



**OBBR**

Office of Biorepositories  
and Biospecimen Research

# The NCI Biospecimen Research Database

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NCI Biospecimen Research Network Symposium  
“Advancing Cancer Research Through Biospecimen Science”  
March 17, 2009

NATIONAL  
CANCER  
INSTITUTE



## Overview

**OBBR** Office of Biorepositories  
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- **The existing need for a biospecimen science literature database**
- **What is the Biospecimen Research Database (BRD) and what information does it contain?**
- **How the BRD can serve you**
- **The future of the BRD**



# Biospecimen Science: Confounding Variables of Cancer Research

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Patient



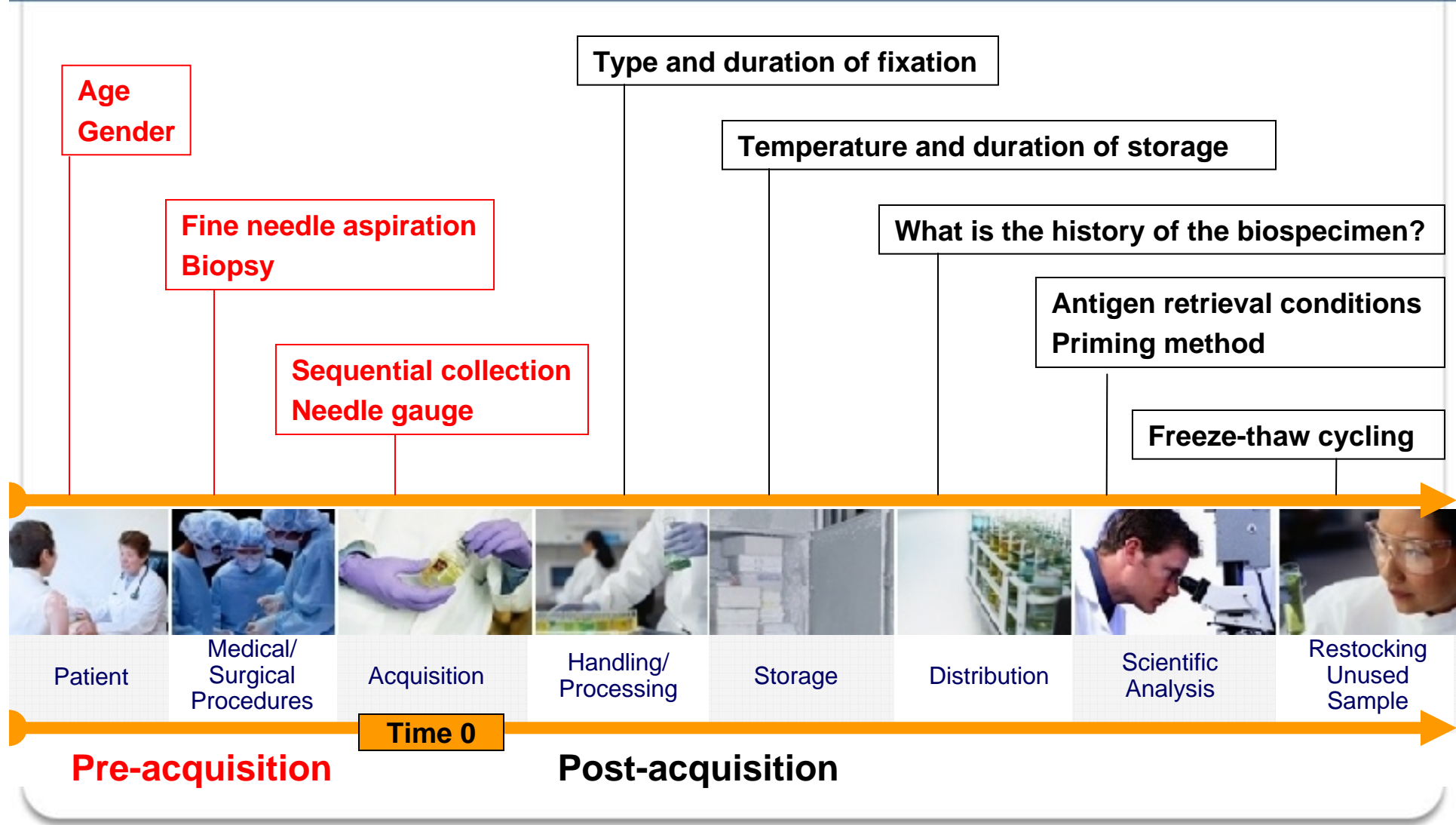
Scientific Analysis





# Pre-analytical variables can affect the biospecimen integrity

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# The Biospecimen Research Database

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## Questions

- Is this an active field of research?
- Is the data published?
- Where can I find it?

## Answers

- The field of biospecimen science is growing as awareness increases.
- Relevant data has been published although papers are rarely focused on biospecimen handling variables
- The Biospecimen Research Database



# The Biospecimen Research Database

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- **The Biospecimen Research Database (BRD)**
  - is a publicly available and searchable web-based literature database
  - contains published and peer-reviewed data pertinent to biospecimen science
  - is curated to highlight and summarize those results that provide further insight into the field of biospecimen science
  - is indexed based upon the variables addressed, and the biospecimens and technology platforms utilized.



