

BIORESOURCE PAPER

# The Australian Breast Cancer Tissue Bank (ABCTB)

Jane E. Carpenter,<sup>1</sup> Deborah Marsh,<sup>2</sup> Mythily Mariasegaram<sup>3</sup> and Christine L. Clarke<sup>4</sup>

<sup>1</sup> Australian Breast Cancer Tissue Bank, University of Sydney, NSW, Australia

<sup>2</sup> Kolling Institute for Medical Research, University of Sydney, NSW, Australia

<sup>3</sup> Australian Breast Cancer Tissue Bank, Westmead Millennium Institute, NSW, Australia

<sup>4</sup> Westmead Institute for Cancer Research, University of Sydney, Westmead, NSW, Australia

The ABCTB was established in 2006 as an open access, not for profit resource dedicated to providing bio-specimens and/or data to both national and international research projects in the field of breast cancer. Donors are consented according to standard ethical principles for use of their material for unspecified future research. ABCTB collects fully annotated clinical samples and associated clinical and longitudinal data from donors. Material and data is supplied to research projects.

**Keywords:** breast cancer; biological samples; clinical data; longitudinal data

**Funding Statement:** Current funding: National Health and Medical Research Council of Australia (#633291, from 2009-2014); The National Breast Cancer Foundation (#FG0601 from 2007-2012 & #IF1205 from 2012-2017); The Cancer Institute NSW (#12/RIG/1-16 from 2012-2014).

## (1) Overview

### Project description

Lack of high quality breast cancer tissue and attendant clinical information has been a major impediment for those working in the field of breast cancer research. In response to these needs the Australian Breast Cancer Tissue Bank was established with the support of major Australian funding bodies.

The aims of the resource were to establish a standardised framework for the ethical and appropriate recruitment of breast cancer tissue donors; to collect and store cancer and matched normal tissue, blood and associated standardised clinical, longitudinal and outcome data from breast cancer patients; and to make material available for basic and translational research [1]. Operating principles are based on best practice guidelines [2], and encompass two significant strategic features: Integration of tissue banking into clinical practice; and the development and adoption of web-based data management solutions [3].

Both tissue and blood samples are collected and stored and a central processing laboratory is able to perform DNA and RNA extractions, sectioning of tissue, creation of Tissue Micro Arrays (TMAs) and digital imaging of stained sections of tumour. The latter are made available for viewing on the ABCTB website [4] so that researchers can review and select individual cases. Data is collected via both electronic and manual methods. The ABCTB developed an auditing tool within its database to ensure accuracy of key data fields and maintain data integrity [5]. The ABCTB participates in consortia studies such as the Breast Cancer Association Consortium (BCAC) and the Triple Negative

Breast Cancer Consortia (TNBC). This allows ABCTB samples to be pooled in very large cohort studies [6, 7].

### Classification (1)

Human

### Species

Human

### Classification (2)

Biological samples and associated data.

### Context

#### Spatial coverage

ABCTB consists of a central management hub located at the Westmead Millennium Institute in New South Wales, Australia, with collection centres and affiliate sites distributed across Australia [1].

### Collection Centres

- New South Wales
  - Royal North Shore Hospital/Kolling Institute (active)
  - John Hunter Hospital (active)
  - Liverpool Hospital/Ingham Institute (active)
  - Westmead Hospital (active for metastatic cases)
  - St Vincent's Hospital (not currently recruiting)
  - Port Macquarie (not currently recruiting)
  - Royal Prince Alfred Hospital (not currently recruiting)
- Australian Capital Territory

- Canberra Hospital (active)

#### Affiliate Sites

- Western Australia
  - St John of God Healthcare (active)
- Queensland
  - Brisbane Breast Bank – Royal Brisbane and Women's Hospital (active)

Northern boundary:

+/- x.x -27.45, 153.03 (Brisbane)

Southern boundary:

+/- x.x -35.35, 149.10 (Canberra Hospital)

Eastern boundary:

+/- x.x -33.82, 151.19 (Royal North Shore Hospital)

Western boundary:

+/- x.x -31.94, 115.83 (St John of God)

#### Temporal coverage

Start date 01 February 2006 to present, no end date.

#### Temporal coverage for accessibility

N/A

## (2) Methods

### Steps

- Donors are recruited and consented in breast cancer clinics at the time of diagnosis of breast cancer. [SOPs are in place for obtaining informed consent; for consent form management; for withdrawal of consent; for confidentiality agreements by staff].
- The ABCTB collects blood, tissue and clinical data from consenting patients.
- Bloods are collected from donors by clinical staff and tissue is collected from surgery via diagnostic anatomical pathology laboratories and only if there is excess tissue that is not required for diagnostic purposes as assessed by a pathologist. [SOPs for blood processing and storage; tissue processing and storage; data entry].
- Clinical data is collected from medical records, pathology reports, cancer registries and clinical databases. [SOPs for data collection and entry: pathology data; surgical details; demographics; clinical history].
- Tissue sections from FFPE blocks are reviewed for tumour content by a qualified pathologist [SOP for pathology review].
- Donor information, specimen details and clinical data is stored in a secure customised SQL (Caisis) database. [SOPs for data management; database operation; data storage and security; and data auditing].
- Longitudinal data is collected on the donors and their clinical outcomes will be followed for ten years.
- A website provides information for researchers and donors.

