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Healthy Foods, Healthy Lives Institute
Faculty Research Grants and
Graduate & Professional Student Research Grants
Awarded Spring 2015

FACULTY GRANTS

Grant Category: Prevention of Obesity & Diet-Related Disease

"Linking environmental and dietary factors to the anti-carcinogenic effects of the Mediterranean Lifestyle"

Amount Awarded: $100,000 (two year grant)
Timeframe: June 1, 2015 - May 31, 2017
PI: Douglas G. Mashek, PhD, Associate Professor, Department of Food Science & Nutrition, College of Food, Agriculture and Natural Resource Sciences, U of M

Co-Investigators: Li Li Ji, PhD, Director, School of Kinesiology, Professor and Director, Laboratory of Physiological Hygiene and Exercise Science, U of M

Guisheng Song, PhD, Assistant Professor, Department of Medicine: Division of Gastroenterology, Hepatology & Nutrition

Abstract: The Mediterranean Diet (MD), often considered the gold standard of diets, reduces the risk of cancer as well as other metabolic diseases. However, the biological mechanism defining how the MD reduces disease risk is largely unknown. Early studies suggested consumption of resveratrol, a bioactive compound in red wine, activated the protein sirtuin 1 (SIRT1), a protein deacetylase well documented to increase lifespan and decrease aging related diseases including cancer. However, subsequent work has shown that effects of resveratrol on SIRT1 are not specific and require supraphysiological doses. Herein, we show preliminary data that point towards a viable and novel biological mechanism that links the MD to SIRT1 activation. We show that the fatty acid oleate, which is enriched in foods common to the MD, such as olive oil and nuts, is a direct activator of SIRT1. Interestingly, dietary oleate must first be stored in cellular triacylglycerol and subsequently undergo lipolysis before it can activate SIRT1; the enzyme adipose triglyceride lipase (ATGL) is responsible for the lipolytic cleavage of oleate from triacylglycerol stores. In support, our preliminary data also show that overexpression of ATGL reduces proliferation in hepatocellular carcinoma (HCC) cell lines and in hepatocytes stimulated by growth factors. Based on these studies, we hypothesize that dietary oleate will synergize with exercise or calorie restriction, processes known to induce lipolysis, to attenuate HCC development. Thus, the objective is to determine the interaction between dietary oleate (e.g. olive oil) and either exercise or caloric restriction on HCC development in carcinogen-induced murine models of HCC. We expect these studies to help define a novel biological mechanism describing the health benefits of the Mediterranean Diet/Lifestyle, and provide strong preliminary data to pursue external funds for both mechanistic and translational studies in cancer prevention and treatment.

GRADUATE AND PROFESSIONAL STUDENT GRANTS

"Immigrant Microbiome Project: Characterization of the obesogenic gut microbiome among Somali Immigrants"

Amount Awarded: $9,926.00
Timeframe: June 1, 2015 - May 31, 2016

PI: Pajau Vangay, Biomedical Informatics and Computational Biology, Ph.D Program (2013 - 2017), Computer Science and Engineering Department, College of Science and Engineering
Advisor: Dan Knights, PhD, Assistant Professor, Department of Computer Science and Engineering and the Biotechnology Institute, College of Science and Engineering, U of M
Abstract: Immigrants in the US, such as the Somali in Minnesota, are developing chronic “new world” diseases such as obesity, diabetes, hypertension, and heart disease at alarming rates. Recent studies indicate that the trillions of bacteria living in the intestines, known as the gut microbiome, play an important role in many of these “new world” diseases, including potential causal roles in obesity. An individual’s resident gut microbes are partly dependent on dietary and environmental exposures, and yet can also be a causal factor in disease. A drastic and permanent change in dietary and environmental exposures, characteristic of immigration, could lead to disruption of gut homeostasis. This project will test the hypotheses that immigration from developing countries to the US induces loss of important microbial members in the native gut microbiome, predisposing the host to obesity, and that increasing dietary fiber intake supports maintenance of the native microbiome. Our study analyzes bacterial taxonomic marker genes from stool samples in 80 Somali women stratified by body mass index and years spent in the US. We will also evaluate the effect of increased dietary fiber consumption in reversing the effects of dietary changes and through changes in microbial composition and metabolite profiles in the gut microbiome. Our collaboration with the Somali, Latino and Hmong (SoLaHmo) Partnership for Health and Wellness at West Side Community Health Services provides an unparalleled opportunity to partner and conduct multi-community research with the Somali communities in Minnesota. We expect the results from this study to provide novel insights into how the gut microbiome and host metabolism change after immigration, determine whether dietary fiber consumption can minimize these changes, and lay the groundwork for future therapeutics and community dietary practice interventions to prevent obesity in immigrant and refugee populations.