ACRF ACCELERATE

An Impact Philanthropy Initiative

AUSTRALIAN CANCER RESEARCH FOUNDATION

Giving better options to women at high risk of breast cancer

Project Title	ACRF Centre for High-Risk Breast Cancer
Lead Institute	Princess Alexandra Hospital and Griffith University, QLD
Focus Area	Revolutionising prediction for high-risk breast cancer enabling earlier intervention and potential cure
Cancer Types	Breast, ovarian

Challenge and Opportunity

A ten-year study of women at high risk for breast cancer which analysed their breast tissue chemistry, correctly predicted those that would develop a cancer - on average four years ahead of current methods. This method of assessing breast tissue biochemical changes utilises a technique referred to as magnetic resonance spectroscopy (MRS) with results to date showing that it can provide a means of identifying women who are at imminent risk of breast cancer development, thus enabling earlier intervention and potential cure.

The state-of-the-art MRS scanner can identify specific lipid-based metabolites in the breast which can predict and herald the evolvement of a breast cancer, allowing clinicians to intervene at an early stage by either introducing risk-reducing medications or undertaking prophylactic surgery.

The MRS technology can also provide an important alternative to contrast enhanced imaging for determining breast density for those women unable to tolerate contrast agents or who store contrast agents in their body.

A ten-year blinded clinical trial of 480 women, conducted by this team, correctly predicted 32/32 women would develop a breast cancer. The next phase will be to move to an open trial to further confirm the efficacy of the approach.

Project in Brief

MRS provides a means of assessing the biochemical changes in a woman's breast tissue, with results demonstrating that the presence or absence of tumour promoters will more accurately predict their risk for developing a cancer. This essentially provides a real-time risk assessment tool.

In this next phase of research, using updated technology in the form of a Magnetic Resonance Imaging (MRI) scanner, breast clinicians will offer women with significant biochemical changes risk-reducing medications and determine whether these medications can slow, stop or reverse the identified biochemical changes in the breast.

The scanner will be installed in the Radiology Suite at the Princess Alexandra Hospital and patients referred from the High-risk Breast Clinics in South East Queensland. Using the new technology these women are identified as having tissue in transition to cancer. Once this evaluation process has commenced, the women become their own control. The challenge to be researched with the new unblinded study is the management of their treatment, which is where the speed of the development is correlated with a range of factors including genetic status, density and menopause.

This ongoing study will further validate existing research data, and ultimately this new technology will provide a woman whose breast demonstrates these in-transition chemical changes the choice of opting for preventative surgery or preventative medications.

Going forward, the project team plans to continue the longitudinal trial and add the option of treatment for those women who develop in-transition biochemical changes.

PATIENT SCAN
- Patient scanned
- 15 minutes scan in 3T MRI scanner
- Raw 2D patient data is sent to Siemens Teamplay cloud

DATA CAPTURE
- Data captured and sent to DatChem
- Data is transmitted from Siemens Teamplay to DatChem's private cloud
- Teamplay capture usage data to inform billing and demand management

DATA PROCESSING
- Data analysis and reporting
- Cloud-hosted DatChem application receives data
- Data undergoes pre-processing, processing and feature extraction
- Standardised reporting output to physician outlining data analytics results

PHYSICIAN RECEIVES
- Physician receives results
- User friendly output can inform treatment and patient communications

The Benefit

MRS of the breast has the potential to prevent women from developing breast cancer and allows them to have input into how best to proceed. Access to this new MRI scanner, will provide new options for watching cancers develop in real-time, evaluate new management options and generate new guidelines for patient management. The technology can identify tissue committed to a cancer up to six years ahead of conventional imaging. This will give women choice in managing their diagnosis - with options of taking pre-emptive action either in the form of prophylactic surgery or preventative medications.

To make this technology available nationally and internationally it is imperative to have access to the latest MRI scanner hardware and software.

The technology used to provide an accurate evaluation of risk for breast cancer is also now possible for ovarian cancer and a longitudinal study will be undertaken. Furthermore, it is likely that the neuroradiologists will have use for the new technology for risk and an early diagnosis of brain tumours and to monitor response to the new immune therapies.

"This is really a game-changer for the management of women at high risk of familial breast cancer because when we see these changes in the metabolites in the breast in these women who are then entering into this in transition phase it gives us a window of opportunity to actually better manage the outcome.

This could mean they potentially can all be cured and it gives them a greater control of their own lives to actually make the decision as to how and when they want to go forward."

Top left: Professor Carolyn Mountford, Chief Investigator, pictured with Professor Ian Bennett, Chief Investigator

Bottom left: Princess Alexandra Hospital

Use of Funds

The $2.5 million investment will enable purchase of a state-of-the-art 3T MRI scanner to undertake an unblinded clinical trial of the management of women at high-risk for breast cancer who have been objectively diagnosed as "In Transition" towards a malignant cancer.

Siemens 3T MRI Scanner

Technology	Cost
Siemens 3T MRI Scanner	$2,500,000
Total	**$2,500,000**

Meet the Team of Chief Investigators

The ACRF Centre for High-Risk Breast Cancer supports a world-leading multidisciplinary team who have worked for over 30 years together to deliver the goal of management of women at high-risk for breast cancer at a time when the condition can be prevented.

