



Charlie Teo Foundation Brain Tumour Bank

BIORESOURCE PAPER

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ABSTRACT

Charlie Teo Foundation Brain Tumour Bank (CTFBTB) was started by Charlie Teo Foundation (CTF), an Australian charity funding brain cancer research. CTFBTB was established under the CTF's research strategy of More Data – to produce and share high-quality, well-annotated, biological and clinical data that has the potential to drive further innovation and scientific breakthroughs. CTFBTB collects samples of human tissue, live cells, DNA and blood to be used for brain cancer research. CTFBTB also has a cell line repository of real-world brain tumours. Researchers can apply to use these valuable and accurate models that enable more refined analysis of the mechanisms that regulate individual patient response to treatment and allow for the further development of models for precision medicine.

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KEYWORDS:

Brain Cancer; Brain Tumour;
Neuroncology; Biorepository

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(1) OVERVIEW

PROJECT DESCRIPTION

Brain tumours, classified by cell origin and how the cells behave, range from least aggressive (benign) to most aggressive (cancer), with the most aggressive type (glioblastoma) being notoriously difficult-to-treat and despite improvements in detection and treatment, the number of deaths from these brain cancers has remained unchanged in the past 30 years [1].

The most aggressive form of brain cancer is currently treated using a multipronged approach that can involve surgery, radiotherapy and chemotherapy [2]. Yet the long-term outlook and survival rates of people with such cancers remains very poor (14.6 months) [3].

Current efforts in brain cancer research are to tailor treatments to the individual's brain cancer however this can only be successful if there are reliable ways of identifying what is different about an individual's brain cancer and adapting treatment to that difference.

In order to identify ways to personalise treatment and ensure individuals receive therapies that will benefit them the most and make a significant difference to their chances of beating brain cancer, procurement of high-quality samples is vital. Brain cancer research with real world impacts (translational) into the 1) identification of risk, 2) early detection, 3) sub-classification (including prognostics and predictive biomarkers), and 4) identification of new drug targets and treatments across a broad range of research fields, including molecular and cell biology, cancer genetics, clinical research and biomarker research heavily rely on the use of high-quality samples.

The proposed establishment of CTFBTB will collect, process, store, retrieve and disseminate high-quality samples and information for research projects following informed consent from participants diagnosed with brain tumours, ranging from the relatively benign pituitary adenomas and meningiomas through to the aggressive forms of brain cancer such as glioblastoma and gliosarcoma.

Together, the proposed collection and processing of these samples, with the data that would be made available for use to the research community, not only increases the utility of these samples but also increases research information that can be obtained, increases the rate of research and accelerates research findings to benefit brain tumour patients.

CLASSIFICATION (1)

Human.

SPECIES

Homo sapiens.

CLASSIFICATION (2)

Biological samples and associated clinical and research data.

CONTEXT

Spatial coverage

CTFBTB collects biospecimens from a single site: Prince of Wales Private Hospital, Randwick Sydney NSW, Australia. Coordinates are as follows Latitude: -33.921290 and Longitude: 151.239470.

Temporal coverage

Start date 08 January 2019 to present; with collection, processing and storage of biospecimens approved until 24 September 2029.

(2) METHODS

CONSENTING AND MATERIAL HANDLING PROCEDURES

Recruitment Protocol

- Participating clinicians (as listed in this protocol) are responsible for identifying participants that would be suitable to contribute to the CTFBTB.
- Those participants identified are then contacted by the Biobank Co-Ordinator or Co-Investigator in order to obtain informed consent.
- Informed consent is obtained using the CTFBTB's participant information sheets and consent forms. The participant information sheets outline in easy to understand language with diagrams, the proposed use of the samples, the risks and benefits to the participant and what participation involves. The consent forms are designed to collect, process and store samples for broad and as yet unspecified research into brain cancer. The CTFBTB uses 3 types of participant information sheets and consent forms depending on the participant and their mental capacity, that is, self, parent/guardian and assent.
- A revocation of consent form is to be completed should a participant wish to withdraw from the study. Upon revocation, any of the participants specimens and information that remain in the bank will be destroyed.
- If the Biobank Co-Ordinator or Co-Investigator is successful at obtaining informed consent, then the samples, including fresh tumour tissue, blood and other relevant bodily fluids as listed in [Table 1](#), are collected at time of surgical resection.
- Fresh tumour tissues are collected in conjunction with the anatomical pathology department of the participating hospital with qualified pathologists and only fresh tumour tissue which is deemed in excess of diagnostic requirements are stored securely and anonymously by the CTFBTB.
- All data as listed in [Table 1](#) (if available) is recorded electronically, using the Biobanking software, OpenSpecimen.

