

Cornell Veterinary
Biobank



Dog Aging
Project

Banking on Exposure - Companion Animals as Sentinels

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Agenda

KEY TOPICS OF DISCUSSION

- ☑ Defining Biobank
- ☑ Obstacles in Biobanking of Sentinels
- ☑ Standardization of Biobanking Practices
- ☑ Environmental Specimen Biobanks
- ☑ Strategies and Incentives for Sharing/
Collaboration

The Definition



A biobank is a facility for the **collection, preservation, storage and supply** of biological samples and associated data, which follows standardized operating procedures and provides material for scientific and clinical use.

Hewitt & Watson *Biopreserv Biobank* 2013

Biobanking is NOT

“Biohoards occur when tissue specimens are ‘hidden’ from the very researchers who have the ability to unlock their value in generating new medical knowledge through translational research”

Catchpoole *Journal of Health Services, Research & Policy* 2016



The Obstacles

Challenges to Overcome

What are the obstacles (e.g., scientific, infrastructure, ethical, and financial) to using companion animals as biomonitors?

Obstacles in Biobanking

Non-standardized biobanking processes

Non-standardized clinical data annotations

Nonuniform bioinformatic systems

Insufficient/ variable consent procedures

Reluctance to share collected biospecimens

Difficult access to samples from researchers outside institution



Lack of environmental variables or location to link participants to exposure data

The Standards

Best Practices for Biobanks

What are the best practices for collection, storage, and analysis of biosamples to assess exposures?

Best Practices for Biobanks



February 2006



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2005

2007

2008

2011

2012

2016

NCI Best Practices for
Biospecimen Resources
3rd Edition

2018

Best Practices: Recommendations
for Repositories, 4th Edition



US Representative ISO Expert and Delegate

INTERNATIONAL
STANDARD

ISO
20387

First edition
2018-08

**Biotechnology — Biobanking —
General requirements for biobanking**

*Biotechnologie — «Biobanking» — Exigences générales relatives au
«biobanking»*



Reference number
ISO 20387:2018(E)

© ISO 2018

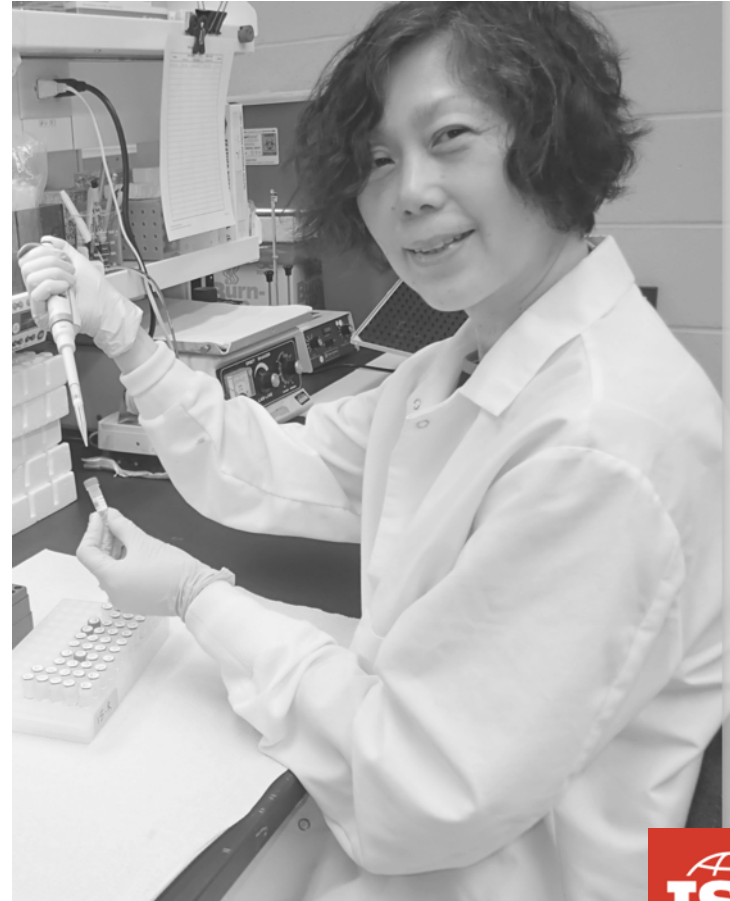
First ISO Standard for Biobanks August 2018



What is **Conformity Assessment**?

Demonstration that specific requirements relating to a product, process, system, person, or body are fulfilled.

