CUNY | Research Scholars Program

List of CSI CRSP students and their abstracts presented at the 2022 CRSP Symposium

Expression Patterns of Cytokines and Human Leukocyte Antigens (HLAs) in Glioblastoma Multiforme (GBM): A Developing Story

Lara Anastasia Colombo
Mentor: Professor Nancy Liu-Sullivan

Despite all the progress made, cancer remains a challenging disease. Glioblastoma multiforme (GBM) is widely known as the most aggressive form of brain cancer and has a substantially low overall survival rate. Glioblastoma multiforme continues to pose a challenge in treatment efficacy and overall patient survival. Since the immune system plays a crucial role in cancer development, interleukin-6 (IL-6) is an essential molecule that controls multiple aspects of human immunity in the immune system. IL-6 molecule is a key pro-inflammatory (which promotes inflammation causing the disease to become more severe) cytokine. Cytokines, signaling molecules with immune responses, are growing in interest in how they shape cancer cell growth and spread of cancer from one part of the body to another, also referred to as metastasis. Human leukocyte antigen (HLAs) are also vital for the immune system to thrive due to the ability to regulate immune responses as well as detect foreign cells or agents that are then transferred to T-cell receptors. Understanding the role of HLAs helps better characterize and understand how glioblastoma multiforme evades immune defense. This information is also beneficial in providing potential candidates of therapeutic targets in glioblastoma multiforme. Using the Oncomine and Kaplan-Meier Plotter databases, numerous studies were analyzed for the following genes, IL-6, IL-6R, HLA-A, HLA-B, and HLA-C. Since glioblastoma multiforme is a very aggressive grade four glioma and is a form of astrocytoma, patient age is imperative to consider and investigate. Each set of patient age ranges for each available case study has indicated that middle age to elderly population are the most common patients for GBM. Findings of statistically significant over- or under-expressed HLA Class I genes and cytokines along with exploring the potential influence cytokines may have on HLA genes, could help shed more light on the interaction between immunity and cancer.

Effect of pathological human tau in non-neuronal cells

Amani Elmaadawy
Mentor: Professor Alejandra del Carmen Alonso

Presentation Award Winner

Alzheimer's disease (AD) is the most common form of dementia, and it starts from confusion, loss of memory, and dementia. Inside the brain of AD patients, there is an accumulation of two proteins, amyloid, and tau. Tau is a protein that plays a role in the microtubules, which are like the train tracks

that guide the transport of information in the communication of the neurons. We study tau, and how it becomes toxic in AD. From our studies, we have developed a way to mimic the Pathological Human Tau (PH-tau). PH-Tau, like tau from AD, breaks down microtubules in the neurons blocking neuronal communication. It has been reported from epidemiological studies that AD has a positive correlation with diabetes. Therefore, people with diabetes have a higher probability of developing AD. We have developed a mouse model (DT mouse) that expressed PH Tau in the brain, and it mimics AD pathology. Surprisingly, our mouse model has a higher fasting glucose level than the control animals. A higher glucose level means that there may be a problem related to the pancreas as it is the source of insulin that regulates glucose levels. We used immunocytochemistry to see the pancreas structure and compare the structure of the control and DT mice. We propose then to study the changes in the pancreas of this mouse model to see if the expression of PH-Tau can affect the function of the pancreas. Form the examination of the slide we prepared; we think that PH-Tau is presented in the pancreas of the transgenic mice. To be able to tell if PH-Tau affects the pancreas function more investigation need to be done.

Provenance of sediments (hemipelagic muds) in accretionary wedges – interpretation of major, trace, and rare earth element signatures

Nourhan Elzayat
Mentor: Professor Jane Alexander

The chemistry of clastic sediments, particularly fine-grained muds, is assumed to reflect a homogenized representation of the source rocks. This study uses samples collected from ODP (Ocean Drilling Program) cores from four subduction zone accretionary wedges: the Nankai Trough (Japan), the northern Barbados Ridge, the Cascadia margin, and the Costa Rica accretionary wedge. These samples can therefore be used to determine the tectonic setting in which the sediment was deposited. In this project, we have obtained chemical analyses of 15 samples from each location and made interpretations of provenance based on trace and rare earth elements. The provenance of the sediments is related to the composition of the volcanoes in the subduction zone region. The graphed data from each location has shown us what we aimed to identify. The Nankai Trough has intermediate provenance, the Costa Rica accretionary wedge has mafic provenance, and the Cascadia margin and the northern Barbados ridge have a mixture of both. In Cascadia, this is related to the location of the drill core relative to the shore while in Barbados, the composition changed over time. Along with the provenance, the graphs of both the rare earth elements and trace earth elements support the same conclusions for each location.