### Stabilization/preservation

- EDTA (blood)
- Snap freeze tissue in liquid nitrogen

### Type of long-term preservation

- Formalin Fixed Paraffin Embedded (FFPE)
- Frozen
- Fresh into media (for specific project requests only)
- Dried blood spot cards

All samples are labelled with a unique code and contain no patient identifiable information. Samples are stored in temperature monitored freezers and tanks that are locked and accessible only by ABCTB employees.

### Storage temperature

- -80°C (Serum; plasma; whole blood; DNA)
- -196°C (Tissue; white cell buffy coat)
- Room temperature (Blood spot cards; FFPE blocks; TMAs)
- Storage duration: 7 years plus

### Shipping temperature from patient/source to preservation or research use

Various from: -190°C (liquid nitrogen), -56°C (on dry ice); 0-4°C (on ice); room temperature (18-25°C).

### Shipping temperature from storage to research use

- -80°C to -196°C (Tissue)
- -56°C (DNA, blood products)
- Room temperature (FFPE sections)

### Quality assurance measures

- % tumour content reviewed by pathologists
- RIN for RNA samples
- Control sample on every DNA extraction run
- Participate in external QAP scheme for RNA, DNA and tissue histology
- BRISQ report provided
- Auditing of essential data fields [5]
- Samples collected across all collection nodes follow common SOPs

### Source of associated data

- Hospital health records both paper and electronic
- Health records from individual specialist's rooms/clinics
- NSW Cancer registry – via hospital data feeds
- G.P. Surgeries
- Family history via questionnaires
- Death registry

### Ethics statement

The main ethical multi-site approval for the ABCTB is provided by the Royal Prince Alfred Hospital Zone Ethics Committee in New South Wales, Australia.

Protocol No X12-0279 (prev X08-0124) & HERC/08/RPAH/215 – “Australian Breast Cancer Tissue Bank”. Multi-site approval was initiated on 6/08/2008. Prior to this date, collection sites had individual approvals in place. All collection/affiliate sites also have site specific ethical approvals. Samples are intended to be stored indefinitely.

**Constraints**

Funds supporting the resource are mostly via competitive research grants and of short term duration. Planning for long term operational activities is difficult with lack of financial security.

**(3) Bioresource description****Object name**

Breast cancer

**Biobank name**

- Australian Breast Cancer Tissue Bank
- Bioresource acronym: ABCTB

**Bioresource location**

- Central Management hub based at Westmead Millennium Institute, University of Sydney, Hawkesbury Road, Westmead, NSW 2145, Australia
- Collection nodes across Australia

**Bioresource contact**

Ms Jane Carpenter: jane.carpenter@sydney.edu.au

**Bioresource URL**

www.abctb.org.au

**Identifier used**

N/A

**Bioresource type**

Breast cancer

**Type of sampling**

Disease based

**Anatomical site**

- Breast
- Metastatic lesions

**Disease status of patients/source**

Breast cancer

**Clinical characteristics of patients/source**

- Sporadic cases of breast cancer of all ages
- Males and females
- Majority of the biospecimens are collected at the time of the first diagnosis of breast cancer for the donor

**Size of the bioresource**

- 6,225 donors as at 15 May 2014
- On-going recruitment of 500-600 new donors per annum
- Collection is ongoing to reflect changes in treatment practices over time and has no definite end date

**Vital state of patients/source**

Alive

**Clinical diagnosis of patients/source**

Breast cancer

**Pathology diagnosis**

- All breast cancer sub types
- ICD50

**Control samples**

Very small numbers of non-breast cancer tissue collected from reduction mammoplasty surgeries.

**Biospecimen type**

- Frozen tissue: approx. 5mm, 1-2 per donor on 25% of cohort
- FFPE tissue: 1-2 FFPE blocks on 85% of cohort
- Tissue Microarrays: various
- Whole blood: 2 aliquots per donor, 0.5ml each
- Serum: 4 aliquots per donor, 0.5ml each
- Plasma: 4 aliquots per donor, 0.5ml each
- White cell buffy coat: 2 aliquots per donor, 0.3ml each
- Dried blood spot cards: 4 spots per donor
- DNA from blood: 4 vials per donor, 50µl each
- DNA from tissue: processed on a project specific basis
- RNA from tissue: processed on a project specific basis

**Release date**

Has been open for applications since 2008.