(ISO/IEC 17000:2020)



Conformity Assessment (CA) Practices

FIRST PARTY

Self-declaration of
conformity

Biobank



My products
conform to
requirements of
ISOxxxx

User/

Medical researcher



SECOND PARTY

Conformity assessment
report

User/
Medical researcher



I checked your
products, and they
conform to
requirements

Biobank



THIRD PARTY

Certificate



Certification or
accreditation body

An external body assessed biobank for
compliance with requirements

Biobank



Biobank Accreditation



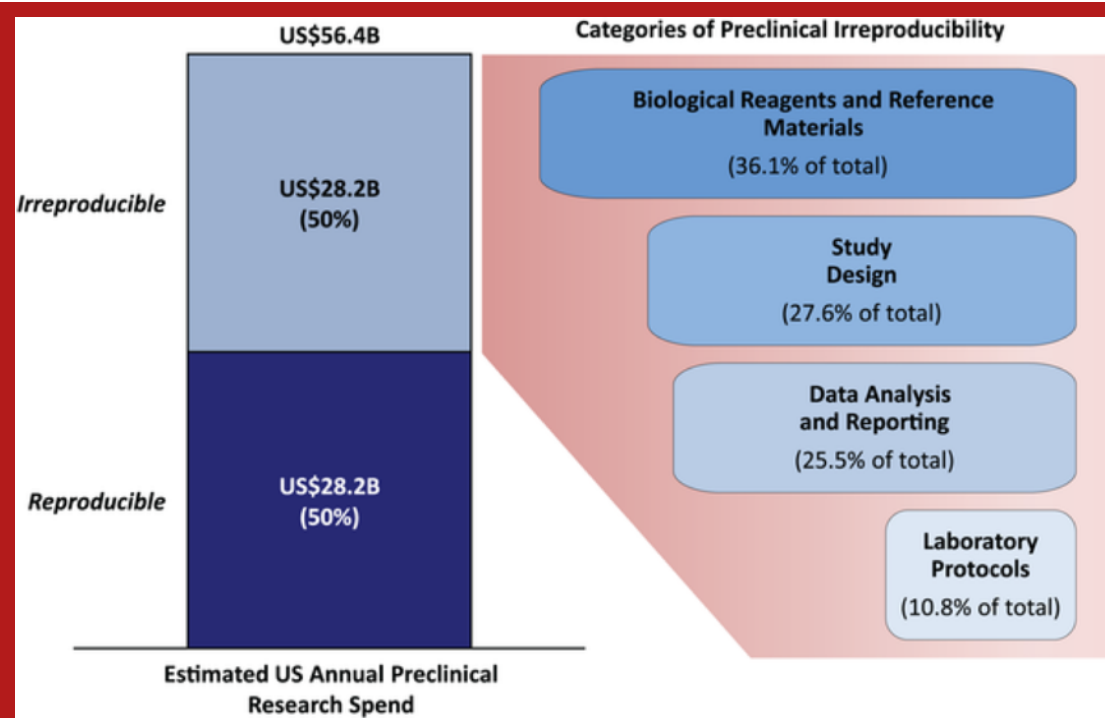
PERSPECTIVE

The Economics of Reproducibility in Preclinical Research

Leonard P. Freedman^{1*}, Iain M. Cockburn², Timothy S. Simco^{2,3}

¹ Global Biological Standards Institute, Washington, D.C., United States of America, ² Boston University School of Management, Boston, Massachusetts, United States of America, ³ Council of Economic Advisers, Washington, D.C., United States of America

* lfreedman@gbis.org



Biobank Accreditation

“...economic research also has shown that **standardization** and **auditing** of biological materials—through biological resource centers—can enhance cumulative production of scientific knowledge by improving both **availability** and **reliability** of research inputs.”

Freedman, Cockburn, et al. *PLOS Biology* 2015

American Economic Review 101 (August 2011): 1933–1963
<http://www.aeaweb.org/articles.php?doi=10.1257/aer.101.5.1933>

Climbing atop the Shoulders of Giants: The Impact of Institutions on Cumulative Research

By JEFFREY L. FURMAN AND SCOTT STERN

Biobank Accreditation



Assurance of
technical competence



Harmonization
of procedures



Control of pre-
analytical sample
variations



Interoperability
among biobanks

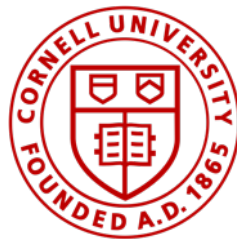


Documentation of
processes for specific
intended purposes (FIP)



Accuracy, Comparability and Reproducibility
of research results





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First Biobank in the World
accredited to ISO 20387



Biobanking for Biomonitoring

Towards Harmonized
Biobanking for
Biomonitoring:
A Comparison of Human
Biomonitoring-Related and
Clinical Biorepositories

Lermen, Gwinner, et al. *Biopreserv Biobank* 2020



science and policy
for a healthy future



The Biobanks

Environmental Specimen Biobanks

Are there opportunities to promote sample sharing and collaboration to advance research on the role of companion animals as sentinels for predicting environmental exposure effects?