Is there a relationship between writing quality and rhythm?

Khadijatou Hamadou
Mentor: Professor Jason Bishop

One of the defining properties of prose is that, unlike poetic verse, it does not adhere strictly to a meter—i.e., a fixed patterning of word groupings, or of stressed and unstressed syllable sequences. Nonetheless, a common observation is that prose writing—at least “good” prose writing—is intuitively rhythmic in some way. In the present study, we attempt to quantify rhythmicity in novice prose writing in order to determine the extent to which writing quality (determined using writing samples that were independently evaluated for quality on a range of non-rhythm-related metrics) exhibits more rhythmic properties. The findings of our study have implications for writing assessment, particularly automatic writing assessment using computational tools.

Dopamine neuron axons in the corpus callosum: potential role in experience-dependent myelination

Zahid Hassan
Mentor: Professor Leora Yetnikoff

Neuroplasticity is a remarkable phenomenon in which the brain reorganizes and modifies its connections in response to behavioral experiences. For a long time, it was thought that neuroplasticity occurred mainly at the level of the synapse – that is, between neurons. However, we now know that neurons also communicate with oligodendrocytes to regulate myelination, a phenomenon termed 'experience-dependent myelination.' Myelin is a fatty membranous sheath that insulates axons to conserve the conduction velocity of neurons' action potentials. Emerging evidence indicates that experience-dependent myelination is crucial for social behaviors, as well as fear, spatial and motor learning. While the mechanisms regulating experience-dependent myelination are not well known, it is known that dysregulation of myelin in the corpus callosum (CC), the largest white matter tract in the brain, is associated with dopamine (DA)-related neuropsychiatric diseases, such as addiction. The purpose of this study was to begin to investigate the possible role of midbrain dopamine neurons in experience-dependent myelination of the CC. We used adult male DAT-cre mice that express cre under the control of the DAT promoter and targeted the midbrain with a cre-dependent eYFP virus. Using this approach, we have revealed DA neuron axons and varicosities in the CC, although with a lower density than that seen in the neighboring medial prefrontal cortex and striatum. To examine if DA axon architecture in the CC is regulated by exposure to drugs of abuse we treated DAT-cre mice with five amphetamine (AMPH) injections on alternating days. Our data shows that repeated treatment with AMPH increases the number of DA axon segments in rostral, but not caudal, regions of the pre-genum CC. Evaluation of the effect of this drug treatment on number of DA varicosities is on-going. How changes in DA axon architecture may contribute to hypomyelination of the CC observed in addicts remains to be determined. Understanding the role of midbrain dopamine neurons in experience-dependent myelination may potentially contribute to the treatment of dopamine-related neuropsychiatric diseases.

Development of VR mapping for E+A candidates within the Coma Cluster

Sam Pakravan
Mentor: Professor Charles Liu

Using virtual reality we gain a unique first person perspective of galaxy clusters and the behavior of E+A galaxies. E+A galaxies are known for having spectra of an early-type ("E") galaxy, typically many billions of years old, together with strong hydrogen Balmer absorption lines that are produced in the photospheres of stars that are only about 1 billion years old (type "A"). That means E+A galaxies are a special type of "post-starburst" galaxies, in which star formation had been going at a high rate but then shut down approximately 1 billion years ago.When a galaxy enters a post-starburst phase, O and B type stars (which are the brightest and most short-lived) die off, and about a billion years later leave A type stars to be the brightest in the galaxy. With the Unity game engine and the Blender graphics software we can improve upon a previously built virtual reality system allowing for a visually impressive and more informative experience. Using previous data from the cluster of galaxies known as Coma Berenices to develop this system we will have a better understanding of the evolution of galaxies within the last few billion years.

Project Insight: Discovering the secrets of the Newark Basin using Geochemistry

Jay Tobon
Mentor: Professor Jane Alexander

There's a story behind every piece of rock collected. The ones collected at the Stockton Formation in North Bergen New Jersey tell us a very interesting one. Each sample was collected from a metasammite area (slightly metamorphosed sandstone) beneath the Palisades Sill. Using geochemistry, we know where they've been and the different interesting elements in these samples. With trace elements and major elements, we uncover the history of these samples. We can see the channel deposits, clastic dyke, metapelites, and suspected ash. We can confirm with major elements the types of rocks we have and the continental setting, but with trace elements we get a completely different story. We suspect that there was a trace of volcanic ash in the original sediment due to the high amount of thorium. We also suspect that this sample contains smoky quartz as a result of the radiation, a special mineral that loses its color when blasted with high temperatures. There haven't been any reports on potential volcanic landforms in the Newark basin which is why this project is important, but most importantly with this project we hope to understand Newark Basin a little more.