## Goals for the BRD

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- **To make existing and emerging biospecimen research data more accessible**
  - for users conscious of these potential and confounding variables that feel frustrated with current search options (PubMed)
  - for users unfamiliar with the field who prefer to “browse” without feeling overwhelmed with search options.
- **Increase awareness of biospecimen effects on the results of molecular and histological analyses**



## Compiling Literature References for the BRD

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- **All papers contained within the BRD have been hand chosen due to their relevance in human biospecimen science**
- **Papers have been identified via**
  - Search engines
  - Cross referencing
  - Recommendations
    - Private Companies
    - International Organizations (ISBER)
    - Individual researchers and clinicians (YOU!)





## BRD Curation

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**Each paper has been reviewed by 2 curators (PhD scientists)**

(1) Categorized (indexed) based upon

- Biospecimen investigated (tissue type and location)
- Preservative used
- Patient diagnosis
- Autopsy versus biopsy
- Analyte of interest
- Technology Platform
- Experimental factors

(2) Contains free-text fields summarizing

- the purpose and findings as they pertain to biospecimen science
- recommendations by the authors



## What information can be found within the BRD?

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### Population of the BRD is ongoing

- To date, the BRD contains 155 research articles published in 75 peer reviewed journals from 1985 to 2008.
- 100 papers are awaiting secondary curation
- 450 papers have been identified for inclusion in the BRD  
*(in the curation cue)*

