

Dr Andrew Whittle
MRL

Vidal-Puig Laboratory



Understanding the regulation of brown adipose tissue and how it may be used to treat obesity and the Metabolic Syndrome:

Recent investigations have discovered that humans, just like smaller mammals, have depots of specialized brown adipose tissue (BAT) that are thermogenically active. Thermogenesis occurs in BAT as a mechanism for maintaining core body temperature and ultimately allows for the mitochondrial oxidation of fat to be uncoupled from ATP production. Instead, the nutritional energy is converted directly into heat and subsequently dissipates into the environment.

This is obviously an attractive mechanism to redress the positive energy balance associated with obese states and in humans the amount of existing, detectable BAT tends to correlate negatively with BMI, fat mass and diabetic status - More BAT = reduced weight and improved metabolic health.

Our research uses animal models to assess whether directly altering the amount and activity of BAT can reduce or alleviate metabolic complications associated with obesity. In addition to this *in vivo* work we also use brown adipose cell lines to try and understand the molecular mechanisms that regulate BAT's development, its activity and how it interacts with the vascular and nervous systems to respond to changes in diet and environment.

Our latest work has focused on novel molecular regulators of nervous activation of BAT and also understanding which regulatory centres in the brain co-ordinate thermogenesis in response to cold-exposure and high-calorie diets.

Relevant publications:

1. Ouellet, V., Routhier-Labadie, A., Bellemare, W., Lakhil-Chaieb, L., Turcotte, E., Carpentier, A.C., and Richard, D. 2011. Outdoor Temperature, Age, Sex, Body Mass Index, and Diabetic Status Determine the Prevalence, Mass, and Glucose-Uptake Activity of ¹⁸F-FDG-Detected BAT in Humans. *J Clin Endocrinol Metab* 96:192-199.
2. Whittle, A.J., Lopez, M., and Vidal-Puig, A. 2011. Using brown adipose tissue to treat obesity - the central issue. *Trends Mol Med* 17:405-411.