The impact of environmental endocrine-disruptors on adipose tissue function and health

Supervisory team:
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Project description:
This project will investigate whether lipid-soluble "endocrine disruptors" negatively impact adipose tissue phenotype and function.

Humans are exposed to chemicals on a daily basis that have the potential to disrupt normal physiological function. One such compound is Bisphenol A (BPA). BPA has potent hormone-like activity and epidemiological studies indicate that exposure to BPA is a risk factor for the development of chronic diseases in humans. People are exposed to BPA through its use in the production of plastics in food packaging (e.g., food storage containers), as well as via the consumption of contaminated foods and water. The median intake of BPA through food consumption alone is estimated to be ~34 ng/kg/d. BPA is lipophilic. Preliminary evidence from one small study indicates that some (but not all) people accumulate considerable BPA and BPA derivatives in their adipose tissue. It is not clear if some people are more susceptible to BPA accumulation or whether this reflects variable environmental exposure. Whatever the cause, the accumulation of endocrine disruptors such as BPA in adipose tissue could negatively impact core functions of adipose tissue (e.g., secretion of adipokines such as leptin and adiponectin), as well as health-related outcomes mediated by adipose tissue function (e.g., insulin sensitivity). Thus, there is a need to establish the impact of the accumulation of environmental endocrine disruptors on adipose tissue function and health, as well as the causes of heterogeneity between people.

This project will begin with the measurement of BPA and other endocrine disruptors in adipose tissue and blood samples from a cohort of men and women from a previous BBSRC project. Along with access to samples, there is already comprehensive phenotypic information for study participants (e.g., adipose RNAseq). The direction of subsequent experimental work will be developed in partnership with the student, for example, examining mechanisms using cell models (e.g., 3T3-L1 adipocytes), studying new populations (e.g., young vs older people), or conducting randomised controlled trials to examine the effect of interventions that affect adipose tissue (e.g., weight/fat loss, exercise). This project is an excellent training opportunity. This includes technical training in mass spectrometry, qPCR, western blotting, and cell culture – plus the development of bioinformatics skills using curated datasets. There is also the opportunity to develop skills in the conduct of human studies, ranging from working with existing patient samples and datasets through to the development and implementation of new human studies (as desired).

Our aim as the SWBio DTP is to support students from a range of backgrounds and circumstances. Where needed, we will work with you to take into consideration reasonable project adaptations (for example to support caring responsibilities, disabilities, other significant personal circumstances) as well as flexible working and part-time study requests, to enable greater access to a PhD. All our supervisors support us with this aim, so please feel comfortable in discussing further with the listed PhD project supervisor to see what is feasible.