

# IMPACT Medical Imaging

## Implementation of x-ray PhAse-Contrast Tomography to transform cancer diagnosis

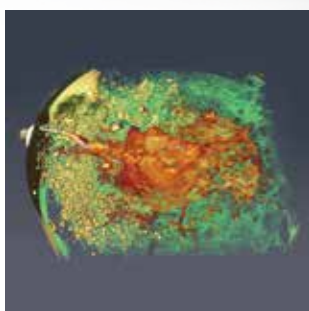
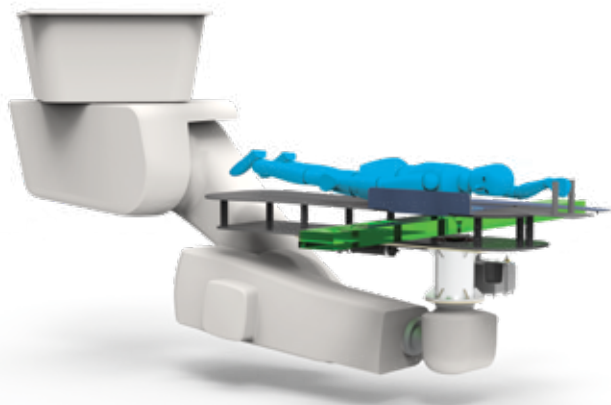
**A program that will transform diagnosis of breast and lung cancer by establishing a path to clinical implementation of a novel low-dose, high-quality, 3D imaging technique.**

“Propagation-based phase-contrast computed tomography (PB-CT) can improve the imaging signal 10-fold, leading to a considerable improvement in image quality and a substantial reduction in the X-ray dose, compared to conventional X-ray imaging techniques,” said Professor Brennan.

“Successful clinical translation of PB-CT requires a multidisciplinary team of experts in academia and beyond. This National Health and Medical Research Council (NHMRC) Synergy Grant allows us to bring together the right people to deliver a world-first PB-CT imaging facility.

The program could revolutionise breast and lung cancer diagnosis worldwide and position Australia as an international hub of scientific, clinical and industrial excellence in X-ray phase-contrast imaging.

Through vastly improved cancer diagnosis and reduced risk and discomfort, PB-CT has the potential to significantly reduce cancer mortality and morbidity.”



## Postdoctoral positions available for Aim 1 & 2

### Career Opportunities

#### ✔ Postdoctoral Research Associate in Medical Imaging (IMPACT Program), SYDNEY

- Utilise your exceptional medical imaging and processing skills to assess image quality and investigate volumetric image interpretation by radiologists
- Based at the University of Sydney, Camperdown campus, Sydney with the potential to travel interstate for work
- Full time fixed term until May 2025 with a Base Salary A\$98,645 – A\$105,305 + 17% superannuation

#### Your key responsibilities will be to:

- Reconstruct and process volumetric medical images
- Assess objective image quality and investigate image interpretation by radiologists
- Support in the running of a clinical trial in this area
- Work effectively as part of a large team
- Lead drafting research publication and presentation

**Contact:** Dr Amir Tavakoli Taba - [amir.tavakoli@sydney.edu.au](mailto:amir.tavakoli@sydney.edu.au)

#### ✔ Postdoctoral Research Associate, Imaging and Medical Beamline, MELBOURNE

- Integrated in the IMBL team to lead the imaging side of IMPACT
- Based at the IMBL, Australian Synchrotron (ANSTO), Melbourne
- Full time fixed term until May 2025 with a Base Salary A\$98,645 – A\$105,305 + 17% superannuation

#### Your key responsibilities will be to:

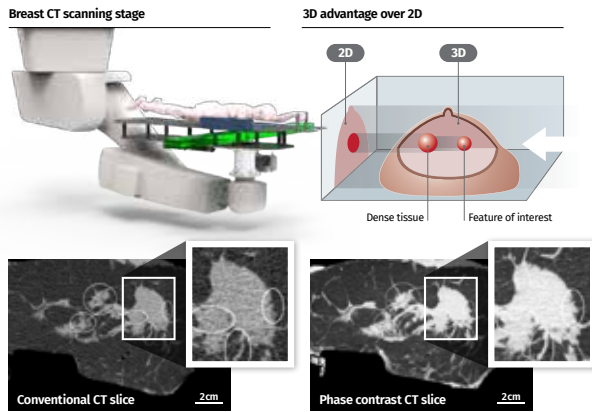
- Conduct X-ray imaging experiments with phantoms and breast tissue samples
- Act as liaison between the IMBL and the partner institution to support the clinical trial
- Perform a wide range of CT imaging within the cross-disciplinary IMBL team
- Reconstruct and process volumetric medical images
- Develop custom software to perform image processing
- Conduct self-directed research in the same area as IMPACT
- Lead drafting research publication and presentation

**Contact:** Dr Daniel Hausermann - [danielh@ansto.gov.au](mailto:danielh@ansto.gov.au)

## Aims of Research Program

### Aim 1 – Optimise breast imaging conditions for the clinic

- Optimise the hardware components of PB-CT scans.
- Develop protocols for beam energy, radiation dose and phase-retrieval algorithms for a range of breast sizes and compositions.
- Evaluate dosimetry, safety, motion stability and simulation data.



### Aim 2 – Establish a world-first PB-CT clinic

- Establish infrastructure for a breast imaging clinic.
- Develop and implement a study protocol that is co-design with consumers.
- Compare the effectiveness of PCT with standard care.
- Establish a clinic for stratified screening and assessment.
- Evaluate the effectiveness of PCT for human trial, as related to established test such as ROC for a range of pathologies and MBD (through specimen imaging).

### Aim 3 – Develop a pathway for widespread clinical implementation using compact X-ray sources

- Delivering PB-CT technology via commercially available compact X-ray sources will allow it to be widely integrated into specialist cancer care facilities across Australia and overseas.

### Aim 4 – Imaging Lung Cancer with PB-CT

- Investigate potential approaches and advantages to PB-CT of lung cancer to lay the basis for a future clinical trial.
- Identify protocols for PB-CT of lung cancer at the Imaging and Medical Beamline (IMBL), Australian Synchrotron (ANSTO).

## Expected Outcomes

1. Lower radiation dose
2. High quality imaging (high contrast, low noise)
3. A full 3D image
4. Better diagnostic accuracy, particularly in dense tissue
5. No breast compression (more comfortable)

## IMPACT Team – Chief Investigators (Cis) & Their Expertise

**Prof Patrick Brennan**, Uni of Sydney - Diagnostic Imaging

**Prof Harry Quiney**, Uni of Melbourne - Physics and Chemistry

**Prof Sarah Lewis**, Uni of Sydney - Medical Imaging

**Prof Keith Nugent**, Australian National Uni - Physics, X-ray optics

**Prof Andrew Peele**, ANSTO - Physics, X-ray optics

**Dr Seyedamir Taba**, Uni of Sydney - Medical Imaging Science

**Dr Kaye Morgan**, Monash Uni - Physics, X-ray optics

**Dr Jane Fox**, Monash Health - Medicine, Surgery

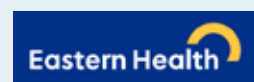
**Dr Giuliana Tromba**, Elettra Synchrotron, Italy - Physics

**Dr Darren Lockie**, Eastern Health - Medicine, Radiology

### Funded By:



### CI Institutions:



### Administering Institution:



## For more information

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