Rationale, Content, and Reported Use of the National Cancer Institute's Biospecimen Research Database

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Abstract

Statement of Problem

Variability in human biospecimen collection, preservation, processing, and storage practices can adversely affect downstream results, undermine study conclusions, and complicate meta-analysis efforts. Despite recognition of Biospecimen Science as a field of scientific study by the biobanking community, relevant literature remains dispersed across hundreds of journals and is, therefore, challenging to locate with standard literature search engines such as PubMed. In addition, information about the Standard Operating Procedures (SOPs) utilized by different institutions can be lacking, hindering harmonization of biospecimen handling practices and further contributing to preanalytical variability.

Proposed Solution

The National Cancer Institute's Biorepositories and Biospecimen Research Branch developed the Biospecimen Research Database (BRD; http://biospecimens.cancer.gov/brd) to serve as a free centralized literature repository of peer-reviewed articles specific to the field of human Biospecimen Science, and to house a collaborative library of SOPs from a diverse set of biobanks. The aims of the BRD are to improve the quality of biospecimens used in discovery and clinical research by providing researchers and biobanks with information about preanalytical variability and to facilitate harmonization of biobanking practices by supplying a forum to share SOPs developed and used by established biobanks.

Conclusions

Since its inception in 2008, the BRD has grown to include more than 2,900 curated articles published in 700 different scientific journals and over 500 SOPs contributed by more than 80 source organizations including U.S. government, international, private, and non-profit biobanks. The BRD has proven to be a resource for the biobanking and scientific community with an average of 1,300 unique visitors and 13 ,000 SOP downloads per month. Based on publications by authors not affiliated with NCI, the BRD has been used as a literature database, a vehicle to publicly share and cite specific protocols, and to survey biobanking SOPs to identify common practices. We invite you to explore the BRD as a resource and to consider contributing relevant publications and SOPs addressing biospecimen handling to the database. To share your BRD experience with NCI, email us at ncibbrb@nih.gov.

Rationale

The Biospecimen Research Database is a free online database that was developed and is maintained by NCI's BBRB to serve as a resource for the scientific community. The aim of the Literature Repository is to serve as a centralized resource of articles in the field of human Biospecimen Science. The aim of the SOP Library is to improve overall specimen quality by facilitating transparency and promoting harmonized biospecimen handling practices across biobanks. Biospecimen Evidence-Based Practices are a series of procedural guidelines developed using evidence from primary research articles that are intended to facilitate the development and execution of evidence-based SOPs.

Potential Uses of the BRD Literature Repository

- To locate background information when authoring research, reviewing manuscripts, or preparing grant proposals
- To identify promising research avenues that might appear as gaps in the literature for a specific pre-analytical factor, biospecimen type, or analyte/assay
- As a resource when troubleshooting unexpected results for a specific gene or protein
- To determine if your laboratory practices have any reported preanalytical effects

Potential Uses of the BRD SOP Library

- To view practices currently in place at other respected laboratories when establishing your own
- To view current practices in use for specimen quality assessment
- To prepare for laboratory accreditation

Potential Uses of BEBPs

- To develop new evidence-based SOPs
- To reevaluate and revise existing SOPs
- To view the current state of the science on specific preanalytical factors in a fit-for-purpose context

Please visit us at http://biospecimens.cancer.gov/brd

Submit SOPs to the BRD online or via email to *ncibbrb@nih.gov*

Content of the Biospecimen Research Database (http://biospecimens.cancer.gov/brd)

Literature Repository

- 2,900 Curations of Peer-reviewed Articles in Human Biospecimen Science
- 778 Journals Represented
- Commenting and Article Suggestion Features Available

SOP Library

- 570 Standard Operating Procedures (SOPs)
- 83 Contributing U.S. Government, Non-Government, and International Sources
- Commenting and SOP Submission Features Available

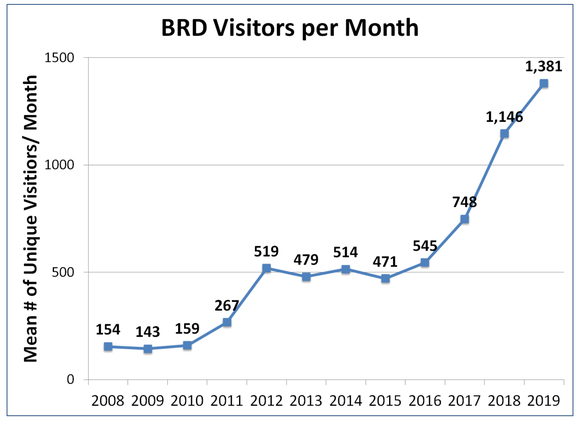
BEBPs

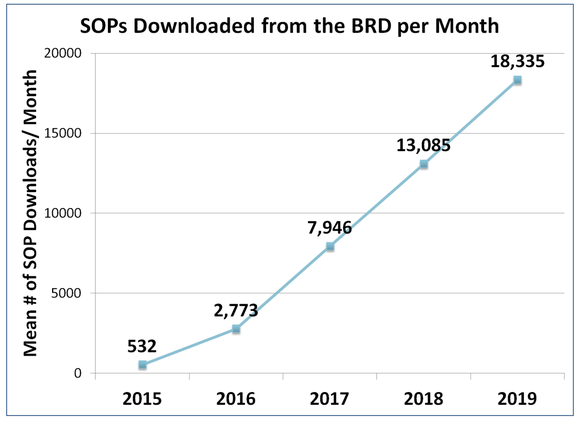
Available Biospecimen Evidence-Based Practices:

- Cell-free DNA: Biospecimen Collection and Processing
- Nucleic Acid Extraction from Formalin-Fixed, Paraffin-Embedded (FFPE) Tissue
- Snap-Freezing of Post-Surgical Tissue Biospecimens

Entries in the BRD (#)	Preacquisition	Acquisition	Processing	Preservation	Storage and Shipping	Analyte Extraction	Platform-specific Methodology
Articles	826	1222	1184	938	1592	506	1152
SOPs	26	202	330	201	313	74	99

Visitors to the BRD Website





Reported Use

- The BRD was cited as the access location for SOPs used during published studies (Cavallone 2019, PMID 30824523; Aguilar-Mahecha 2017, PMID 28752846).
- One publication used the BRD to determine the most popular method of leukocyte purification among researchers (Heng 2018, PMID 30379576).
- An article referenced the BRD as a resource for the standardization of liquid biopsy research (Geeurickx and Hendrix 2019, PMID 31711714).
- Other articles cited the BRD as a Biospecimen Science-specific literature search engine (Compton et al. 2019 PMID 31329478; Zhou et al. 2015, PMID 26030251)

Popular SOPs Downloaded from the Library

Rank	SOP ID	Source	SOP Title	Total
1	941	NIEHS	Cell Viability Testing with Trypan Blue Exclusion Method	29,684
2	944	NIEHS	Laboratory Shipping Protocols	10,386
3	945	NIEHS	Labeling SOP	8,442
4	823	CC GMI	RNA Isolation	8,015
5	890	GAPPS Repository	Vaginal Swab Collection	7,291
6	1088	OSUCCC LTB	Preparation of cytological slides from mononuclear cell fraction of bone marrow aspirate or peripheral blood	6,702
7	841	UCHC Tissue Repository	Tissue Processing	5,518
8	161	MMI	DNA Extraction from Blood	4,961
9	889	GAPPS Repository	Urine Collection	4,369
10	894	GAPPS Repository	Shipping	4,248

Do you use the SOP Library? Please take a short 6 question survey at:

https://nci.az1.qualtrics.com/jfe/form/SV_bdfJPzby9QX54Y5