CAF/21/13 - Investigating mitochondrial dysfunction in determining the innate colonic epithelial phenotype in Ulcerative Colitis (UC): Developing a cell-based gut repair approach using human organoid technology.

Ulcerative colitis (UC) is a relatively common condition affecting the large bowel where the gut lining becomes very inflamed. A flare up of UC can have a significant impact on their quality of life and can lead to emergency surgery to remove their colon.

In our study, we think that the mitochondria in the gut stem cells that replenish the gut lining may play a important role in UC. Mitochondria, primarily act to produce energy ***'cell batteries'***. In the gut (particularly in UC), the mitochondria can be damaged after exposure bacteria and toxins.

If the mitochondria become damaged in the gut stem cells, they can be passed on as cells divide, eventually the entire gut lining will have ***'faulty batteries'***.

We will study this by growing small sections of the human gut lining ***('mini guts on the dish')***, with cells from individuals with and without UC. In particular, we will investigate how mitochondria can cause the gut lining and epithelial cells to fail and how we might correct this with drug treatment.

One day, we may be able to grow healthy gut cells to replace and repair the damaged gut lining in UC as a treatment ***('replacing the faulty batteries')***.