

BIORESOURCE PAPER

Tumorbank@uza: A Collection of Tissue, Fluid Samples and Associated Data of Oncology Patients for the Use in Translational Research

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Tumorbank@UZA is an academic hospital integrated biobank that collects tissue, blood and urine samples from oncology patients. We work according to a quality management system and have established SOPs for all work procedures in the biobank. Tumorbank@UZA is funded by the National Cancer Plan, an initiative from the Belgian government since 2009. Samples from our biobank are available for both academic as well as commercial researchers, through a well-established access procedure. Currently the collection consists of more than 85.000 samples of more than 8000 patients.

Keywords: oncology; tumorbank; biobank; human material transfer agreement; cancer research

Funding statement: Tumorbank@UZA is funded by the National Cancer Plan (initiative 27) from the Ministry of Health of the Belgian Federal Government.

(1) Overview

Project description

In March 2008 the Belgian National Cancer Plan (NCP) was launched by the Federal Minister of Social affairs and Public Health. To promote translational cancer research and the collaboration between different cancer researcher groups in Belgium, one of the initiatives of the NCP (initiative 27) was the creation of a Belgian Virtual Tumourbank. Under the supervision of Prof. Dr. Pauwels, head of molecular pathology and Prof. Dr. Peeters, head of the Multidisciplinary Oncological Centre of Antwerp (MOCA), Tumorbank@UZA was established as a new project in 2009 by Prof. Elke Smits. It is a core facility of the Multidisciplinary Oncologic Centre of Antwerp (MOCA) and embedded in the pathology department of the University Hospital of Antwerp (UZA). There is a close collaboration with the clinical chemistry lab and with the clinical departments where patients are admitted.

The aims of Tumorbank@UZA is the collection, processing and distribution of different sample types and the associated data for the use in research projects. Sample types include fresh frozen and FFPE tissue, whole blood and blood derivatives such as serum, plasma, buffy coat and red blood cells and recently also urine samples are being collected. All biobank processes are well documented in a quality management system which we continually strive to improve. Tissue material and serum samples are residual

(left-over) material, which is collected within the opt-out system as stated in the Belgian law of 19th of December 2008. Residual material that is not needed for diagnosis of the patient may be used for translational research, upon approval by the hospital research ethics committee (REC). For human material that is specifically collected for the biobank, a broad consent is used which explicitly asks to the patient for an extra blood sample that will be stored in the biobank. These blood samples are stored as whole blood or processed into serum or plasma, buffy coat and red blood cell fractions.

All material transfers are covered by a human material transfer agreement and every research project has to be approved by the local REC.

Classification (1)

Human.

Species

N/A.

Classification (2)

Biological samples and associated data, clinical data.

Context

Spatial coverage

Description: Tumorbank@UZA, University Hospital of Antwerp, Wilrijkstraat 10, 2650 Edegem, Belgium

Latitude: 51°9'23.0832"N
Longitude: 4°24'36.3738"E

Temporal coverage

Tumorbank@UZA was founded in 2009 and started with the upload of a historical pathology collection of residual fresh frozen tissue samples with annotated data (1995–2009).

From 2010 onwards, it started to actively collect residual tissue samples. In 2012 the residual serumbank was added to Tumorbank@UZA.

In 2013 the broad informed consent of the biobank was approved and the collection of blood and blood derivatives such as plasma and buffy coat started.

In September 2016 Tumorbank@UZA started with the collection of residual urine samples of oncology patients.

All collections described above are still ongoing as long as governmental funding from the National Cancer Plan continues.

Temporal coverage for accessibility:

N/A. Tumorbank@UZA has no indicated date when it must be destroyed.

(2) Methods

Steps

All processes in the biobank including:

- Education and training
- Safety
- Access to the biobank
- Logistics
- Identification of equipment and consumables
- Automated systems such as LIMS
- Temperature control
- Document control
- Consent procedures
- Sample intake, handling, storage and distribution (SOPs)
- Services
- Non-conformities
- Audit
- Management review

are documented in a quality management system under supervision of the biobank quality manager.

