

BIORESOURCE PAPER

The Prostate Cancer Research Consortium Bioresource (Ireland)

Antony Wekesa and William Watson

UCD Conway Institute of Biomolecular and Biomedical Research, University College Dublin, Belfield, Dublin 4, Ireland

Corresponding author: Antony Wekesa (antowexa@gmail.com)

The Prostate Cancer Research Consortium (PCRC) is a co-ordinated group of researchers and clinicians from universities and hospitals in Ireland whose aim is to improve the diagnosis and treatment of prostate cancer by engaging in biomarker discovery and validation research. The PCRC has established a prostate cancer bioresource that collects biological samples and comprehensive clinical information collected at time of recruitment and subsequent follow from prostate cancer patients undergoing Transurethral resection of the prostate (benign disease) or radical prostatectomy (indolent, significant and aggressive, Gleason Score 4–10). This disease based bioresource with potential for reuse has recruited ~900 patients and collected >10000 tissue, serum, plasma, urine, DNA and RNA samples.

Keywords: Biobanking; biobank system; biobanking processes; biological samples; biological sample management

Funding statement: Irish Cancer Society; Health Research Board; Science Foundation Ireland; British Urological Foundation.

(1) Bioresource Overview

Project description

The PCRC was established in 2004 to bring together researchers from different academic institutions and hospitals in understanding the molecular and cellular basis of prostate cancer development and progression. The PCRC includes four clinical sites; Mater Misericordiae University Hospital, St James's Hospital, Beaumont Hospital and the Adelaide & Meath incorporating the National Children's Hospital and four research institutions; Conway Institute of Biomolecular and Biomedical Research, University College Dublin; Institute of Molecular Medicine, Trinity College Dublin; Royal College of Surgeons in Ireland Education and Research Centre and National Centre for Sensor Research, Dublin City University.

One of the objectives of the PCRC was to establish a bioresource. The first samples to be incorporated into the bioresource were collected in 2002. The PCRC established collection and temporal storage sites at its hospitals, following ethical approval by each of the hospital's ethics committees. The PCRC uses an agreed collection model, with agreed standard operating procedures (informed consent, sample collection, processing and transportation) that are implemented across the different sites, ensuring uniformity of the bioresource. Samples are temporarily stored at the collection centres using monitored storage facilities and periodically collected and transferred to the

PCRC bioresource. They are then processed for long term storage. There is a bioresource management system that facilitates effective storage, retrieval, tracking and dissemination of biological samples.

The bioresource has a Bioresource Information and Management System (BIMS) which is a central data repository for the sample, clinical and research data. The BIMS data originates from the hospital and research sites. Research nurses upload de-identified clinical, sample and pathology data and PCRC researchers upload research data from biological assessment. Uploading is done over a secure web browser to ensure confidentiality and security. BIMS allows researchers to identify what samples are available and where they are located and associated clinical and biological assessment data.

Classification (1)

Human.

Species

Human.

Classification (2)

Biological samples and associated clinical data.

Keywords

Prostate cancer, bioresource, biological samples.

Context**Spatial coverage**

Latitude: 53.310697.

Longitude: -6.225038.

Description

Ireland.

All counties of Southern Ireland.

Temporal coverage

Start date 2002 to present; with collection, processing and storage of samples indefinite.

Temporal coverage for accessibility

N/A.

(2) Methods**Steps**

1. Patients deemed suitable for recruitment are identified by research nurses.
2. Potential patients are contacted and informed consent sought.
3. After obtaining informed consent, research nurses organise with the patient to collect blood and urine samples prior to surgery. Tissues are collected at time of TURPs or radical prostatectomy.
4. Blood and urine samples are processed by the research nurses and temporarily stored at hospital sites. The tissues as processed by pathology laboratory staff and stored. All samples are processed using the agreed SOPs.
5. Clinical, pathological and sample data are recorded electronically into BIMS by research nurses.
6. Serum, plasma, urine and fresh frozen tissue (clarified in next section – Stabilization/preservation) are periodically collected from collection sites and transferred to the combined bioresource. FFPE blocks are stored at the pathology laboratories until required for biological assessment.

Standard Operating Procedures used include consent, sample collection, storage, retrieval, tracking and data management.

Stabilization/preservation

Bloods: vacutainer, EDTA, heparin.

Tissue: tissue container, 10% formalin; tissues for FFPE are kept in formalin until processing (processed within 2 hours of collection), fresh frozen tissues are transferred to freezing container and frozen in a -80°C freezer.

Type of long-term preservation

Bloods: plasma, serum, whole blood.

Tissue: fresh frozen, FFPE.

Storage temperature

Plasma, serum and fresh frozen tissue: -80°C.

FFPE tissues: room temperature.

DNA and RNA whole blood: -20°C.

Shipping temperature from patient/source to preservation

Bloods and tissue: room temperature.

Shipping temperature from storage to research use

Plasma, serum, fresh frozen tissue, and DNA/RNA whole blood: -80°C (on dry ice).

FFPE tissues: room temperature as FFPE blocks.

Quality assurance measures

1. All the samples are collected, processed and transported by following agreed SOPs across the different sites.
2. All personnel handling samples are trained.
3. Any modifications or revisions of SOPs are documented.
4. All records pertaining to samples, equipment and consumables are safely maintained.
5. Tissues are verified by pathologists.
6. Sample processing methods are validated via literature reviews, end user feed-back and/or laboratory quality control results.
7. Periodic internal audits.

Source of associated data

Health records and questionnaires.