Co Lead: Professor Carolyn Mountford, DPhil (Oxon), MS (Harv)
Princess Alexandra Hospital, Radiology
IBG, Griffith University

Co Lead: Professor Ian Bennett, FRACS, FACS, CCPU
Princess Alexandra Hospital, High Risk Breast Clinic
IBG, Griffith University

Professor Gorane Santamaria, PhD, FRANZCR
Princess Alexandra Hospital, Radiology
IBG, Griffith University

Professor Peter Malycha AM, FRACS, FRCS, CCPU
Griffith University, prev Royal Adelaide Hospital and Princess Alexandra Hospital
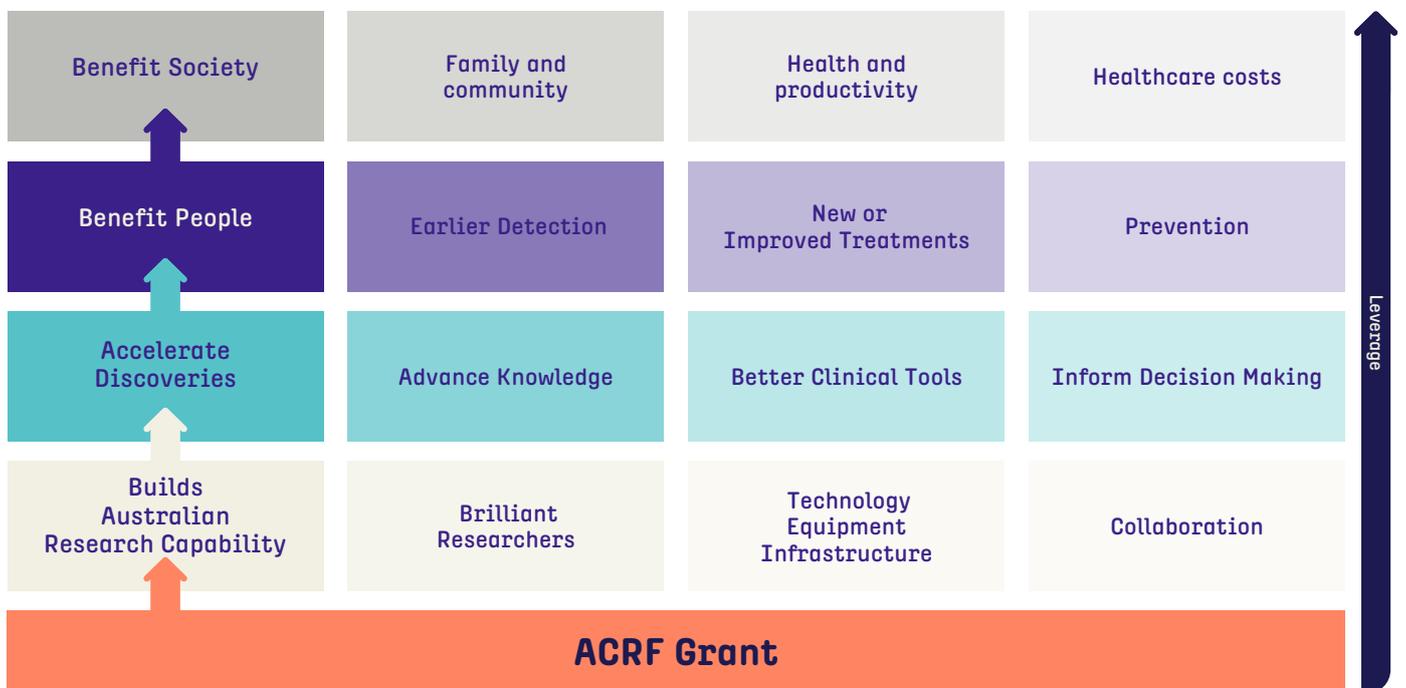
Adjunct Professor Susanne Jeavons, FRANZCR
Princess Alexandra Hospital, Radiology
IBG, Griffith University

Professor John Irvine, PhD
Griffith University

ACRF's approach accelerates impact

- ACRF is uniquely positioned to access brilliant researchers and facilitate collaboration across Australia. Our focus on equipping researchers with technology and infrastructure is vital to progress and innovation.

- An outstanding independent panel of Australian and international cancer experts recommended funding this project. The research is cutting edge, distinctive, and has the potential for impactful outcomes.

- Projects outcomes will be reported to ACRF for seven years. These typically include scientific breakthroughs, advanced knowledge, publications, new approaches both in the clinic and use of information.

- The impact for people affected by cancer – through earlier detection, new and improved treatments – is better quality of life through the diagnosis, and lives saved. In some cases, research even results in preventing cancer.

- Furthermore, research benefits society – including keeping families and communities intact, reducing healthcare costs and keeping people healthy and productive.

Benefit Society	Family and community	Health and productivity	Healthcare costs
Benefit People	Earlier Detection	New or Improved Treatments	Prevention
Accelerate Discoveries	Advance Knowledge	Better Clinical Tools	Inform Decision Making
Builds Australian Research Capability	Brilliant Researchers	Technology Equipment Infrastructure	Collaboration
ACRF Grant			

Leverage

ACRF seed funds remarkable projects and recipients typically leverage the ACRF grant to secure funding from other funding agencies. Reports from 33 grants (2013 – 2023) with an award total of $80 million evidence self-reported leverage to $778 million, a factor of 9.6 times.

Beyond the primary research objectives ACRF funded equipment has been used in the training of numerous new doctors and scientists, and it has played a part in attracting and retaining leading talent in Australia and global acknowledgement of the high quality of Australian cancer research.

BACKING BRILLIANT

To find out more about Australian Cancer Research Foundation, the ACRF Accelerate program and this exciting project please contact
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