Understanding the mechanism of regulation of transcription at the molecular level is therefore of crucial importance in understanding development and pathogenesis. It has now been established that in the case of bacterial RNA polymerase (RNAP) direct protein-protein interactions between RNAP and transcription activators are critical for the activation to occur in vivo. In an attempt to understand the role of these interactions in transcription activation, two experimental procedures have been adopted. The procedures to introduce fluorescent probes to specific locations in RNAP and activator molecules have been developed. Using these probes, the development of protein-protein contacts, the structural features of protein-protein complex, and conformational changes within the complex can be studied. The topography of recognition sites for protein-protein interactions can be determined using footprinting methods. Several aspects of this project will be available for study.

B 0110 - Molecular Basis of Acute Myeloid Leukemia
Credit(s): 7 Credits
My laboratory is studying the biochemical activity of the RNA polymerase II elongation factor ELL and its role in the development of acute myeloid leukemia. ELL is a family of RNA polymerase II general elongation factors that can increase the catalytic rate of transcription elongation by Pol II. Our goal is to characterize the biochemical mechanisms of action for ELL. Several aspects of this project will be available for study.

B 0111 - Analysis of Diffusible Vesicle Intermediates in Inter-Organelle Transport
Credit(s): 7 Credits
A system has been developed that measures the transport of protein between two distinct populations of cellular organelles. This project involves modifying this system to determine whether transport between organelles occurs when both populations of membranes are bound to a solid matrix. The objective is to determine whether protein transport requires direct contact between organelles or involves a membrane vesicle intermediate that can diffuse between organelles. The project requires a minimum of 8 hours a week. Prerequisite: successful completion of one-half day radiation safety course. The expectations are that a student will acquire demonstrable skill in: knowledge of the project’s experimental concepts, basic biochemical and cell biological laboratory techniques, principles of experimental design, concept of experimental controls, and evaluation and interpretation of data.

B 0118 - Identifying New Lipid Molecule
Credit(s): 1-12 Credits (Repeatable for credit)
This elective will focus on identifying new metabolites that may be mediators or biomarkers of inflammation and cardiovascular disease. Samples will be analyzed via a variety of quantitative tools including gas chromatography (GC), HPLC, GC/mass spectrometry and electrospray ionization mass spectrometry. Background in analytical methods and cell culture techniques will be helpful.

B 0303 - Biochemistry and Molecular Biology Extramural Career Exploration
Credit(s): 1-12 Credits

B 0401 - Metabolic Analysis by GC-Mass Spectrometry
Credit(s): 2-12 Credits
The student will participate in the separation and identification of intermediary metabolites or cell membrane lipids by gas chromatography-mass spectrometry. The instrument to be used is one of the most advanced analytical devices available today. The VG Trio-2 Gas Chromatograph-Mass Spectrometer. The student will learn the type of techniques now used to prove, for example, that an athlete has used illicit steroids, a criminal has trafficked in controlled substances, or a newborn infant has a genetic metabolic defect. Specifically, the student will assist in the collection and preparation of clinical or research samples and synthesize appropriate standards relevant to our studies in nutritional assessment and genetic screening.
B 0405 - Molecular Mechanism of New Anti-Cancer Drug
Credit(s): 6 Credits
Amino-terminal processing is one of the most common protein processing events which occurs in all living cells and is essential for normal cell growth. We have discovered two distinct eukaryotic methionine aminopeptidases (MetAPs) that are responsible for this cellular event. Recently, the type-2 MetAP was found to be the common target of angiogenesis inhibitors, TNP-470 and ovalicin. Angiogenesis, the process of new blood vessel formation, plays very important roles in both physiological states and a variety of pathological states. It has been demonstrated that angiogenesis is essential for the growth of solid tumors. TNP-470 was the first antiangiogenesis compound that entered clinical trials as an anti-cancer agent. It has shown significant anti-tumor activity against 55 different types of human and animal tumors. Ovalicin, on the other hand, possesses potent immunosuppressive activity as well as antiangiogenesis activity. We want to determine the molecular mechanism of the angiogenesis inhibitors, TNP-470 and ovalicin, by biochemical and genetic approaches. This research should lead to better understanding of the molecular mechanism of angiogenesis and the development of better anti-cancer agents. The last two decades, we have investigated the roles of polypeptide growth factors in normal and transformed cell growth. Our research currently focuses on the following areas 1) role of cell surface retention sequence binding protein-1 (CRSBP-1) in autocrine regulation of cell growth transformation, 2) role of the TGF-B type V receptors (TBR-V) in IGFBP-3 and TGF-B induced growth inhibition of cells, and 3) TGF-B and antagonists and modulators from bench work to application.

B 0406 - Mechanisms of Induction of Autoimmune Diabetes
Credit(s): 2-12 Credits
Insulin-dependent diabetes mellitus is characterized by selective destruction of insulin secreting ?-cells found in pancreatic islets of Langerhans. ?-cell destruction is an autoimmune process that requires the presence of T-cells, macrophages, and monocytes. It is currently believed that cytokine, released in and around pancreatic islets undergoing autoimmune destruction, directly modulate ?-cell function and participate in ?-cell destruction. Treatment of isolated rat islets with the cytokine interleukin-1 (IL-1) results in a potent inhibition of insulin secretion that is followed by islet destruction. Nitric oxide appears to mediate the inhibitory effects of IL-1 on insulin secretion and islet destruction. Inhibitors of nitric oxide synthase prevent cytokine-induced inhibition of insulin secretion and IL-1-induced islet destruction. Furthermore, IL-1 has been shown to selectively induce the expression of iNOS by ?-cells. The focus of this project is to delineate the intracellular signaling mechanisms by which IL-1 induces the expression of iNOS by B-cells. Also, molecular mechanisms associated with nitric oxide-induced islet damage will be evaluated.

B 0412 - Virulence Determinants of Cryptococcus Neoformans
Credit(s): 2-12 Credits
No description available.

B 0413 - Advanced Topics in Biomedical Research
Credit(s): 1 Credit
Students will read recent biomedical research literature. Students will summarize and communicate biomedical information in a clear, coherent written form for a lay audience.

B 0903 - Biochemistry and Molecular Biology Research
Credit(s): 1-12 Credits (Repeatable for credit)
This course may be used to register for an Biochemistry elective. The elective experience must fulfill the requirements for a research elective. The location of the experience may be at a SLUSOM affiliate or at another health care institution.