

MEASUREMENT OF OXYSTEROLS IN BREAST TISSUE

Breast Cancer UK awarded a grant to Dr James Thorne, at Leeds University, to support his research whose aim was to develop a new method (using mass spectrometry) to measure accumulation of oxysterols in human breast tissue. Dr Thorne collaborated with Dr Hanne Røberg-Larsen, Dr Lisa Marshall and Dr Thomas A Hughes on this project.

Summary of results

Dr Thorne and colleagues developed a novel way of measuring 5 different oxysterols in breast tissue samples and cell culture. Crucially, it only requires a very small amount of tissue; less than that from a typical biopsy.

Details of the research: Preventing breast cancer recurrence through reducing dietary intake of oxidized cholesterol: An analytical tool

Some oxysterols can interfere with endocrine signalling and may be formed enzymatically, at sites of hypoxia (low oxygen in tissues), or when dietary cholesterol is exposed to high temperatures during frying or food processing. Emerging evidence indicates that tumours that develop in a high oxysterol environment may be more resistant to chemotherapy and more likely to spread (metastasize).

Oxysterols can promote oestrogen positive breast tumour growth through activation of the oestrogen receptor, and increase metastasis of triple negative breast tumours through other routes. Oxysterols can be readily removed from the diet and the activity of oxysterols produced in the body may be repressed by a diet rich in plant-sterols (e.g. vegetable oils, nuts, grains, peas and beans).



The project will aim to develop a method that can detect the accumulation of several different oxysterols in breast tissue samples. This will complement on going work that is investigating whether high oxysterol content of tumours increases the likelihood of unsuccessful cancer treatment. The work also aims to demonstrate if oxysterol concentrations in breast tumours can be reduced by dietary changes.

The research began in July 2016, and was completed in October 2017.

Discover More

See <https://www.ncbi.nlm.nih.gov/pubmed/29730298> for a review that focuses on phytosterols and breast cancer prevention by Dr Thorne and colleagues. Faikh, O. et al. (2018). Exploring the biophysical properties of phytosterols in the plasma membrane for novel cancer prevention strategies. *Biochimie* 153: 150-161.

See <https://www.ncbi.nlm.nih.gov/pubmed/30779932> for an article which describes the technique to measure multiple oxysterols in breast tissue samples developed by Dr Thorne, Dr Hanne Røberg-Larsen and colleagues. Solheim et al. (2019). Fast liquid chromatography-mass spectrometry reveals side chain oxysterol heterogeneity in breast cancer tumour samples. *Journal of Steroid Biochemistry and Molecular Biology* 2019 Feb 16. pii: S0960-0760(18)30754-4. [Epub ahead of print].