

The Hancock Lab research focus is on metabolic pathways impacted by changes in energy supply and demands. Factors that contribute to insulin resistance and type 2 diabetes are most often a result of a mismatch between metabolic fuel supply (the food energy that we eat) and metabolic fuel demands (the food and stored energy that we burn through activity). We study energy metabolism and the development of insulin resistance using nutritional, exercise and pharmaceutical approaches.

**Our general research objectives include the following:**

- Understand mechanisms by which lifestyle and other factors contribute to the development of insulin resistance.
- Investigate the effects of different bioactive compounds on glucose management and energy metabolism.
- Explore mechanisms by which various bioactive compounds impact glucose management and energy metabolism.

This research is vitally important to gain a better understanding of the metabolic problems of insulin resistance and diabetes, which continues to affect more and more people every year. We expect our work can lead to improved prevention and therapy for diabetes and related disease conditions.

**Recent projects of interest include:**

- A study looking at the effect of dietary selenium and/or increased isoflavones on insulin resistance and baseline glucose management.
- A study examining the effect of caloric restriction on mitochondrial content.
- A study examining the effect of iron deficiency and specific enzymatic responses to this energy challenge.
- A study examining the effect of high fat diets as well as the activation of a critical enzyme involved in energy sensing (AMPK) on muscle mitochondrial content and capacity.
- A study looking at the effect of high fat diets and activating AMPK on liver fat accumulation.

**Current projects of interest include:**

- Examining a potential role of elevated cellular iron in the development of insulin resistance.
  - Exploring the effects of specific bioactive compounds on muscle iron metabolism and the development of insulin resistance.
- We are examining the possibility that some anti-diabetic therapies may be effective at reducing unwanted toxicities associated with certain chemotherapeutic treatments.