Undergraduate Research Symposium May 19, 2017 Mary Gates Hall

Online Proceedings

POSTER SESSION 1

Commons East, Easel 68

11:00 AM to 1:00 PM

Pass Subsidies and Employee Transit Utilization: An Analysis of the Impact of Commute Trip Reduction Programs Using ORCA Smartcard Data

Rohan Aras, Senior, Informatics: Data Science, Community, Environment, & Planning, Mathematics
Mentor: Mark Hallenbeck, TRAC - CEE

This research aims to understand how Commute Trip Reduction (CTR) transit subsidy programs, when controlling for various built environment variables and the structure of the transit network, impact employee transit utilization commuting to the worksites of large employers in the Central Puget Sound region. This transit utilization is measured using the ORCA fare card records over two nine week periods in 2015 and 2016 of the major transit agencies in the Central Puget Sound. Manipulating monetary costs is a known method of transportation demand management. Earlier research on preliminary data has suggested that these transit subsidies do have a significant impact on transit utilization. However, results in the wider literature suggest that transit utilization was operationalized in a way—defined on the level of an individual card without accounting for the existence of people who never take transit—that may have altered the significance of the control variables. Indeed, some of the results were counterintuitive. In this research I attempt to avoid this by focusing solely on trips of employees of large employers to and from their worksites. This allows me to incorporate data on how many employees are not utilizing transit. Specifically, I create a regression tree model that predicts the number of trips taken to and from a worksite on an individual card. The features include subsidy values associated with each card, the closeness centrality of the stops around worksites weighted for travel time and headways, and built environment variables measured around each worksite. The built environment variables measured include, among other things, density, free parking price, demographics, and the design of the street network. I expect that higher centrality of worksites and higher pass subsidies will both increase transit utilization.

POSTER SESSION 1

MGH 206, Easel 166

11:00 AM to 1:00 PM

Gut Bacteria of Desiccation Tolerant *Drosophila*

Andrea M. (Andrea) Darby, Senior, Biology: Ecology and Evolution, University of Nevada Las Vegas
McNair Scholar
Mentor: Allen Gibbs, University of Nevada Las Vegas

Bacteria have long been viewed as negative impacts to humans and other organisms they inhabit, so it is common for individuals to associate bacteria that they possess as pathogenic. However, research has shown that organisms possess commensal bacteria that inhabit mucosal and skin surfaces. This collection of bacteria is known as the microbiome. These bacteria live in symbiosis with their host by providing them with essential nutrients, helping break down food that passes through the digestive system, and keeping pathogenic bacteria from colonizing. The fruit fly *Drosophila melanogaster* has been used as a model organism in order to investigate the relationship between the host and its gut microbiome. An investigation into approximately how much bacteria is in an individual fruit fly is an important first step to understanding how their microbiome impacts the fly's development and physiology. I studied three normal fed populations (TFA, TFB, and TFC) and three desiccation selected populations (TDA, TDB, and TFC). Serial dilutions of fly homogenates were plated on de Man, Rogosa and Sharpe (MRS) agar, which is a medium ideal for the growth of the genus *Lactobacillus*, as well as most other species common in the *Drosophila* gut. Preliminary results indicate that desiccation tolerant populations, TDA and TDC, had approximately double the amount of bacteria compared to control populations, TFA and TFC. The TDB population was reverse of this with its control population possessing double the amount of bacteria. Additional tests are necessary in order to identify if bacteria aid desiccation survival of flies and whether desiccation tolerant *Drosophila* have different microbial communities than controls.

POSTER SESSION 3

MGH 241, Easel 128

2:30 PM to 4:00 PM

Determination of the Clinical Efficacy of Film Array Testing for Detection of Gastrointestinal Pathogens
Roberto Morales, Fifth Year, Medical Laboratory Science
Mentor: Allen Bateman, Laboratory Medicine

Traditional gastrointestinal pathogen detection includes many bacterial, viral, and parasite tests that require clinicians to order many different tests that have various sensitivity and turn-around-time (TAT). As a result, pathogen detection can be delayed or missed, if the correct tests are not ordered. This ongoing study is evaluating the time-to-diagnosis of gastrointestinal infections using the FilmArray Gastrointestinal (GI) Panel test (BioFire Diagnostics, Salt Lake City, UT, USA) compared to conventional methods. The Filmarray GI test is a multiplex PCR test with targets for 22 gastrointestinal bacteria, viruses, and parasites. The study is also comparing the FilmArray GI test to conventional stool cultures, to evaluate the impact of the FilmArray GI test on clinical decision-making. In this interim analysis, the sample population was composed of 167 outpatient or recently admitted (<3 days) patients who had stool specimens submitted for the FilmArray GI test. The time from collection to result for the FilmArray GI test was compared to stool culture. Results from our interim analysis found that the mean time from collection to a FilmArray GI result was 9.8 hours, while the mean time from collection to first actionable stool culture result (if positive) was 62.9. The time from collection to final stool culture result was even longer (77.2 hours). We also found that the FilmArray GI test identified many more pathogens than stool culture: 38% of the samples were positive by FilmArray GI, while only 5% were positive by stool culture. Thus far, the FilmArray test has demonstrated more rapid results and higher sensitivity than stool culture. Ongoing work is evaluating the clinical impact of the FilmArray GI test, but this interim analysis shows that it is more rapid and sensitive than traditional stool culture. As such, it appears to be a promising test for promptly detecting gastrointestinal pathogens.

POSTER SESSION 3

MGH 241, Easel 129

2:30 PM to 4:00 PM

Validation of Various Media and Incubation Conditions for Yeast Mass Spectrometry Identification
Da Yae (Dayae) Kim, Senior, Microbiology, Medical Laboratory Science
Mentor: Allen Bateman, Laboratory Medicine
Mentor: Lynda Bui, Laboratory Medicine/Clinical Microbiology

Matrix assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) is a method of organism identification that is currently used widely in clinical microbiology. Compared to traditional biochemical testing, it offers a faster turnaround time and provides a more cost-efficient way to identify clinical isolates. Currently at the University of Washington clinical microbiology laboratory, if a yeast grows from any media other than inhibitory mold agar (IMA) media, it is subcultured onto IMA and incubated to test by MALDI-TOF the following day. This validation study will allow medical laboratory scientists (MLS) to bypass the subculturing step, which will decrease the turnaround time by approximately 24 hours. We evaluated five different media types and incubation conditions, with a sample size of 51 organisms. Through this validation study, it was concluded that the various media and incubation conditions had little to no effect on yeast identification by MALDI-TOF. Because the different conditions tested had no effect on the MALDI-TOF MS score values, this successful validation will allow for shorter turn-around time for yeast identification, which in turn will allow for faster and more accurate patient care.