

BIORESOURCE PAPER

# Biobank Lodz – DNA Based Biobank at the University of Lodz, Poland

Dominik Strapagiel, Marta Sobalska-Kwapis, Marcin Słomka and Błażej Marciniak

Biobank Lab, Department of Molecular Biophysics at The University of Lodz, Poland

Corresponding author: Dominik Strapagiel ([strapag@biol.uni.lodz.pl](mailto:strapag@biol.uni.lodz.pl))

The Biorepository in Department of Molecular Biophysics of the University of Lodz was established in 2010 as an internal bioresource to collect and store Polish population-based biospecimens. In 2014 biorepository started to act as Biobank Lab of University of Lodz (BLUL/Biobank Lodz). The Biobank Lodz joined the BBMRI\_PL (consortium of Polish biobanks) in 2014 and in 2016 BLUL became a member of the BCNet (Biobank and Cohort Building Network) and ESBB (European and Middle Eastern Society for Biopreservation and Biobanking). The BLUL stores over 12.200 samples and their data, including section of formalin fixed paraffin embedded (FFPE) and fluid samples (serum, full blood, saliva). Biobank Lodz is expanding the collections to include some important human diseases as well and is open for the international scientific community for the purpose research projects.

**Keywords:** biobanking; biospecimens; research infrastructure; general population; obesity; breast cancer; pancreatic cancer

**Funding statement:** This work was supported by the Polish POIG grant 01.01.02-10-005/08 TESTOPLEK from the European Regional Development Fund. As a one of the infrastructure of University of Lodz, funding for personnel and running costs of BLUL is covered by the university.

## (1) Bioresource Overview

### Project description

The BLUL was initially created using the human-based biomaterials and related clinical/questionnaire data collected from the “Role of multidrug transporters in pharmacokinetics and toxicology – in vitro tests in pharmaceutical and clinical practice” project (Supported by the Polish POIG grant 01.01.02-10-005/08 TESTOPLEK from the European Regional Development Fund). The main goal of TESTOPLEK project (in a part of genetic study) was to create a genetic profile of Polish population [1–4]. Over 10.000 individuals nationwide were involved to create a retrospective POPULOUS collection (**POPULATION – LODZ UNIVERSITY** Biobank) and registered in 2013 in the BBMRI catalogue of the population collection (Biobanking and Biomolecular Resources Research Infrastructure). In 2014 Biobank Lab started to operate as a separate scientific unit of the Department of Molecular Biophysics. The main goal of the BLUL is to promote research via sharing biospecimens and related clinical/questionnaire data with interested scientific institutions. Our next step is to implement policies to share genomic data (microarrays, whole exome sequencing data, microbiome, targeted genotyping data) related to a different collection. The BLUL policies and procedures have been formed and formulated according to the ISBER *Best Practices for Repositories Guidelines* [5].

The BLUL is composed of two main complexes. CORE LAB – principal place of preparation of biological material for biobanking (e. g. blood fractionation, isolation of nucleic acids), place of storage of biological material, conducting mass genetic assays (e. g. the study of polymorphisms, gene expression (Q-PCR) and quantitative assessments of selected parameters). BIG DATA LAB – the spare/emergency storage location of biological material, automated microarrays analysis (e. g. SNP, gene expressions microarrays, analysis of the methylation status) and analysis using the NGS technology [6, 7]. Additionally, all bioinformatics analyzes are carried out with the use of widely available commercial software.

### Classification (1)

Human

### Species

Human

### Classification (2)

BLUL collection includes biological samples with associated anthropological, clinical, molecular data, based on questionnaires, pathology reports, physical examinations – depending on collection.

**Context****Spatial coverage**

Description: Main collection of the BLUL is POPULOUS, which is based on general Polish population

Northern boundary: 54°50' N

Southern boundary: 49°00' N

Eastern boundary: 24°09' E

Western boundary: 14°07' E

**Temporal coverage**

Since 2010 to present, on-going with no fixed expiry date.

**Temporal coverage for accessibility**

N/A

**(2) Methods****Steps**

All laboratory methods related to the collection of biomaterials have been evaluated and standard operational procedures (SOPs) have been established (e.g. biomaterial collection, aliquots sampling, DNA isolation, measurement of DNA concentration, DNA normalization, quality testing of DNA samples). Starting from 2015 routine lab methods and SOPs have been validated during Biospecimen Proficiency Testing Programme IBBL (Integrated BioBank of Luxembourg) endorsed by ISBER (International Society for Biological and Environmental Repositories). The BLUL collects samples of different origin – mainly saliva and DNA and for some registered collections blood, serum, plasma or FFPE tissue. All the data records are anonymized to ensure the security and privacy protection of the participants.