Environmental Specimen Biobanks



Credit: Marc Valitutto



Credit: Alex Holt



Former National Biomonitoring Specimen Bank (NBSB), established in 1979 and Marine ESB, established in 2002

Environmental Specimen Biobanks



Specimen Collection



Pass-through from
TAMU to Cornell



Accessioning



Processing and Storage

Environmental Specimen Biobanks



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Cornell's Signature Program of Postmortem
Tissue Collection

43 minutes
Average PMI

Biospecimens in the Cornell Biobank

Blood Derivatives

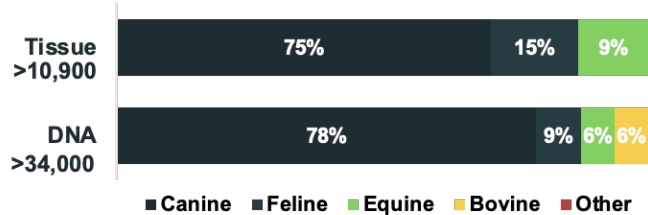
PBMC
Plasma
Serum
Dried blood spot

Orthopedic Tissue

Bones
Cartilage
Joint adipose (fat pads)
Joint capsule
Ligaments
Synovial fluid
Synovium
Tendons

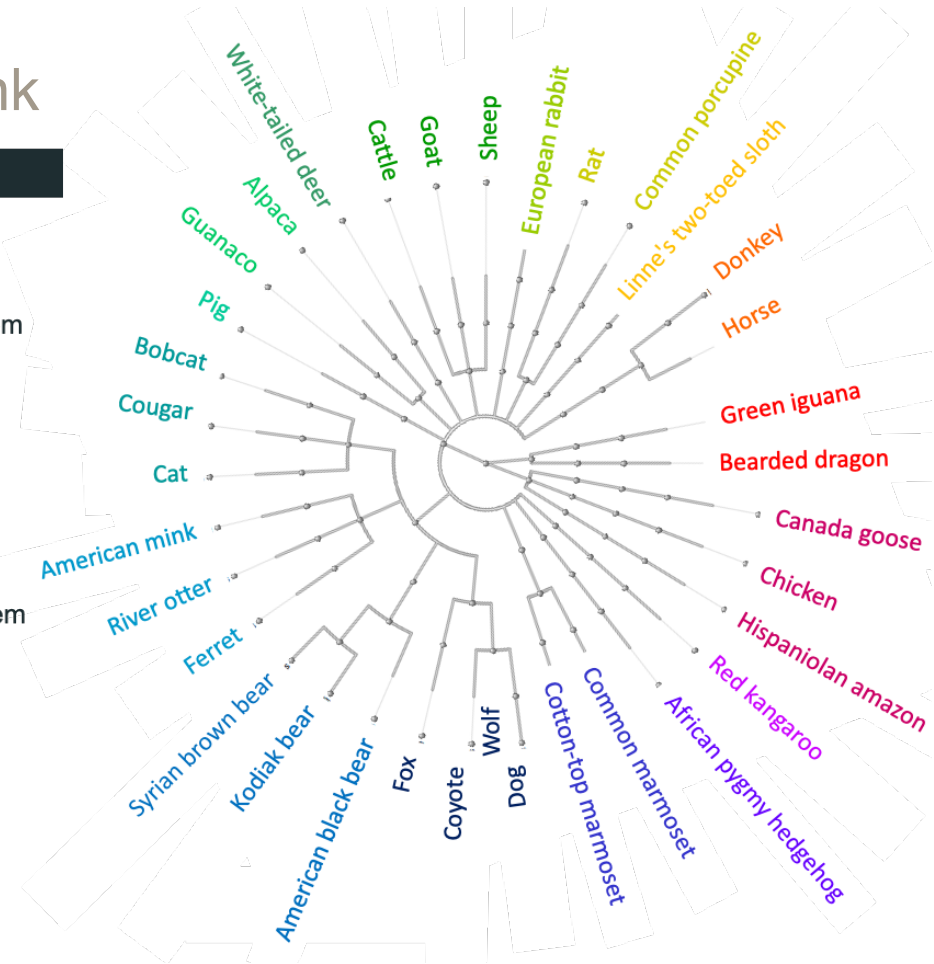
Soft Tissue

Neoplasia
Biliary tract
Blood vessels
Gastrointestinal system
Gingiva
Heart
Kidneys
Liver
Lungs
Lymph nodes
Mammary glands
Oral mucosa
Central nervous system
Peripheral nerves
Ovaries
Pancreas
Salivary glands
Skin
Spleen
Testicles
Thyroid glands
Uterus



Specimens banked for The Dog Aging Project

- Whole blood
- Serum
- Plasma
- Live PBMCs (peripheral blood mononuclear cells)



The Incentives

Working Together

What incentives are needed to encourage sample sharing and collaboration? What infrastructure and resources are needed? Which groups need to be engaged?

Strategies and Incentives

Biobankers

- Infrastructure Support
- Risk Management Plan
- Incentives to Standardization
- Biospecimen Science Funding
- Marketing/Communication Initiatives (to promote utilization)

Researchers

- Specimen/Data Locator
- Standardized Specimens/Data
- National Environmental Specimen Program
- Marketing/Communication Initiatives (to promote awareness)



**Clinical and Translational Science Award
One Health Alliance**



BBMRI-ERIC®

Banking on a New Understanding

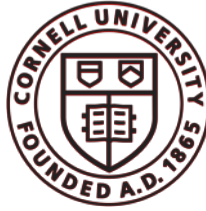


Credit: Jocelyn Simone

**Biobanks for
Environmental Exposure**
Same household
canine-human collections



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Will you join us?

biobank@cornell.edu

