BISC 462
DIABETES, OBESITY, AND THE BRAIN

DR. ALAN WATTS
Fall 2009 (2 units, course #13040D)
THURSDAY 8am – 9.50am
HNB 100

Preliminary Syllabus

For the past thirty years the rates of obesity and diabetes (particularly type 2 diabetes) have increased dramatically, to the extent that their consequences now place serious health and economic burdens on the populations of most developed countries. Although a great deal of attention has focused on the contributions of peripheral tissues such as the liver, pancreas, and muscle to metabolic diseases, it is now universally recognized that the brain is also a major player in their etiology.

This seminar class will address some of the cutting-edge research that has made the brain a pivotal part of the mechanisms underlying these clinically important conditions.

The course will include lectures and discussions on the following topics:

- An introduction to metabolism, the pathological consequences of metabolic dysfunction, and the role of brain control mechanisms.
- Fat: why is it important and why is it such a problem?
- What is diabetes, and why is it becoming more prevalent?
- How does the nervous system regulate metabolism?
- The control of liver and adipose tissue function by the brain.
- How are glucose and other metabolites sensed in the brain and periphery?
- The regulation and dysfunction of counterregulatory mechanisms in diabetes.
- The regulation of food intake.
- Gut hormones and their impact on the brain.
- Do glial cells play role in metabolic diseases?
- The impact of metabolic hormones on the early life development of neural circuits, and the resulting consequences for disease.
- Do metabolic hormones directly regulate brain reward mechanisms?
- Interactions between circadian rhythms, arousal states, and metabolic disease processes.
- The impact of metabolic diseases on cognitive function.
- Imaging techniques and their contributions to our understanding of the effects of metabolic diseases on brain function.
- The success of gastric bypass and related surgeries for treating obesity and diabetes. How might the brain be involved?
Course Organization

Classes will generally follow a two part format (with a short recess in between):

Part 1: For the first part of each class, Dr. Watts, or occasionally another leading scientist in the field, will discuss a particular topic including recent insights from experimental research. In some cases the lecture will occupy the entire class.

Part 2: The second part of most classes will feature student-led discussions of important research papers that together cover all the topics for the course. Students will select papers from a list that will be distributed during the first class. Depending on the number students in the class, it is anticipated that each student will lead at least two discussions.

Grading

Grades will be determined in equal proportion by participation (attendance, participation in class discussions, and the research paper presentations) and an essay that will substitute for a formal final exam (in other words, no final exam).

The essay will expand on topic(s) discussed by the student in the class presentation, and will typically be 5-10 single-spaced pages in length. The essay will take the form of a published minireview—that is, essays need to be well written, logically organized, and properly referenced in terms of ideas and data in the previous scientific literature. Examples can be found in journals like Neuron, the Journal of Comparative Neurology, and the Journal of Neuroscience. The essay must be submitted by the end of Tuesday December 15th, the day scheduled for the final exam.