The standard work procedures implemented by CTFBTB have been formulated based on several best practice guidelines, which include the International Society for Biological and Environmental Repositories (ISBER) Best Practices for Repositories Guidelines and the Organisation for Economic Co-operation and Development (OECD) Best Practice Guidelines for Biological Resources Centres and ISO 20387 – Biotechnology – Biobanking – General Requirement for biobanking.

STABILIZATION/PRESERVATION

Fresh tumour tissue are stabilized on ice at 4°C before fixation in formalin, non-aldehyde fixative agent, or medium to allow the establishment of cell line culture; or snap freezing in liquid nitrogen. Blood specimens and other bodily fluids are stabilized at 4°C before long-term preservation at –80°C or –196°C with the exception of plasma samples which are stabilized in vacutainers of EDTA and stabilized at 4°C prior to long-term preservation [5].

TYPE OF LONG-TERM PRESERVATION

Please see section (3) *Bioresource description, Biospecimen type* for details.

All biospecimens and information are stored securely and anonymously.

STORAGE TEMPERATURE

Please see section (3) *Bioresource description, Biospecimen type* for details.

SHIPPING TEMPERATURE FROM PATIENT/SOURCE TO PRESERVATION OR RESEARCH USE

Biospecimens are transported using temperature-controlled, cold chain solutions [5]. Depending on the biospecimen type to be transported and the transportation logistics, several options may be available including:

- Controlled ambient → +15°C to +25°C

	CHARACTERISTIC	DESCRIPTION		
Sample	Tumour Type	Brain Tumour defined according to 2016 WHO classification system [4]		
Collection	Collection Site	Centre for Minimally Invasive Neurosurgery, Prince of Wales Private Hospital, Sydney Australia		
	Sample Collection Type	Tumour Tissue Peripheral Blood Cerebrospinal Fluid* Demographic Data Clinical Data Pathological Data Imaging Data Quality of Life (QoL) Data		
Processing	Sample Processing	Fresh Frozen Tumour Tissue		
		Whole Blood		
		Guthrie Card		
		Plasma		
		Serum		
		Buffy Coat		
		Peripheral Blood Mononuclear Cell (PBMC)		
		Formalin-Fixed Paraffin Embedded Tissue (FFPE)		
		Haematoxylin & Eosin (H&E) Cryosections		
		Fixed Tissue	Non-aldehyde fixative agents	
		Other		
		Cell Line Culture		
		Whole Genome Sequencing Data		
Whole Transcriptome Sequencing Data				
Whole Exome Sequencing Data				
Single-Cell DNA Sequencing Data				
Single-Cell RNA Sequencing Data				
Storage	Sample Storage Facilities	Long-Term	Garvan Institute of Medical Research	
		Short-Term (if required)	Centre for Minimally Invasive Neurosurgery, Prince of Wales Private Hospital, Sydney Australia	
	Data Storage Facilities	OpenSpecimen		
Other	Source of Associated Data	Hospital Medical & Pathology Records		
		Local Health Districts and NSW Cancer Registries		
		Attending Clinicians Consult Rooms		
		Participants		
	Source of Other samples and data	Steve and Lynette Waugh Brain Tumour Bank		

Table 1 A summary of the characteristics of Charlie Teo Foundation Brain Tumour Bank.

- Refrigerated → +2°C to +8°C
- Frozen → -20°C
- Deep frozen → -70°C
- Packed on liquid nitrogen → -196°C

SHIPPING TEMPERATURE FROM STORAGE TO RESEARCH USE

Biospecimens are transported using temperature-controlled, cold chain solutions [5]. Depending on the biospecimen type to be transported and the transportation logistics, several options may be available including:

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- Refrigerated → +2°C to +8°C
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QUALITY ASSURANCE MEASURES

CTFBTB is a NSW Health Pathology certified Biobank with its processes and procedures compliant with ISO 20387 – Biotechnology – Biobanking – General Requirement for biobanking. It has a quality management system that comprises quality assurance and quality control protocols, designed with the purpose to ensure that all relevant biobanking activities are not compromised by human or processing error as well as to ensure the sustainability of CTFBTB. Detailed Safe Work Procedures (SWPs) which provide step-by-step accurate descriptions of specific tasks ensure that all samples are handled consistently and correctly.

