Healthy Foods, Healthy Lives Institute
Faculty Research Grants and
Graduate & Professional Student Research Grants
Awarded Spring 2014

FACULTY GRANTS

Grant Category: Food Safety

"A chemical approach to the detection of bacterial food pathogens"

Amount Awarded: $50,000
Timeframe: June 1, 2014 – May 31, 2015
PI: Valerie C. Pierre, PhD, Assistant Professor, Department of Chemistry, College of Science and Engineering, U of M
Co-Investigators: Srinand Sreevatsan, PhD, Professor and Director of Graduate Studies, Department of Veterinary Population Medicine, College of Veterinary Medicine, U of M

Francisco Diez‐Gonzalez, PhD, Professor of Food Safety Microbiology and FScN Department Head, Food Science and Nutrition, College of Food, Agriculture and Natural Resource Sciences, U of M

Abstract: Contamination by bacterial pathogens such as Escherichia coli and Salmonella enterica are increasingly problematic in our complex and global food production and distribution networks. Given the near impossibility of completely removing the sources and causes of these bacterial contaminations in our food supply, the eradication of outbreaks of diarrheal and other foodbased diseases increasingly necessitates new tools to rapidly and easily assess contamination of our food supply before they reach consumers. Our long-term goal is to develop a simple and low-cost technology, operational in any field setting, which enables immediate detection and differentiation of bacteria. This goal will be met by developing chemical probes that (1) make use of bacteria-specific biomarkers of virulence and infectious state, (2) give immediate read-out with portable instruments such as hand-held UV lamp, and (3) are easy to scale up and are storable at room temperature. The central hypothesis is that these three requirements can be met with the use of luminescent probes that make use of bacterial siderophores, the small iron chelators excreted in large quantity by bacteria to sequester and uptake iron from the environment, as Trojan horses. The overall objective of this application is to develop sensitive and selective chemical probes that use the siderophores produced by Salmonella and Escherichia coli as Trojan horses and which become luminescent once uptaken by the bacteria. To test the central hypothesis, the following specific aims will be pursued: synthesize and evaluate responsive luminescent probes incorporating 1) enterobactin, 2) salmochelin, and 3) aerobactin, the siderophores produced by Escherichia coli and Salmonella enterica. This approach is innovative because it uses chemical probes to diagnose bacteria. The proposed research is significant because it is expected to result in field-appropriate tools for the immediate detection of bacterial contamination of our food supply.

Grant Category: Prevention of Diet-Related Chronic Disease and Obesity

"Reducing Sugar-Sweetened Beverage Portion Size Through a Pricing Intervention"

Amount Awarded: $23,408
Timeframe: August 1, 2014 – July 31, 2015

PI: Sarah E. Gollust, PhD, Assistant Professor, Division of Health Policy and Management, School of Public Health, U of M

Co-Investigators: Simone French, PhD, Professor, Division of Epidemiology and Community Health, School of Public Health, U of M

Alexander Rothman, PhD, Professor and Associate Dean for Research and Graduate Programs, Department of Psychology, College of Liberal Arts, U of M

Ford Runge, PhD, Professor, Department of Applied Economics, College of Food, Agriculture and Natural Resource Sciences, U of M

Abstract: Reducing young adults' consumption of sugar-sweetened beverages (SSBs) is an important public health priority, yet finding an effective and politically acceptable policy intervention has proven challenging. One possible avenue for intervention is changing the pricing structure of fountain-style beverages (a primary source of SSBs). Food retail settings use a value pricing model in which larger sized beverages are priced to be a better value than smaller sized beverages. Modifying the pricing model so that larger beverages are not a better value may be a promising way to reduce the consumption of SSBs. In order to understand the effectiveness and potential political feasibility of modifying this structure, we propose three study aims: (1) to implement a laboratory-based experiment to examine how removing value-sized pricing incentives affects students' choice of beverages; (2) to evaluate students' perceptions of beverage sizes and prices in University retail settings; and (3) to create a partnership with university officials to develop a field-based intervention designed based on the results obtained from aims 1 and 2. We intend to use funding from the Obesity Prevention Center to conduct the field-based intervention. This project has a high potential for shaping organizational change, as institutions – including universities and other employers – have been seeking new ways to incorporate healthy beverage policies. This research also contributes to our interdisciplinary research team's long-term research goals to understand the many mechanisms through which SSB-targeted interventions (including the framing of these policies in public discourse) shapes individuals' and populations' behaviors, attitudes, beliefs, and norms with regard to sugar-sweetened drinks.

