Online Proceedings

SESSION 1C

PUBLIC HEALTH

Session Moderator: Clarence Spigner, Health Services
MGH 231
12:30 PM to 2:15 PM

* Note: Titles in order of presentation.

A Survey of Prevalence of *Helicobacter pylori* within Vietnamese Community through the Vietnam Health Clinic (VHC)

Ky Ngo, Senior, Biology (Physiology), Biochemistry
UW Honors Program
Lisa Chang (Lisa) Ngo, Recent Graduate,
UW Honors Program
Yogavedya (Yoga) Mukkamala, Non-Matriculated,
Jacky Vinh Tran, Recent Graduate,
Mentor: Scott Fung, Office of Minority Affairs & Diversity, Instructional Center

Helicobacter pylori (*H. pylori*) are gastric bacteria known to cause chronic gastritis, peptic ulcers, and can eventually lead to gastric adenocarcinoma in the long term. Prevalence of *H. pylori* among Caucasian, Hispanic and African-American populations has been previously surveyed in past studies. However, prevalence and distribution of *H. pylori* among Asian communities has yet to be exhaustively profiled. While *H. pylori* exhibits worldwide circulation, studies have shown that infection is more prevalent in developing third world countries. The Vietnam Health Clinic (VHC) is a mobile clinic that provides free healthcare to underserved populations in Vietnam every year. The data collected from the roughly 3000 patients served from VHC trips between 2012 and 2014 presents an invaluable opportunity to learn more about *H. pylori* prevalence and distribution within the native Vietnamese community. By delving into the patient's background, medical history and previous treatment history of *H. pylori*, we give the dataset more meaningful resolution that can facilitate novel prevention and treatment processes in future VHC trips. Data and statistical analysis with Tableau and Excel is currently in progress and the consequent results will prospectively be available in May for the Symposium presentation. As this is a retrospective and exploratory study, a causation link cannot be drawn. However, by providing insight into a patient's demographic and connection with *H. pylori*, our research can help to provide a foundation for causally directed studies in the future.

POSTER SESSION 4

MGH 241, Easel 131
4:00 PM to 6:00 PM

The Influence of Conserved Elements Responses during the Acute Infection of HIV on the Response to ART and DNA Therapeutic Vaccination

Nika Hajari, Senior, Microbiology
Mary Gates Scholar, UW Honors Program
Mentor: Deborah Fuller, Microbiology
Mentor: Paul Munson, Microbiology

While HIV treatment is improving, there are still problems associated with it. Antiretroviral therapy (ART) has unfavorable side effects, is expensive, and requires a lifelong daily pill intake. However, it has been proposed that a therapeutic vaccine could provide durable control of viremia in the absence of ART. This is a difficult approach due to the high mutation rate of the virus. Research has shown that there are conserved elements (CE) within the virus that do not change because they are important for the viral fitness. Accordingly a therapeutic DNA vaccine is being investigated that targets the CE epitopes. To address this, rhesus macaques were infected with SIV (Simian Immunodeficiency Virus), put on ART, vaccinated with four doses of DNA vaccine expressing CE, removed from ART, and their viral loads monitored. A successful vaccine is expected to reduce the viral loads to negligible amounts post ART cessation. My research project investigates the role of CE responses developed during acute infection. *I hypothesize that macaques that naturally develop higher CD4+ and CD8+ T cells (types of white blood cells) with CE specificity in response to the acute SIV infection will respond better to ART and CE vaccinations*. To investigate this I collected plasma and lymphocytes from the blood during acute infection and analyzed the CD4+ and CD8+ T cells using enzyme linked immunospot (ELISpot) and intracellular cytokine stain (ICS) assays. The viral loads were monitored by measuring the concentration of viral RNA in the plasma. T cell responses measured at each time point was then correlated to viral loads post ART-pre vaccinations or to CE responses measured after the final DNA vaccination by Spearmann Rank correlative test. My findings will help us better understand the significance of conserved elements in

controlling the HIV and thus design better human therapeutic vaccines.

POSTER SESSION 4

Balcony, Easel 102

4:00 PM to 6:00 PM

Designing Protein Oligomers and Fibers Using Parametrically Generated Helical Bundles

Sereno Luis Roberto (Sereno) Darwin Lopez, Sophomore, Pre-Sciences
Mentor: Chunfu Xu

De novo protein design can be used to create many types of biomaterials. In this project we explored if helical bundles (structural motifs consisting of several alpha helices arranged with rotational symmetry) could be used to create two different nanomaterials: fibers and oligomers. Both structures have broad industrial and experimental applications including small-molecule transport, structural support, and catalysis, so developing a strategy for specific and stable design is an important task. The oligomers (structures made from a small number of repeating units) consisted of two cylindrical layers of helices connected by short loops. The fibers were made with tapered helical bundles which docked into one another and bound strongly to form a string. Both the fibers and the oligomers were designed parametrically; we set intervals for several geometric variables and used the macromolecular modeling program Rosetta to determine which combinations of variables created the most energetically favorable shape for protein folding, as well as which amino acid sequences were most likely to fit these shapes. We then used the HBnet protocol to insert hydrogen bond networks (polar amino acid groups which form hydrogen bonds with one another to increase binding specificity). For each round of design, we chose four designs to express in E. coli based on amino acid ratios, solubility, and hydrogen bond network quality. For the fiber expression, no 6-helix bundles formed correctly, but several 5-helix bundles were successful. We have selected and expressed the oligomers and have used mass spectroscopy and SAXS (small angle x-ray scattering) data to confirm structure. In the future, we will use this design strategy to make stable oligomers and fibers with larger internal radii that can accommodate large molecules such as DNA.