Quality Assurance

The quality assurance measures that are implemented by CTFBTB include:

- Implementation of SWPs
- Personnel training; documented and updated, if required, on a periodic basis
- Documentation of modifications or revisions of SWPs and risks assessments (RAs)
- Maintenance of records pertaining to samples, equipment, and consumables

Quality Control

The quality control measures implemented by CTFBTB include:

- Verification of samples by a pathologist
- Validation of processing methods of samples via literature reviews, end user feed-back and/or laboratory quality control results
- Internal sample testing, checking RNA Integrity Number.

SOURCE OF ASSOCIATED DATA

Sources of associated data include:

- Hospital medical and pathology records
- Local health district and NSW Cancer registries
- Attending clinicians consult rooms
- Participants

ETHICS STATEMENT

Ethics approval is obtained from Bellberry Limited, SA, Australia, [2019-08-682], in accordance with the guidelines of the National Health and Medical Research Council of Australia's National Statement on Ethical Conduct in Human Research.

CONSTRAINTS

Current constraints include uncommon disease condition.

(3) BIORESOURCE DESCRIPTION

OBJECT NAME

Brain Cancer

BIORESOURCE NAME

Charlie Teo Foundation Brain Tumour Bank

Bioresource acronym: CTFBTB

BIORESOURCE LOCATION

The central site of CTFBTB is located at Charlie Teo Foundation, 605 Botany Road, Rosebery NSW 2018, Australia.

BIORESOURCE CONTACT

Research@charlieteofoundation.org.au

BIORESOURCE URL

<https://charlieteofoundation.org.au/>

BIORESOURCE TYPE

Brain Cancer

TYPE OF SAMPLING

Disease based

ANATOMICAL SITE

Brain

DISEASE STATUS OF PATIENTS/SOURCE

Cancer

CLINICAL CHARACTERISTICS OF PATIENTS/SOURCE:

- Age: all ages
- Gender: males and females
- Treatment information: yes
- Inclusion criteria: ability of participant to give informed consent
- Stage of the disease at time of collection: Biospecimens are collected at the time of surgical resection

SIZE OF THE BIORESOURCE

- Over 600 participants as at 25 January 2021
- Ongoing recruitment of approximately 100 participants per annum
- Collection of biospecimens is ongoing and indefinite

VITAL STATE OF PATIENTS/SOURCE

Alive

CLINICAL DIAGNOSIS OF PATIENTS/SOURCE

Brain Cancer

PATHOLOGY DIAGNOSIS

Brain Tumour defined according to 2016 WHO classification system [4].

BIOSPECIMEN TYPE

A summary of the biospecimen characteristics is provided below ([Table 1](#)).

RELEASE DATE

The date at which biospecimens have been available for applications is 2019.

ACCESS CRITERIA

Principles of Access

Biospecimens collected by CTFBTB are made available to researchers on the provision that use of samples are for scientifically valid and ethically approved research projects.

- 1.** Prior to applying to CTFBTB, the investigator is encouraged to contact the Biobank to discuss sample availability and other relevant information.
- 2.** The investigator will submit a completed 'Charlie Teo Foundation Brain Tumour Bank Researcher Application Form', which will be available on request from Charlie Teo Foundation, along with their ethics application and ethics approval and/or amendment letter(s), CV of the principal investigator and Material Transfer Agreement (MTA), which will be received by CTFBTB Co-Ordinator.
- 3.** CTFBTB Co-Ordinator will notify the Head of Research who will convene the Biobank Committee, who will assess the application.
- 4.** If the application is approved, Charlie Teo Foundation will formally notify the investigator and forward an MTA (if not already completed), to which the investigator must sign and return.
- 5.** Once receipt of the signed MTA has been received by Charlie Teo Foundation, the samples (non-identifiable) will be packaged and shipped to the investigator.

Material Transfer Agreement

The MTA governs the supply of materials (defined as samples and data), use of the materials, reporting and access, intellectual property rights, including commercialization provisions, the use and survival of materials in relation to confidentiality, liability and indemnity. The MTA is entered into where CTFBTB material is transferred to an organisation for the purposes of that organisation's own research. Once receipt of the signed MTA has been received by CTFBTB, then the samples will be packaged and shipped to the researcher.

(4) REUSE POTENTIAL

CTFBTB does not request return of samples but should be informed about research results. The CTFBTB encourages, where possible, sharing of materials created from the use of samples, which may include whole genome, exome or single-cell RNA sequencing data and validated protein expression data.

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COMPETING INTERESTS

The authors have no competing interests to declare.

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- Nicole J. Caixeiro, Curator
- Joseph W. Po, Co-Curator
- Ashraf Zaman, Co-ordinator
- Michael E. Sughrue, Co-Investigator
- Charles Teo, Creator

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