Why are we interested in inflammation in adipose (fat) tissue in obesity?

The expression of genes involved in lipid metabolism, cell growth, and inflammatory and immune responses. Therefore, they may be a promising solution to limiting adipose tissue inflammation in obesity, but this has not been reported before.

Why are we interested in omega-3 fatty acids?

The omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) occur naturally in fatty fish and fish oil. They have been shown to reduce inflammation and affect the expression of genes involved in lipid metabolism, cell growth, and inflammatory and immune responses. Therefore, they may be a promising solution to limiting adipose tissue inflammation in obesity, but this has not been reported before.

What did we find - How did inflammation occur in adipose tissue in obesity?

1. Changes to expression of genes associated with:
   - Immune response
   - Inflammation
   - Remodelling
   - CHO metabolism and insulin signaling
   - Lipid metabolism
   - Adipocyte differentiation
   - Adipogenesis

   % of changed genes involved

2. Enlarged fat cells and immune cells collecting in the tissue

3. Reduced inflammation resolving oxylipins

What did we measure?

What did we find - Could omega-3 reduce inflammation?

Omega-3 Supplementation resulted in:

- An increase in adipose tissue levels of EPA and DHA – figure 1.
- A decrease in pro-inflammatory oxylipins from arachidonic acid – figure 2.
- An increase in adipose tissue levels of EPA and DHA – figure 1.
- A poorly understood cause of obesity related diseases is inflammation which stems from the adipose (fat) tissue when there is increased fat storage.
- Adipose tissue has important roles in controlling energy storage and release, blood sugar, and regulating our immune system. This malfunctions in obesity.
- We may be able to improve health and prevent/reduce inflammation through nutrition such as using omega-3 fats (fatty acids).

What does this mean and why is it important?

- Reduced levels of anti-inflammatory oxylipins are a key feature of obesity.
- Omega-3 fatty acids can increase anti-inflammatory oxylipins but not in obesity. This may be due to lower expression of SLC27A2.
- Individuals living with obesity do not get the same health benefits that healthy weight individuals do, yet recommended intakes of omega-3 are not given for obesity (SACN dietary reference values – GOV.UK). This requires revision.
- I have identified a gene (SLC27A2) that may contribute to inflammation and poor response in obesity which could be targeted to improve health in this group.