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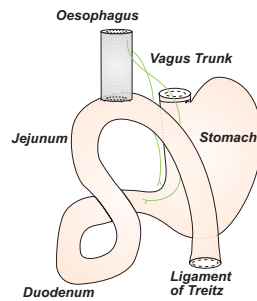
## Introduction

- Long chain polyunsaturated fatty acids, as present in fish oil, are believed to be protective against several diseases including cancer
- We have tested this hypothesis with regard to oesophageal cancer on a rat (surgical) model
- This poster reports the metabolomics analysis by 600 MHz <sup>1</sup>H NMR of the rat blood plasma and stomach tissues to assess the diet affect on the animal metabolism

## Experimental

### 1. Operation

- The surgery (done at weight 150-200g) causes reflux of jejunal contents into the oesophagus leading to inflammation, development of Barrett's metaplasia and ultimately oesophageal adenocarcinoma
- Rats (n~30 per group) were fed one of four diets based on corn oil (control); corn oil plus aspirin; fish oil (post-operation); fish oil (pre- and post-op). Tissues and blood were collected at 28 weeks.

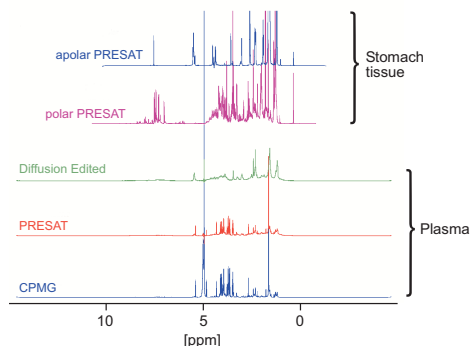


### 3. Sample preparation

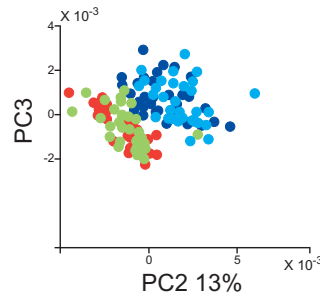
- 90/10 H<sub>2</sub>O/D<sub>2</sub>O (420 μl) was added to plasma (150 μl) and 520 μl were analysed
- 100 mg of stomach tissue were extracted and separated into polar and apolar fractions, dried and reconstituted in, respectively, 650 μl of 100 mM phosphate buffer in D<sub>2</sub>O and 700 μl of CDCl<sub>3</sub>/CD<sub>3</sub>OD (2:1). 520 μl were analysed

### 4. <sup>1</sup>H NMR profiling

- 600 MHz <sup>1</sup>H spectra, 128 scans (8 min recording)

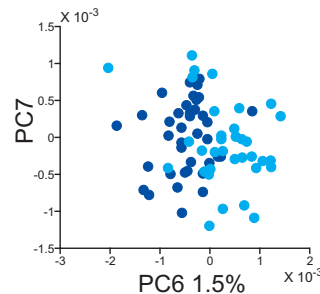


## Results



- Principal Component Analysis (PCA) on diffusion edited <sup>1</sup>H NMR of rat plasma, samples coded according to diet
- Discrimination on PC2 based on signals at 0.9 and 2.8 ppm arising from CH<sub>3</sub> from unsaturated lipids and methylene group from =CHCH<sub>2</sub>CH= from lipoproteins, higher in fish oil group

- corn oil
- corn oil plus aspirin
- fish oil fed post-op
- fish oil fed pre and post-op



- Same PCA, discrimination on PC6 based on signal at 5.2 ppm arising from unsaturated protons from lipoproteins, higher in pre feed group

- PCA on presaturation and CPMG <sup>1</sup>H NMR spectra of rat plasma and presaturation spectra of the apolar fraction of rat stomach tissue (not shown) also demonstrate discrimination between fish oil and corn oil feeding based on signals arising from lipids. No discrimination based on tumours (histopathology)

## Conclusions

- Markers from fish oil diet are associated with unsaturated lipid chains (large and small). No other metabolites seem affected by this diet
- Length of the fish oil diet affects plasma lipid composition and fish oil affects lipid composition of stomach tissue
- Tumour number was not affected by diet but size was slightly reduced (p=0.1). The surgical model might have led to a disease too aggressive to allow diet to have an effect
- This unique study combining cancer research and nutrition still holds promise for future work based on nutritional metabolomics

## Acknowledgement

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