Can GIS be used to improve public awareness of environmental and social vulnerabilities?

Grace Anna Akparanta and Elmar Abu
Mentor: Professor Katie Cumiskey

Partnering with Miami Dade College, students at CSI are learning how to use GIS as a tool for increasing public awareness of environmental vulnerabilities at the intersection of social vulnerability. FEMA flooding maps do not reveal inherent vulnerabilities as it relates to compounded risk as a factor of economic instability, precarious housing and being undocumented (in a broad sense). The FEMA Flood Map is hard to navigate and difficult to translate community risk from the data that FEMA collects. Students are using newspaper archives and information from local community organizations and important community informants from the last ten years, with Hurricane Sandy as a starting point for stories of people's experiences with flooding during rainstorms to create a data set that will add information to FEMA flood mapping and tell a fuller story of where true vulnerabilities lie. Alternative sources of media and information (i.e. social media, blogs, vlogs, internet websites) will also be vetted and sources for information not readily available. This project will focus on the North Shore of Staten Island. Centered on storytelling with maps, we hope to make the community more knowledgeable about the flood risk that may lead to community asset building. This tool will be adapted to provide the public with a better understanding of environmental threats and social vulnerabilities. Special attention will be paid to the impact of economic development projects on the destruction of wetlands and other natural barriers that protect local communities from rising sea levels and extreme weather events. Maps can also assist individuals with making important decision-making related to housing and transportation. We hope to develop a prototype for a GIS based tool that can be accessed by the public for free.

Access to healthy food as a human right: What Honduras has to teach Staten Island about food injustice and mutual aid.

Andrea Guifarro
Mentor: Professor Katie Cumiskey

In the Spring of 2022, I spent time with a mutual aid project on Staten Island called the Forest Avenue ComeUnity Fridge. The ComeUnity Fridge is a group of residents in the community that came together to provide mutual aid to the members of the community around food insecurity. The goal of this project is to explore ways to expand local community activism around food justice. I will spend time in a place where there is a constitutional "right to food". I will learn about what the United Nations is doing to support access to food as a human right. I hope to return to Staten Island to share the lessons learned and enhance our mutual aid project.

My hypothesis is that greater community education and ways to connect to a global effort around food justice might increase community members commitment and respect for the Fridge. Over the next four weeks, I will be in Honduras. The Constitution of the Republic of Honduras explicitly guarantees the right to adequate food. I want to document the history of this constitutional right and interview people who live there. I plan to do 4 – 8 in-depth interviews as my methodology. I will analyze the interviews to gain some guidance as to how to advocate for food as human right. I will share what I learn with the organizers of the ComeUnity Fridge on Staten Island. We will use technology to build international connections to food justice initiatives around the world. The goal will be to use an international focus to enhance local commitment to mutual aid and ending hunger.

#African Burial Grounds Matter: Using QR codes and oral histories to support youth empowerment

Yamilet Vasquez

Mentor: Professor Katie Cumiskey

Presentation Award Winner

The goals of this project is to learn about the history of slavery on Staten Island and the Settlement of "Free Blacks" in our community. I will identify critical geographical locations that capture significant aspects of this history. I will collect stories from key figures in the community of activists (both on Staten Island and in Flatbush, Brooklyn) focused on preserving this history.

I was interested in this topic because burial grounds were found on Forest Avenue. There are between 100-1000 slaves buried under that parking lot. I sought out other groups in New York City who are also trying to raise awareness about hidden African Burial Grounds. The focus of the African Graves Matter organization is the recognition of burial grounds in the five boroughs and around the world. This organization was started by activists who wanted to honor the dishonored graves in Flatbush.

I hope to place a QR code on the site. This code will link people to a virtual memorial that will also share access to open data sources related to the hidden history of the space. We will learn skills of augmented and extended reality to enhance the impact of encountering this place. We will infiltrate online mapping services like Google Maps to landmark the space. Participants in this phase of the project will participate in a national event in October 2022 on Staten Island that will be focused on how we can use technology to remember and to guide future generations towards embracing their ancestors. This project will inform the second phase which will focus on engaging local youth and structure pathways towards youth empowerment and education.