All materials such as tissue, residual serum and blood taken with informed consent are all delivered to the biobank, as fast as possible and with the necessary request forms containing information such as patient identification, material collected, collection date and time, ... If necessary, the informed consent will also be delivered to the biobank. All steps (collection/excision, reception by biobank, centrifugation, fractionation and snap freezing) are timestamp documented in the LIMS system of the biobank.

Dedicated biobank technicians check the received material and handle it according to the different SOPs. All material is registered within a single sample management database (Slims – Genohm) which is connected to

other databases in the hospital to retrieve clinical data, associated with the patient. Only trained biobank staff has access to this database and the physical collections.

Stabilization/preservation

Tissue:

- formalin fixed tissue: 2D labeled cassette
- fresh, in isopentane snap frozen tissue: 2D labeled cryovial 1 ml

Serum:

- addition of clot activator: 2D labeled cryovials of 500 µl
- Plasma, buffy coat, red blood cells:
- EDTA blood, centrifuged within 90 minutes: 2D labeled cryovials of 500 µl

Type of long-term preservation

All material is stored in access restricted areas where only biobank personnel can enter.

- FFPE tissue: stored in cabinets at room temperature
- Fresh frozen tissue: stored in manual –80°C freezers. Plasma, buffy coat, red blood cells, serum: stored in manual –80°C freezers.

Tissue samples and dedicated blood derivatives will be stored in fully automated freezers in the vapour phase of liquid nitrogen (Hermetic storage system from Askion with internal and external automation) from May 2017 onwards. Samples in this system are automatically processed at at least –100°C and are stored between –150°C till –190°C to maintain a continuous cold chain.

Storage temperature

Room temperature, –80°C, –150°C, vapour phase of liquid nitrogen (< –150°C). If requested so by the researcher, samples can also be stored at 4°C and –20°C.

Shipping temperature from patient/source to preservation or research use

Shipping of samples from the clinic to the biobank, is done immediately after collection at room temperature. The biobank is notified when samples are taken and follows up actively on fast delivery. Timestamps are documented in the LIMS.

Shipping temperature from storage to research use

Frozen material is shipped on dry ice (–80°C). FFPE material is shipped at room temperature. Deviations can occur when requested by the client.

Quality assurance measures

Tissue material will be processed to a control slide, stained with hematoxylin-eosin and checked by a certified pathologist before transfer of tissue material to a researcher. Diagnosis will be confirmed and, if applicable, tumour cell percentage will be estimated.

DNA and RNA extractions performed by biobank will be quality controlled by spectrophotometry based methods

(Nanodrop – Thermo Scientific). For RNA the RNA integrity will be assessed (Bioanalyzer – Agilent).

Freeze-thaw cycles are avoided but, in case they emerge, documented in the LIMS system and will be provided to the requesting researcher.

Source of associated data

The demographical information (gender, birth date, postal code) of patients is extracted automatically from the patient administration database from UZA.

- Tissue: pathology diagnosis and description of localisation (CODAP code and ICD-O coding system) are automatically imported in SLims, from the LIMS of the pathology department.
- Serum: clinical results of the serum is automatically imported in SLims through database connectivity with the LIMS system of the clinical chemistry lab of the hospital.

Quality parameters such as SPREC [1] is calculated automatically from sample data entered in SLims.

All clinical data of the patient is recorded in an electronic patient database (EPD) which can be accessed by authorized biobank personnel. All databases, including SLims, are embedded in a datawarehouse which is maintained by the hospital IT department. The researcher can request additional clinical information which is processed and procured by MOCA data management.

Ethics Statement

The procedures used by Tumorbank@UZA for the residual material collections, were approved by the REC of the hospital (Comité voor Medische Ethiek van het Universitair Ziekenhuis Antwerpen en de Universiteit Antwerpen) at 30/4/2012.

The broad consent used by Tumorbank@UZA was approved at 04/03/2013 and an updated version was approved at 18/11/2014. Every research project needs to be approved by the REC of the hospital as well, before samples can be exchanged.

Constraints

All material stored in Tumorbank@UZA is collected within the University Hospital of Antwerp. Residual material from patients processed at the laboratories of the University Hospital of Antwerp but not seen in this hospital will be excluded from the biobank.