All the steps involved in biomaterial preparation are recorded in the BLUL Sample Management System (SMS) by laboratory personnel. Only well-trained Biobank Lab staff are authorized to manage the samples.

**Stabilization/preservation**

All samples (saliva, blood) are stored in monodimensional barcoded tubes. Aliquots are stored in 2D barcoded tubes. FFPE sections are stored in monodimensional barcoded tubes.

Saliva is stored in ORAGEN Kit DNAGenotek;

DNA for the purpose of backup storage is kept in DNA Stable Plus (Biomatrix).

**Type of long-term preservation**

Freezing in mechanical freezers (DNA aliquots, blood).

For long-term preservation saliva and DNA samples are stored in Oragene (DNA Genotek Inc.) and Biomatrix, respectively.

**Storage temperature**

Depending on material (e.g. -80°C; -20°C; 4°C; room temperature).

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

-80°C (on dry ice); 0–4°C (on ice); room temperature (18–25°C).

**Shipping temperature from storage to research use**

-80°C (on dry ice); 0–4°C (on ice); room temperature (18–25°C).

**Quality assurance measures**

Different and rigorous quality control measures are applied to all procedures performed by the Biobank Lodz. The host laboratory's operational quality system is validated within Proficiency Testing Programme performed by IBBL [8] in order to guarantee high quality standards in terms of procedures and sample preservation. The principal measures for ensuring the quality of the samples include a number of procedures to:

- govern the sterilisation of reagents and laboratory materials
- guarantee the integrity of nucleic acids using real time PCR sex testing [9], MultiNA, and concentration measurement
- ensure an immediate intervention in case of an electrical blackout to safeguard samples with proper alarm systems for all freezers
- have a back-up storage for each sample in separate freezers and boxes in separate buildings
- maintain data bases up-to date

**Source of associated data**

Source of the associated data: collected during the research projects aiming at the collection setting up, depends on the collection type and can include hospital medical records and laboratory reports, both paper and electronic; instrumental data obtained from post-processing analysis and questionnaires within the specific research project can be added.

The BLUL uses an in-house biobank database and biobank information management system designed for both the registration of biomaterials and sample management. Next goal is to prepare web-based interface for the database to enable external users to search and find appropriate samples for their research project(s). The system for genetic data storage and sharing is in preparation phase.

**Ethics Statement**

The Biobank Lab operates regarding to:

1. Declaration of Helsinki: ethical principles for medical research involving human subjects [10].
2. Polish Data Protection Authority, Data Protection Code [11].

Approvals obtained from University of Lodz's Review Board:

1. Resolution of KBBN-UŁ from 17/06/2010.
2. Resolution of KBBN-UŁ/I/9/2013.
3. Resolution of KBBN-UŁ/I/10/2013.
4. Resolution nr 7/KBBN-UŁ/II/2014.
5. Resolution nr 8/KBBN-UŁ/II/2014.

The Contributors who have been responsible for recruitment of the participants evaluate all access requests to ensure compliance with the informed consent documentation.

All donors were recruited within approved research protocol by the Institutional Review Board (IRB) of the University of Lodz or other IRBs from the Institutions collecting biological material. All operations on collected biospecimens (reuse) within approved research protocol by the IRB of the University of Lodz.

To get an access to the services of BLUL, the following procedures have been implemented:

1. initial contact with the staff manager of the Biobank.
2. sample contributor provides a signed copy of the Informed consent form
3. agreement form is signed to accept the rules and policies of the BLUL
4. assignment of an individual and unique code to samples and collection is granted by the director of BLUL
5. samples are coded in data storage system BIMS (Biobank Information Managing System).

The BLUL use the model of sharing in which the Contributor (institution/contributor/principal investigator) maintains ownership of the collection (including related clinical/questionnaire data). The biospecimens are governed by the Contributor. Reuse of collected biomaterials depends on the agreement of the Contributor and opinion of IRB of the University of Lodz. The Contributor has agreed to share collected biomaterials with related data based upon scientific merit and correlation with studies subjects. All biospecimens with related data (stored in the BLUL) have been consented to secondary use by the study participants or by the IRB of the University of Lodz.

