

1. **Title of internship:** Molecular methods for identifying and characterizing bacterial pathogens.

Brief description of scope of internship: Lab projects will include either the development of real-time PCR-based assays, sequence-based methods for speciation and typing of bacterial pathogens or the development of databases to enhance diagnostic and typing analyses.

Minimum qualifications: the first 2 semesters of coursework in the MPH program at SUNY-Albany and a strong interest in molecular biology.

Location of internship: David Axelrod Institute (DAI)

For more information contact:

Kimberlee Musser

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(518) 474-4177

2. **Title of internship:** Development of tools for protein drug purification.

Brief description of scope of internship: Inteins are self-splicing protein elements that exist in nature. We have made intein derivatives that can be used as biotechnology tools for affinity purification of proteins from bacteria. While some protein drugs can be expressed and purified from bacteria, it is likely that many will need to be expressed and purified from animal cells for them to be biologically active. Students will have an opportunity to perform mutagenesis and carry out genetic selection schemes to derive new intein derivatives with utility for protein drug purification. This internship will give extensive opportunity to develop expertise in molecular biology and protein biochemistry.

Minimum qualifications: first 2 semesters of coursework in the MPH program at SUNY-Albany and basic biology/biochemistry as an undergraduate.

Location of internship: Center for Medical Science, New Scotland Avenue.

For more information contact:

Victoria Derbyshire, Ph.D.

(518) 486-6793

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3. **Title of Internship:** Molecular mechanisms driving the reversal of malignancy of metastatic cancer cells.

Brief description and scope of internship: Students will have an opportunity to perform experiments using a model of human carcinoma cancer cells grown *in vivo* to determine the contribution of specific genes to the induction of a dormant behavior in malignant

cells. Technologies based on modern molecular biology, biochemistry and live cell imaging will be used throughout the training. This internship will give extensive opportunity to develop expertise in the area of cancer metastasis biology as well as in state-of-the-art technologies used in modern cancer research.

Description of internship activities: Students will perform RT-PCR and Western blots to detect genes previously identified through gene arrays as potential contributors to the reversal of the malignant phenotype. Growing or dormant tumors will be obtained from nude mice or chicken embryo *in vivo* systems and these tissues will be processed for detection of the desired genes. The candidate genes that for example are increased in dormant or tumorigenic cells will be downregulated using RNA interference (RNAi) to test their functional contribution to the studied phenotypes. RNAi will be also used on cells carrying live-GFP based reporters for mitogenic or stress-activated pathways which will allow to identify the contribution of those genes to a specific signaling pathway.

Minimum qualifications: The first 2 semesters of coursework in the MPH program at SUNY-Albany

Location of internship: UAlbany East campus, GeNYSis Center for Excellence in Cancer Genomics

For more information contact:

Julio Aguirre-Ghiso, PhD

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4. Title of internship: Molecular analysis of a bacterial pathogen

Brief description of scope of internship: Lab projects will involve the molecular analysis of the genetic organization and structure of the spirochete bacterium *Treponema denticola*. This bacterium is involved in periodontal disease and is related to the bacteria that cause Lyme disease and syphilis. The student will work with a laboratory scientist at the lab bench to amplify and clone genes of interest (structure or metabolic genes) and construct plasmids useful for creating genetic mutants. This would involve designing the DNA primers, performing the PCR and cloning the genes into the appropriate plasmid. The plasmid would then be used to construct the appropriate mutant. Upon successful development of the mutant strain, analysis would focus on microscopic characterization as well as additional molecular analysis to determine the effect of the mutation. After the

completion of the rotation, students will have mastered PCR, cloning, DNA analysis and growth and manipulation of anaerobic spirochete bacteria.

Minimum qualifications: the first 2 semesters of coursework in the MPH program at SUNY-Albany and a strong interest in molecular biology.

Location of internship: Axelrod Institute

For more information contact:

Ron Limberger

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474-4177

5. **Title of Internship:** Allele Frequency Studies in Genes of Interest to Public Health

Brief description and scope of internship: This internship will focus on the development of methods to detect DNA variants that cause disease in newborns and/or significant morbidity associated with exposure to pathogens. Assays will then be used to assess the frequency of alleles in the New York State newborn population.