(3) Bioresource description

Object name

Tumorbank@UZA

Bioresource name

Tumorbank@UZA

Bioresource location

Tumorbank@UZA is located in the University Hospital of Antwerp (UZA) within the Pathology department. The automated storage facility in the vapour phase of liquid

nitrogen (Askion system) is located at the Multidisciplinary Oncological Centre of Antwerp in UZA.

Bioresource contact

Tumorbank@UZA

Universitair Ziekenhuis Antwerpen, Wilrijkstraat 10, 2650 Edegem, België

e-mail: tumorbank@uza.be

Phone: +32 3 821 55 62

Bioresource URL

www.uza.be/tumorbank

Identifier used

BE 71030031000

Bioresource type

Tumorbank@UZA is a clinical biobank with main focus on samples from oncology patients.

Type of sampling

Disease-based biobank, sampled in clinical care.

Anatomical site

Because Tumorbank@UZA is a clinical biobank, tissue from various tumour types and anatomical sites are available.

Disease status of patients/source

Oncological patients

Clinical characteristics of patients/source

Tumorbank@UZA is a clinical biobank. We have no specific inclusion criteria, except for some quality criteria. Patients within the oncological care program of the hospital might be included in the biobank on the condition that residual material is available and that the patient did not opt-out and/or that an informed consent of the biobank is signed by the patient.

All clinical data registered in the electronic patient database, or other in-house databases, can be linked to the biobank material.

Size of the bioresource

Tumorbank@UZA is a hospital embedded biobank, not a project with a fixed end date. It contains more than 75.000 samples of more than 8000 patients.

Vital state of patients/source

Patients are alive at the moment of sample collection.

Clinical diagnosis of patients/source

Any oncological diagnosis. Besides malignant tumours we also have a large collection of benign tumours.

Pathology diagnosis

ICD-O M8000/0–M9989/3

Control samples

For tissue samples both tumour and macroscopically assessed tumour-free (uninvolved) tissue material of the same organ.

Biospecimen type

Tissue fresh frozen: 14202 aliquots
 Tissue FFPE: 6621 blocks
 Plasma: 20341 aliquots
 Serum: 27257 aliquots
 Buffy coat: 7411 aliquots
 Red blood cells: 8607 aliquots
 Nucleic acids (DNA and RNA): 1803 aliquots

Size of the bioresource

We have 4.6 FTE working in the biobank with a head count of 7.

Release date

Not applicable

Access criteria

A Standard Access Policy (SAP) procedure was established based on three pillars: a Material Request Form, a Human Material Transfer Agreement (HMTA) and a Biobank Advisory Board (BAB).

Clients (both academic and commercial researchers can be granted access to our collection) will submit the Material Request Form in which they describe their project. This is reviewed by the BAB (i.e. a multidisciplinary board consisting of surgeons, clinicians and scientists) in terms of study design, sample availability, project funding and scientific relevance within 10 working days.

Depending on the request, costs will be agreed upon before finalization of the contract. Costs will cover the consumables needed for collection, handling and storage of the samples as well as the additional services asked for such as DNA/RNA isolation, making tissue slides, look-up of extra clinical data, ... Finally, every project will also be evaluated by the local REC.

Samples, and if requested, associated coded data are released following approval by REC and after positive evaluation by the BAB. According to the terms of the HMTA researchers are committed to give feedback on sample quality and results obtained with the samples from Tumorbank@UZA. Researchers should also acknowledge Tumorbank@UZA in any scientific communication according to the terms in the HMTA.

(4) Reuse potential

Fluid samples are stored in small aliquots of 500µl/vial, with multiple aliquots per collection per patient. Hence, these samples can be used for multiple projects.

Tissue samples are always processed (eg. cutting slides) by dedicated and trained biobank staff only. In this way these samples can be used for multiple projects as well. We do not take back remains of samples as we cannot guarantee the quality of that material anymore.

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Competing Interests

The authors have no competing interests to declare.

Author Roles

Sofie Goethals: Bioresource manager
 Annemieke De Wilde: Bioresource quality manager
 Katrien Lesage: Bioresource IT manager
 Elke Smits: Other (Bioresource project coordinator)
 Patrick Pauwels: Bioresource curator
 Marc Peeters: Bioresource director

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