Ethics Statement

Informed consent: The informed consent is structured along the following headings;

1. What is the purpose of this research study?
2. Why have I been chosen?
3. Who is organizing this study?
4. What will happen to me if I take part?
5. Are there any disadvantages in taking part in this study?
6. Are there any possible risks of taking part?
7. What are the possible benefits of taking part?
8. What happens after the study?
9. Confidentiality- who will know I am taking part in this study?
10. Hospital Research Ethics Committee Approval.
11. What will happen to the results of the study?
12. Voluntary participation.
13. Further Research.
14. Contact details.

Mater Misericordiae University Hospital, St James's Hospital, Beaumont Hospital and the Adelaide & Meath hospital ethics committees.

There are ethical/legal limitations for the collection. The sample release and distribution does not breach Irish data protection legislation. The distribution of associated clinical data falls under the remit of the National Cancer Registry of Ireland (NCR). The NCR collects and distributes data on cancer patients in Ireland and is permitted to do so by specific data protection legislation. PCRC has partnered with the NCR. This allows the PCRC to focus

on the biobanking and release of samples, and the NCR to focus on the dissemination of coded (de-identified) patient data, which thereby protects the privacy of individuals.

Constraints

Loss of patients leading to lack of follow up information and samples.

Lack of long-term funding.

(3) Bioresource description

Object name

Plasma, serum, urine, DNA, RNA, fresh frozen tissue, FFPE blocks and tissue slides.

Bioresource name

Prostate Cancer Research Consortium Bioresource (Ireland).

PCRC Bioresource (Ireland).

Bioresource location

The UCD Conway Institute of Biomolecular and Biomedical Research University College Dublin, Belfield, Dublin 4, Ireland. The bioresource is part of the UCD Conway Institute of Biomolecular and Biomedical Research. Some samples are stored at the Institute of Molecular Medicine St. James's Hospital, James's Street, Dublin 8, Ireland. This is a duplicate of the bioresource.

Bioresource contact

Prof. William Watson: william.watson@ucd.ie.

Bioresource URL

<https://pcrc.tchpc.tcd.ie/>

Identifier used

N/A.

Bioresource type

Prostate cancer.

Type of sampling

Disease based.

Anatomical site

Blood.

Prostate.

Disease status of patients/source

Prostate cancer patients undergoing transurethral resection of the prostate or radical prostatectomy

Clinical characteristics of patients/source

Ethnic origin, family history, current symptoms, past medical/surgical history, current medical history, current medication, Gleason Grade, Gleason Score, Transrectal % core involvement, Digital Rectal Examination, age at time of surgery, cTNM staging, pTNM staging, capsular invasion, pre/post-Op PSA Prostate cancer patients

Size of the bioresource

>10000.

Recruitment of patients and collection of biospecimens is ongoing and indefinite.

Vital state of patients/source

Alive.

Clinical diagnosis of patients/source

Prostate cancer.

TURPs; benign disease.

Radical prostatectomy; indolent, significant and aggressive, Gleason Score 4–10.

Pathology diagnosis

Prostate cancer.

Control samples

N/A.

Biospecimen type

Tissue, serum, plasma and whole blood for DNA/RNA (Table 1).

	Number of aliquots (initial)	Volume/size
Plasma	3	2 ml
Serum	3	2 ml
Urine	2	50 ml
DNA	1	10 ml
RNA	1	10 ml
Fresh frozen tissue	1	N/A
FFPE blocks	>1*	N/A

Table 1: The number of aliquots, volume and size of biospecimen type collected per patient.

*Depends on the size of tissue collected.

Release date

N/A.

Access criteria

Complete access policy is in development and will be available on the resource website. Provisionally, access can be done case by case by contacting +353 (01) 716 6733 or a written demand can be sent to this address School of Medicine, Conway Institute, Belfield Dublin 4 Ireland.

(4) Reuse potential

Biological samples and associated clinical data from the PCRC Bioresource can be reused for biomarker discovery and validation research that would improve detection, prognosis and treatment of prostate cancer. This would include (i) using the samples and applying genomic, transcriptomic and proteomic technologies to identify novel biomarkers for early detection and improved prognosis of prostate cancer cases; (ii) using the samples to

validate their biomarkers and correlate these molecular characteristics with disease progression phenotypes; and (iii) using the samples to evaluate their novel therapies in pre-clinical and potentially Phase I and Phase II studies.

Additional Files

The additional files for this article can be found as follows:

- **Additional File 1: Figure 1.** A flow diagram showing the link between the biobanking processes and research quality. This diagram illustrates the link between the biobanking processes and research quality. <http://dx.doi.org/10.5334/ojb.12.s1>
- **Additional File 2: Figure 2.** Representation of the biobank system design. This diagram illustrates the representation of the design of the biobank system. <http://dx.doi.org/10.5334/ojb.12.s2>

- **Additional File 3: Table 1.** The approaches and tools employed in the biobank system. <http://dx.doi.org/10.5334/ojb.12.s3>

Acknowledgements

Dr. Amanda O'Neil, Senior Technical Officer, UCD Conway Institute of Biomolecular and Biomedical Research University College Dublin, Belfield, Dublin 4, Ireland.

Dr. Lisa Murphy, Postdoctoral Researcher, School of Pharmacy Royal College of Surgeons in Ireland, 123 St Stephen's Green, Dublin 2, Ireland.

Ms. Susie Boyce, Doctoral student, UCD Conway Institute of Biomolecular and Biomedical Research University College Dublin, Belfield, Dublin 4, Ireland.

Competing Interests

The authors have no competing interests to declare.

How to cite this article: Wekesa, A and Watson, W 2016 The Prostate Cancer Research Consortium Bioresource (Ireland). *Open Journal of Bioresources* 3: e5, DOI: <http://dx.doi.org/10.5334/ojb.12>

Published: 15 November 2016

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