Description of internship activities: Students will learn to work with pubmed and DNA databases, design primers and select from a variety of mutation detection techniques to develop a cost-effective, high throughput assay to detect differences in DNA sequences. The student will learn how to extract and amplify DNA as well as carry agarose gel electrophoresis and other methods.

Minimum qualifications: The first 2 semesters of coursework in the MPH program at SUNY-Albany. Undergraduate biology or molecular, cell biology course. Some experience in pipetting, solution preparation, and/or PCR and molecular detection methods etc. are advantageous.

Location of internship: Wadsworth Center, Biggs Laboratory

For more information contact:

Michele Caggana, Sc.D.

Assistant Professor

Molecular Genetics Track

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6. **Title of internship:** Genomic-Scale Array analysis of Human Gene Expression

Brief description of scope of internship: The Tenenbaum Lab uses RNA-binding proteins (RBPs) to study post-transcriptional gene expression. We have a reasonably large very eclectic lab that is divided into a Molecular Biology arm and a Bioinformatic group that work closely together on research funded by the National Human Genome Research Institute ENCODE project. We previously developed methods for purifying endogenous mRNA-protein complexes (mRNPs) and identifying the associated mRNA targets using genomic array technologies, a method we termed ribonomics. This new approach to functional genomics utilizes RBPs and array technologies as tools to identify and profile mRNAs encoding distinct groups of functionally related proteins.

Description of internship activities: Students will have an opportunity to perform genomic-array analysis of human cells that have been treated with various chemical agents, drugs and environmental toxins and study the effects on gene expression. This internship will give extensive opportunity to develop expertise in genomic and systems biology technologies as well as exposure to the supporting bioinformatics tools.

Minimum qualifications: The first 2 semesters of coursework in the MPH program at SUNY-Albany

Location of internship: UAlbany East campus, Gen*NY*Sis Center for Excellence in Cancer Genomics

For more information contact:

Scott Tenenbaum, Ph.D.

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Molecular Genetics

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<http://albany.edu/cancergenomics/index.html>

7. Title of internship: Development and Assessment of Clinical and Forensic Drug Testing

Brief description of scope of internship: Students will have the opportunity to work on the development or validation of methods to test for drugs in human serum and/or urine. They also will be able to develop survey tools, as well as evaluating results, regarding future needs or current limitations of the New York State clinical and forensic drug testing regulatory program, which assesses and approves all clinical and forensic laboratories performing drug analysis. Additional opportunities exist for data mining of the programs databases to extract information regarding the practice of drug testing. Students can also be involved in the assessment and evaluation of the impact of proposed regulations and standards.

Description of internship activities: Aid in the development or validation of toxicology procedures using immunoassays or LC, GC/MS methodologies. Participate in the development of survey questionnaires, create databases, perform statistical analysis of proficiency testing results, and write reports summarizing findings.

Minimum qualifications: The first 2 semesters of coursework in the MPH program at SUNY-Albany

Location of internship: Empire State Plaza – Biggs Laboratory

For more information contact:

Ellis Jacobs, Ph.D.

Head, Therapeutic Substance Monitoring and Clinical & Forensic Toxicology Programs

Wadsworth Center, NY State Dept of Health

Adjunct Professor, Department of Biomedical Sciences

School of Public Health, University at Albany

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8. **Title of Internship:** Cellular Mechanism of Calcium Signaling and Acute Stress Response

Brief Description and Scope of Internship: This internship will examine the cellular mechanism of calcium triggering of the sympathetic stress response, i.e., adrenaline secretion in the “fight or flight” response. The student will be exposed to computational methods of determining the sub-membrane calcium signal that triggers exocytotic secretion. The results of this project will be relevant to most cellular secretory mechanisms ranging from those involved in brain neurotransmitter release and hormone secretion to histamine release (allergic response) and cortical granule secretion (fertilization reaction).

Description of Internship Activities: Students will be expected to read and understand the relevant literature on calcium signaling and cellular secretion. Student will become familiar with the on line software known as the Virtual Cell (see www.NRCAM.uchc.edu) which is used to model Ca²⁺ signaling in the classic neurosecretory cell, the adrenal chromaffin cell and mechanisms of exocytotic secretion. Computer modeling experience desirable for modeling cell calcium signaling and mechanisms of neurohormone (adrenaline) secretion.

Minimum Qualifications: Helpful to have had some computer modeling experience.

Location of Internship: Albany Medical College

For more information contact:

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