



**Healthy Foods, Healthy Lives Institute
Planning Grants for University Research
Awarded Fall 2014**

“Air pollution exposure–induced neuroinflammation and obesity”

Amount Awarded: \$10,000.00

Timeframe: January 29, 2015 – July 31, 2015

University Faculty:

- Tammy A. Butterick, PhD Research Service, VA Health Care System; Adjunct Assistant Professor Department of Food Science and Nutrition
- Tiffany Beckman, PhD, Assistant Professor of Medicine, Division of Diabetes, Endocrinology and Metabolism Department of Medicine, Medical School
- Charles Billington (MD), Professor of Medicine, Medical School, Division of Diabetes, Endocrinology and Metabolism; Co-Director, Minnesota Obesity Center
- Joshua Nixon, PhD Adjunct Assistant Professor Department of Food Science and Nutrition, CFANS
- William Northrop, PhD, Assistant Professor, Department of Mechanical Engineering, College of Science and Engineering (CSE)
- Jacob Swanson, PhD, Adjunct Assistant Professor, Department of Mechanical Engineering, College of Science and Engineering (CSE)

Focus of the Project:

The underlying health problem addressed in this study is the link between air pollution and obesity. Healthy lives and weights derive from effective management of response to the modern rich food environment. The brain is responsible for integrating and controlling response to these cues, but there are many environmental challenges to that brain management. Environmental air pollution such as that generated by diesel exhaust (DE) is a continuing concern worldwide. Most studies of air pollution and health focus on cardiovascular, respiratory, endocrine, and cancer effects of inhaled particles. Epidemiological data, and a few human and animal studies, have suggested a link between air pollution and obesity. While underlying mechanisms between air pollution and obesity remain undefined, recent studies show that pollution effects on brain regions controlling central energy balance contribute to obesity. It is known that pollution can directly and adversely affect brain health. The particulate matter (PM) component of DE, more specifically metal nanoparticles (NP) contained within the PM, can cause deleterious immune responses in neural tissue (neuroinflammation). The size range (1-20 nm diameter) of NP allow these compounds to cross the blood-brain barrier (BBB) and cause neuroinflammation, a condition associated with obesity. This study will employ a series of experiments to test whether NP exposure and subsequent neuroinflammation contribute to obesity.