There are no limitations in sharing samples and related data from POPULOUS collection. Restrictions of sharing of other collections deposited in BLUL depend on Contributors.

#### **Constraints**

None, except the Polish regulation on personal data and biological material.

### **(3) Bioresource description**

#### **Object name**

Human Genomics and Genetic samples and data.

#### **Bioresource name**

Biobank Laboratory, Department of Molecular Biophysics, Faculty of Environmental Protection, University of Lodz  
BLUL, Biobank Lodz

#### **Bioresource location**

Biobank Lab, Department of Molecular Biophysics, Faculty of Environmental Protection, University of Lodz

CORE LAB – Faculty of Biology and Environmental Protection, Building A, 5<sup>th</sup> floor, 12/16 Banacha Street, 90-237 Lodz

BIG DATA LAB – Building of the Dean of the Faculty of Biology and Environmental Protection, Ground floor, 14 Pilarskiego Street, 90-237 Lodz

Biobank Lab, 14 Pilarskiego Street, 90-237 Lodz, Poland

#### **Bioresource contact**

biobank@uni.lodz.pl  
strapag@biol.uni.lodz.pl

#### **Bioresource URL**

www.biobank.uni.lodz.pl

#### **Identifier used**

N/A

#### **Bioresource type**

Genomic and Genetic Biobank

POPULOUS – population based; Contributor – BLUL/Biobank Lodz; 10.000 donors with detailed information; material collected: saliva.

BREAST – breast cancer; Contributor – BLUL/Biobank Lodz; 800 patients with detailed diagnosis information; material collected: FFPE.

PANC – pancreatic cancer; Contributor – BLUL/Biobank Lodz; 100 patients with clinical follow-up; material collected: blood.

PUPILS – schoolchildren's collection; Contributor – Department of Anthropology, University of Lodz; 800 donors with detailed information; material collected: saliva.

BREAST ICZMP – breast cancer; Contributor – Polish Mother's Memorial Hospital Research Institute; 100 patients with clinical follow-up; material collected: blood.

ENDOMETRIOSIS ICZMP – endometriosis; Contributor – Polish Mother's Memorial Hospital Research Institute; 170 patients with clinical follow-up; material collected: blood.

BREAST IBUL – breast cancer; Contributor – Department of Molecular Genetics University of Lodz; 250 patients diagnosed; material delivered: DNA.

#### **Type of sampling**

Depends on stored collection: population, disease based, longitudinal cohort.

#### **Anatomical site**

N/A

#### **Disease status of patients/source**

Pancreatic cancer, breast cancer, obesity, other.

#### **Clinical characteristics of patients/source**

Age:18–80, sex: male and female. Availability of treatment information, inclusion criteria or/and stage of the disease at time of collection depends on various projects specifications.

#### **Size of the bioresource**

The BLUL at University of Lodz is not a project but rather a research infrastructure of the university with no expiry date. The number of full time employees working at BLUL is 4.

**Vital state of patients/source**

Alive at the sampling.

**Control samples**

General population from POPULOUS and PUPIL collection.

**Biospecimen type**

Saliva samples: 12000 (3 ml)

Full blood: 400 (3 ml)

Section of FFPE: 800

DNA aliquots: 40000 with different volumes (0.05–0.4 ml)

**Release date**

Data and samples are currently available.

**Access criteria**

The research group in Poland or in other countries are entitled to apply for a research project through a formal application (objectives, description of sample, methods, data needed, timetable); the PI must have a permanent position in his/her organization, all legal and ethical authorizations must be provided. A financial contribution is determined depending on the number and nature of data needed.

For the process of applying for sampling, individual contact with Head of the BLUL is needed. Contact data are available on the BLUL website in English: [www.biobank.uni.lodz.pl](http://www.biobank.uni.lodz.pl)

**(4) Reuse potential**

Those who are interested in reuse of BLUL samples and/or data for further laboratory and/or data analyses, replication of previous findings or meta-analyses must contact the Head of BLUL directly. The reuse is possible on a collaborative basis, with the permission of the respective contributor and after obtaining the IRB's positive opinion.

**Acknowledgements**

We would like to thank Małgorzata Majewska, Katarzyna Janik, Anna Siewierska-Górska, Agnieszka Grzelak for important contribution during biorepository management in years 2010–2013.

