SCAF/17/02 - Regulation of brown adipose tissue and cold-induced thermogenesis in humans

Approximately two-thirds of adults are now at least overweight with a quarter of the population classed as obese. Obesity causes diseases such as type 2 diabetes, high blood pressure, high cholesterol and increases the risk of developing heart disease. Currently there are very few medications available to aid weight loss and new agents are required to tackle this obesity epidemic. While obesity is characterised by having too much fat or adipose tissue, there is another type of fat in our body called brown adipose tissue or BAT. This tissue's main function is to generate heat to keep our bodies warm when we're in a cold environment. Interestingly, people who are obese have less BAT than lean individuals. In rodents, activating BAT causes weight loss and lowers blood glucose and lipid levels. Therefore, activating BAT in humans is an exciting new strategy to treat obesity.

However, we have only limited knowledge of how human BAT activation is controlled. My research group, funded by the Senior Clinical Academic Fellowship, focuses on identifying the pathways which control how our bodies activate brown adipose tissue to increase energy expenditure. We do this primarily in two ways, firstly by obtaining human brown fat cells from patients undergoing surgery and testing how these cells are activated. Secondly, we perform research studies in humans to see if we can increase their energy expenditure by activating their BAT. We hope that, by improving our understanding of how human BAT is activated, we can identify new therapeutic targets which we can subsequently manipulate to safely activate BAT and increase energy expenditure as a novel treatment for obesity and associated metabolic diseases.