

## **TCS/21/11 - PRevention and Early detection of Breast cancer in high-RISK premenopausal population through mammary lipid composition using novel imaging**

Breast cancer is a major and growing health challenge, and the leading cause of cancer in Scottish women. As population obesity rates increase, the number of new cases continues to rise, and despite treatment advances, it remains an important cause of premature mortality, taking women in the prime of life. Although underlying susceptibility caused by mutation in the genes BRCA1/2 and TP53 is increasingly identified, current pre-symptomatic screening for the general population and those at high genetic risk remains sub-optimal, with high false negative and positive rates. Alteration of breast lipid composition has been observed by us and others in patients with breast cancer and is thought to precede onset. We have developed and tested a novel system to allow a standard 3T MRI scanner to perform quantitative 3D mapping of specific lipid molecules in the breast.

We have already shown that we can visualise altered levels of peri-tumoural lipids in surgically removed breast specimens and have successfully demonstrated the technique in vivo in pre-treated postmenopausal breast cancers. Here we seek funding to see if this method can detect very early breast cancers. We will compare the amount and spread of lipid composition in breast tissue of premenopausal women with breast cancer, obese women without cancer, and those with very high genetic risk of breast cancer. Subsequently we will work with our industrial partner to develop a prospective clinical trial to inform the development of better breast cancer screening for young women at high risk of breast cancer.