

# 2020 Research Awards

## Project Title:

Mammographic Density (MD) as a modifiable breast cancer risk factor and indicator of response to therapy

## Lead Investigator:

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## Collaborative Project Team:

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## Project Summary:

Mammographic Density (MD) corresponds to the white area on a mammogram. It is a risk factor for breast cancer (BC) and can also interfere with mammogram efficiency. Our studies of high MD regions in breast tissues have led to a focus on a set of molecules called Syndecans. We are analysing their regulation, their inhibition, and their levels in the blood. In a world-first, our PA Research Foundation-supported studies have accurately quantified MD in excised breast tissue and now reliably in human subjects, using a novel Portable NMR instrument, paving the way forward for clinical application.

Areas of high MD have dense connective tissue around the mammary glands (fibroglandular tissue). We have examined the genes and proteins of this tissue, cultured breast tissue from high MD regions to study responses to various factors, and measured shed MD-associated proteins in serum. We have focussed in on a set of molecules (Syndecans) and analyse their regulation, inhibition, and levels in the blood.

Several Portable NMR measurements were compared with MD measurements obtained by mammography with quantitative agreement. This enables us to quantify the relative contents of different tissue types (e.g. fat and fibroglandular tissue) within breast tissue samples, and we have conducted a trial to test this instrument for the measurement of MD in the body ("in vivo"). We found the approach to be feasible and provides a safe, noninvasive way of measuring MD within the breast. We also found a good agreement between tissue composition profiles obtained from Portable NMR and clinical "gold standard" MRI. The approach shows great promise for safe and accurate clinical mammographic imaging, and we now plan to optimise this for repeat sampling and test whether we can detect reductions in MD in women receiving hormonal therapy for BC.

## Research Benefits

Understanding the reasons that MD is a risk factor has potential to improve our efforts to prevent, detect and treat breast cancer (BC). Our pathobiology studies address this. Almost 70% of all breast cancers are hormone-receptor positive, where hormone therapies are administered but will not benefit the patient in about 1/3 of the women treated. Identifying such non-responders would be ideal, as they can avoid possible side-effects and/or switch to other therapies. Our Portable NMR may allow monitoring of response to hormonal therapies in BC, and could lead to improvements in BC management.

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