Healthy Foods, Healthy Lives Institute
University Research Grants Awarded Spring 2012

Grant category: Prevention of Obesity and Diet-Related Disease

"Healthy Weight Management in Diverse Youth: A Health Care Home Approach"

Amount Awarded: $50,000
Timeframe: August 22, 2012 - August 21, 2013
PIs: Jerica M. Berge, PhD, Assistant Professor, Family Medicine and Community Health (Medical School)
Dianne Neumark-Sztainer PhD, MPH, RD, Professor, Epidemiology and Community Health (School of Public Health)
Co-Investigator: Shailendra Prasad, MD, MPH, Associate Director, North Memorial Family Medicine Residency

Abstract: Obesity is one of the top public health concerns facing youth today, particularly youth from low income and ethnically and racially diverse populations. There is a need for novel approaches to help youth engage in healthier eating and physical activity behaviors. Parents need to be involved in interventions, given the importance of a supportive home environment. Furthermore, health care providers often report feeling frustrated in trying to address obesity thus, there is also a need to identify new approaches that will engage health care providers. The aim of the proposed study is to develop and test a novel paradigm for a family- based primary care approach to healthy weight management in underserved youth. The proposed intervention, **U**matter (i.e., You matter), will be designed to enhance personal strengths of youth. The approach will strive to help young people feel good about themselves and their bodies so that they will avoid short-term dieting and, instead, will integrate healthy eating and physical activity behaviors into their lifestyles on a long-term basis. The study will be implemented at Broadway Family Medicine Clinic, a large primary care clinic in North Minneapolis, serving a diverse and underserved population. The intervention will be developed based upon input that has been collected from parents and youth from the local community and from clinic staff. Furthermore, the Clinic Advisory Board will be involved with program development and implementation in order to ensure that the program meets the community's needs. **U**matter will include a combination of group, individual, and family components. The intervention will be implemented with 25 youth participants (preadolescents and adolescents in separate groups) and their parents/guardians. This pilot study will provide the needed framework to guide an R01 to be submitted to the National Institutes of Health for a larger randomized, controlled trial.

"Effects of fermented wheat bran on gut microflora and implications for obesity"

Amount Awarded: $93,939
Timeframe: August 22, 2012 - August 21, 2013
PI: Andrea Y. Arikawa, PhD, Research Assistant Professor, Food Science and Nutrition (CFANS)
Co-Investigators: Ryan Fink, PhD, Research Associate, Food Science and Nutrition (CFANS)
Daniel Gallaher, PhD, Professor, Food Science and Nutrition (CFANS)
Mirko Bunzel, PhD, Professor and Chair of the Department of Food Chemistry and Phytochemistry, Karlsruhe Institute of Technology (KIT)

Abstract: This proposal is intended to determine the effects of fermented wheat bran with ferulate release on the composition of the gut microflora and its relationship with obesity-related parameters in diet-induced obese rats. Animals will be fed a high-fat diet for 8 weeks followed by one of the following experimental diets for another 8 weeks: high-fat diet, low-fat diet, high-fat + unprocessed wheat bran, high-fat + fermented wheat bran without ferulate release, and high-fat + fermented wheat bran with ferulate release. Processed and unprocessed wheat bran will be supplied by Kampffmeyer Food Innovation GmbH (Germany) and added to the experimental diets at 15% (w/w). The idea behind processing wheat bran by enzymatic fermentation is to enhance the health benefits of wheat bran via release of ferulic acid, which is bound to the cell walls and is a potent antioxidant. Body weights and food intake will be measured periodically throughout the experiment. Following 16 weeks of dietary treatment, urine and feces will be collected and stored at -70°C. Blood will be collected by cardiac puncture and liver, fat pads, and the large intestine will be harvested and frozen in liquid nitrogen. In addition to determining the diversity and relative abundances of the gut microflora, we will identify microbial metabolites of ferulic acid in blood, urine and feces, and measure several markers associated with obesity including: liver lipids, plasma glucose, non-esterified fatty acids, insulin, PYY, fasting-induced adipocyte factor, bacterial lipopolysaccharide, C-reactive protein, and fecal energy content. Mean differences between diet groups for all outcome variables will be analyzed by one-way analysis of variance (ANOVA) and we will also perform Pearson correlation analyses to assess correlations between variables. All p values will be adjusted for multiple comparisons and a $p < 0.05$ will be considered statistically significant.

"Reduction in Colonic Cancer Stem Cell Formation by Cruciferous Vegetables in Mice"

PIs: Daniel D. Gallaher, PhD, Professor, Food Science and Nutrition (CFANS)
Sabrina P. Trudo, PhD, Associate Professor, Food Science and Nutrition (CFANS)
Co-Investigator: Subbaya Subramanian, PhD, Assistant Professor, Department of Surgery (Medical School)

Abstract: Colon cancer is the third most common cancer in the United States. Although the cause of cancer remains elusive, recent evidence suggests that many cancers are due to mutations in stem cells, forming transformed cells called cancer stem cells, whose uncontrolled proliferation results in tumor formation. We propose to examine the effect of consumption of cruciferous vegetables, putative chemopreventive foods, on the development of cancer stem cells in the colon and on the microRNA (miRNA) profile of colonic crypts in which cancer stem cells have accumulated. We will utilize a mouse model that employs *cre-lox* technology to incorporate (knockin) green fluorescent protein (GFP) as a marker in a manner that is specific for colonic stem cells. Using heterocyclic aromatic amines as the carcinogen, we will determine the ability of a diet containing cruciferous vegetables to reduce development of colonic cancer stem cells using confocal microscopy to quantitate GFP fluorescence in thick sections containing whole colonic crypts. In a second experiment using the same animal model and diets, we propose to collect colonic tissue in which cancer stem cells have accumulated using laser capture microdissection. This tissue will be compared to normal tissue for β-catenin concentration, whose accumulation is a marker of a dysregulated *Wnt* signaling pathwayand is a common finding in colon cancer. Changes in the expression profile of miRNA will also be compared. Changes in the miRNA profile appear to play an important role in the development of many cancers and the regulation of cancer stem cells, but the study of dietary influences on miRNA is extremely limited to date. This proposal represents one of the first, if not the first, investigation of diet on the development of cancer stem cells, and therefore may open an entirely new approach to the study of diet and cancer.