**Access criteria**

Applications to the resource are initiated by the researcher by submission of an on line Expression of Interest. This is reviewed by the ABCTB and if the material and/or data are available and the project meets ABCTB criteria a full application is invited. The researcher is provided with a log in to complete the application on line, which also allows upload of required documents such as evidence of funding and ethical approvals. Following receipt of a full application, all applications for material and data must be assessed and approved by the ABCTB Access Committee to comply with scientific standards. Independent scientific review is sought for project evaluation.

All applications must have ethical approval for the proposed research and must enter into an MTA with the ABCTB before the material is released [3]. A partial cost recovery mechanism is in place ([http://www.abctb.org.au/abctbNew2/Cost\\_recovery\\_Schedule\\_Dec\\_2010.pdf](http://www.abctb.org.au/abctbNew2/Cost_recovery_Schedule_Dec_2010.pdf)). At the conclusion of the project, any data generated must be returned to the ABCTB and this is made available for other users.

**(4) Reuse potential**

Specimens are provided to projects on a non-exclusive basis therefore samples from the same donor may be used in several different projects. If the researcher requires DNA and/or RNA this is extracted by the ABCTB preserving the bulk of the specimen to be available for other research projects.

As a condition of supply of material, the recipient of samples and/or data must agree to return findings to the ABCTB on conclusion of the research purpose. Such data is then available for the use of others.

#### Author roles

- Jane E. Carpenter, Bioresource Manager
- Deborah Marsh, Bioresource Creator
- Mythily Mariasegaram, Bioresource Curator
- Christine L. Clarke, Bioresource Director

#### Acknowledgements

Chief Investigators on ABCTB funding grant applications: Prof Christine Clarke, Clinical A/Prof Rosemary Balleine, Prof Robert Baxter, Dr Stephen Braye, Ms Jane Carpenter, Prof Jane Dahlstrom, Prof John Forbes, Prof Soon Lee, A/Prof Debbie Marsh, A/Prof Adrienne Morey, Dr Nirmala Pathmanathan, Prof Rodney Scott, Dr Peter Simpson, Prof Allan Spigelman, A/Prof Nicholas Wilcken, A/Prof Desmond Yip and A/Prof Nik Zeps.

#### References

1. **Carpenter, J E** 2011 Biobank Profiles: Australian Breast Cancer Tissue Bank. *Biopreservation and Biobanking*, 9(3): 217-221. DOI: <http://dx.doi.org/10.1089/bio.2011.9325>
2. **ISBER** 2012 Best Practices for Repositories: Collection, Storage, Retrieval and Distribution of Biological Materials for Research. *Biopreservation and Biobanking*, 10(2): 79-161. DOI: <http://dx.doi.org/10.1089/bio.2012.1022>
3. **Khushi, M, Carpenter, J E, Balleine, R L and Clarke, C L** 2012 Electronic biorepository application system: Web-based software to manage receipt, peer review, and approval of researcher applications to a biobank. *Biopreservation and Biobanking*, 10(1): 37-44. DOI: <http://dx.doi.org/10.1089/bio.2011.0038>
4. **Khushi, M, Edwards, G, de Marcos, D A, Carpenter, J E, Graham, J D and Clarke, C L** 2013 Open source tools for management and archiving of digital microscopy data to allow integration with patient pathology and treatment information. *Diagnostic pathology*, 8(1): 1-7. DOI: <http://dx.doi.org/10.1186/1746-1596-8-22>
5. **Khushi, M, Carpenter, J E, Balleine, R L and Clarke, C L** 2012 Development of a data entry auditing protocol and quality assurance for a tissue bank database. *Cell and tissue banking*, 13(1): 9-13. DOI: <http://dx.doi.org/10.1007/s10561-011-9240-x>
6. **Garcia-Closas, M, Couch, F J, Lindstrom, S, Michailidou, K, et al** 2013 Genome-wide association studies identify four ER negative-specific breast cancer risk loci. *Nature Genetics*, 45(4): 392-398. DOI: <http://dx.doi.org/10.1038/ng.2561>
7. **Purrington, K S, Slager, S, Eccles, D, Yannoukakos, D, et al** 2013 Genome-wide association study identifies 25 known breast cancer susceptibility loci as risk factors for triple negative breast cancer. *Carcinogenesis*, 35(5): 1012-1019. DOI: <http://dx.doi.org/10.1093/carcin/bgt404>

**How to cite this article:** Carpenter, J E, Marsh, D, Mariasegaram, M and Clarke, C L 2014 The Australian Breast Cancer Tissue Bank (ABCTB). *Open Journal of Bioresources*, 1: e1, DOI: <http://dx.doi.org/10.5334/ojb.aa>

**Published:** 24 July 2014

**Copyright:** © 2014 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution 3.0 Unported License (CC-BY 3.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. See <http://creativecommons.org/licenses/by/3.0/>.