GRADUATE AND PROFESSIONAL STUDENT GRANTS

"Can an underutilized "miracle" tree improve the iron status of Ugandan children?"

Amount Awarded: $8,300
Timeframe: June 1, 2014 – May 31, 2015
PI: Kristina DeMuth, R.D., Masters of Public Health Nutrition, School of Public Health
Advisor: Sarah Cusick, Ph.D., Assistant Professor, Global Pediatrics, Department of Pediatrics, School of Medicine

Abstract: Iron deficiency is the most common nutritional deficiency worldwide, affecting nearly 2 billion people. In Uganda alone it is estimated that 50% of children under 5 years old are iron-deficient. Since iron is critical for brain growth and development, iron deficiency in early childhood can result in lifelong consequences. A tree grown worldwide called the Moringa tree holds vast potential for being a vital, life saving resource for children in Uganda and around the world. It is a fast growing, droughtresistant tree that bares edible, iron-rich leaves. Although the nutritional and medicinal properties of Moringa are widely recognized, its use, particularly among children, has not been studied systematically. Qualitative research with parents and caregivers in Uganda is a necessary first step to understand how the leaves are currently being used for children. This knowledge can then be translated to inform further interdisciplinary research and programming

among experts in forestry, food science, pediatric nutrition, and medicinal physiology. In this study, we will conduct focus groups and individual interviews with Ugandan parents to assess current practices and attitudes about using Moringa for children. The second piece of our study will be to both determine common iron consumption among Ugandan children, using preexisting dietary records of young children currently enrolled in a University of Minnesota research study, and also to estimate how much more iron could be added to this consumption with Moringa. The qualitative information obtained in the study will be used to guide the forestry and food scientists in development of Moringa forests and food products containing Moringa leaves. The quantitative research will provide guidance to the pediatric team about the acceptance, uses, and quantity of Moringa leaves needed for treatment of iron deficiency among the children in their clinics.

"Brain immune cell response to dietary saturated fatty acid"

Amount Awarded: $10,000
Timeframe: July, 1, 2014 – June 30, 2015
PI: Cayla Duffy, Masters of Science, Nutrition, Food Science and Nutrition, College of Food, Agriculture and Natural Resource Sciences
Advisor: Tammy Butterick, Ph.D., Adjunct Assistant Professor, Food Science and Nutrition, College of Food, Agriculture and Natural Resource Sciences

Abstract: Obesity is a complex disease with multiple health implications and affects more than one third of adults and children in the U. S. Excess dietary saturated fatty acids (SFA) can alter metabolic homeostasis and impair normal central nervous system (CNS) function, contributing to the development of obesity. The SFA palmitic acid (PA) induces inflammation in the CNS and hypothalamus through activation of microglia, the immune cells of the brain. Orexin A (OXA), a hypothalamic signaling molecule involved in regulating energy metabolism, can reduce CNS inflammation through a microglial mediated pathway in rodent models of brain injury. Preliminary data indicates that 24 h PA exposure increases NFκB, a key regulator in microglial inflammatory response. Following 4 h PA exposure, microglia increase gene expression of OXA receptor (binding site for initiating communication in a cell), suggesting OXA is involved in response to inflammatory stimuli. These data suggest OXA is a potential mediator of diet-induced microglial activation. Microglia shift between toxic and protective states. We hypothesize that PA induces pro-inflammatory microglial activation, and OXA can reduce the pro-inflammatory phenotype by reverting to an anti-inflammatory/protective state. The research outlined in this proposal will use an in vitro microglial cell line to determine if 1) OXA can reduce PA-induced secretion of pro-inflammatory cytokines through an NFκB-mediated pathway, and 2) if OXA can revert pro-inflammatory microglial activation to a protective state. Cells will be exposed to OXA and/or PA for various time intervals, and cell lysates and media will be collected for analysis. Changes in selected cytokines, NFκB, and an array of known inflammatory response genes will be used to determine OXA mediated responses. Findings from these experiments will provide novel insight to the pathology of obesity, the mechanisms underlying diet-induced neuroinflammation, and will aid in developing therapeutic treatments against obesity.