**Competing Interests**

The authors have no competing interests to declare.

**Author Roles**

Dominik Strapagiel – Biobank Manager

Marta Sobalska-Kwapis – technician of the Biobank Lodz

Marcin Słomka – technician of the Biobank Lodz

Błażej Marciniak – IT specialist of the Biobank Lodz

**References**

1. Koszarska, M, Kucsma, N, Kiss, K, Varady, G, Gera, M, Antalffy, G, Andrikovics, H, Tordai, A, Studzian, M, Strapagiel, D, Pulaski, L, Tani, Y,

Sarkadi, B and Szakacs, G 2014 (October) Screening the Expression of ABCB6 in Erythrocytes Reveals an Unexpectedly High Frequency of Lan Mutations in Healthy Individuals. *PLoS ONE*, 9(10). DOI: <https://doi.org/10.1371/journal.pone.0111590>

2. Słomka, M, Sobalska-Kwapis, M, Korycka-Machała, M, Bartosz, G, Dziadek, J and Strapagiel, D 2015 Genetic variation of the ABC transporter gene ABCC1 (Multidrug resistance protein 1 – MRP1) in the Polish population. *BMC Genetics*, 16(1). DOI: <https://doi.org/10.1186/s12863-015-0271-3>
3. Rosset, I, Strapagiel, D, Sitek, A, Majewska, M, Ostrowska-Nawarycz, L and Żądzińska, E 2016 Association of FTO and TMEM18 polymorphisms with overweight and obesity in the population of Polish children. *Anthropological Review*, 79(1): 17–33. DOI: <https://doi.org/10.1515/anre-2016-0002>
4. Sitek, A, Rosset, I, Żądzińska, E, Siewierska-Górska, A, Pietrowska, E and Strapagiel, D 2016 Selected gene polymorphisms effect on skin and hair pigmentation in Polish children at the prepubertal age. *Anthropologischer Anzeiger*, 2016. DOI: <https://doi.org/10.1127/anthranz/2016/0632>
5. ISBER 2010 Best Practices for Repositories: Collection, Storage, Retrieval and Distribution of Biological Materials for Research. *Biopreservation and Biobanking*, 10(2): 79–161, DOI: <https://doi.org/10.1089/bio.2012.1022>
6. Strapagiel, D, Borówka, P, Marciniak, B, Bakula, Z, van Ingen, J, Safianowska, A, Brzostek, A, Dziadek, J and Jagielski, T 2016 Draft Genome Sequences of Mycobacterium kansasii Strains 1010001454, 1010001458, 1010001468, 1010001493, 1010001495, and 1010001469, Isolated from Environmental Sources. *Genome Announcements*, 4(3): e00456–16. DOI: <https://doi.org/10.1128/genomeA.00456-16>
7. Karczewska-Golec, J, Strapagiel, D, Sadowska, M, Szalewska-Pałasz, A and Golec, P 2016 Draft Genome Sequence of Shewanella baltica M1 Isolated from Brackish Surface Water of the Gulf of Gdańsk. *Genome Announcements*, 4(3). DOI: <https://doi.org/10.1128/genomeA.00611-16>
8. <http://www.ibbl.lu/ibbl-bioservices/biospecimen-proficiency-testing/>.
9. Strapagiel, D, Majewska, M, Słomka, M, Janik, K, Sobalska, M and Bartosz, G Method for determining sex, involves utilizing melting profile analysis technique, and obtaining specific fragments of DNA by PCR-based DNA from samples of human biological material. Patent Number PL406569-A1.
10. World Medical Association 2013 (Nov 27) Declaration of Helsinki: ethical principles for medical research involving human subjects. *JAMA*, 310(20): 2191–4. DOI: <https://doi.org/10.1001/jama.2013.281053>
11. Polish Data Protection Authority Data Protection Code. Retrieved from: <http://isap.sejm.gov.pl/DetailsServlet?id=WDU20140001182>.

**How to cite this article:** Strapagiel, D, Sobalska-Kwapis, M, Słomka, M and Marciniak, B 2016 Biobank Lodz – DNA Based Biobank at the University of Lodz, Poland. *Open Journal of Bioresources* 3: e6, DOI: <http://dx.doi.org/10.5334/ojb.22>

**Published:** 30 November 2016

**Copyright:** © 2016 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC-BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. See <http://creativecommons.org/licenses/by/4.0/>.