### Papers Currently in the BRD Represent

- 33 Tissue Types
- 54 Technology platform
- 113 Diagnoses



## What information can be found within the BRD?

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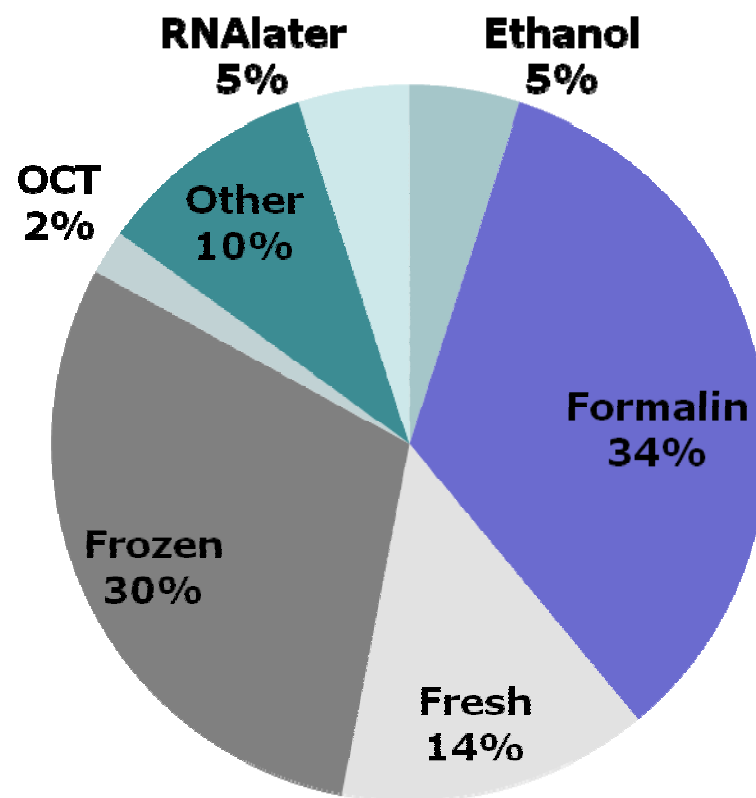
Analyte	BRD Occurrence
Cell count/volume	1%
DNA	30%
Morphology	6%
Peptide	2%
Protein	24%
RNA	37%
Carbohydrate, Electrolyte/Metal, Gas, Lipid, Lipoprotein, Small molecule, Steroid	



## What information can be found within the BRD?

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### BRD Occurrence of Different Preservatives



## Where can I find the BRD?

**OBBR** Office of Biorepositories  
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- Via the Office of Biorepositories and Biospecimen Research webpage  
<http://biospecimens.cancer.gov/>



The screenshot shows the top navigation bar of the National Cancer Institute website. It includes the NCI logo, the text 'National Cancer Institute', and the URL 'www.cancer.gov'. Below this is the OBBR logo and name, along with navigation links for 'About Us', 'Contact Us', 'Site Map', and a search box. A main navigation menu is visible with four tabs: 'Biospecimen Basics', 'Biospecimen Best Practices', 'Biospecimen Science', and 'Biospecimens & NCI'. The 'Biospecimen Science' tab is active, and its dropdown menu is open, showing several options. The option 'Biospecimen Research Database' is highlighted with a red circle.

NATIONAL CANCER INSTITUTE National Cancer Institute U.S. National Institutes of Health | www.cancer.gov

OBBR Office of Biorepositories and Biospecimen Research About Us | Contact Us | Site Map | Search

Biospecimen Basics | Biospecimen Best Practices | **Biospecimen Science** | Biospecimens & NCI

Biospecimen Research Network  
**Biospecimen Research Database**  
Scientific Literature  
Lifecycle of Biospecimens  
Funding Opportunities

- Or directly at  
<http://biospecimens.cancer.gov/brd>

# Navigating the BRD: Quick Search

Scientific Literature  
Lifecycle of Biospecimens

NCI Biospecimen Resources >>

Returning Reviewers Login

 login

## Search the Biospecimen Network Repository (Quick Search)

To find research studies for a biospecimen type and platform click on a cell in the table below.

Analyte	Technology Platform	Biospecimen Locations					Neoplastic Tissue		Others
		Blood	Serum	Plasma	Urine	Saliva	Normal	Cancerous	
<a href="#">DNA</a>	<a href="#">Array CGH</a>							<a href="#">3</a>	
	<a href="#">CGH</a>							<a href="#">1</a>	<a href="#">1</a>
	<a href="#">DNA Sequencing</a>	<a href="#">1</a>						<a href="#">3</a>	<a href="#">2</a>
	<a href="#">FISH</a>	<a href="#">1</a>						<a href="#">6</a>	<a href="#">2</a>
	<a href="#">In situ hybridization</a>								<a href="#">1</a>
	<a href="#">PCR</a>	<a href="#">3</a>						<a href="#">10</a>	<a href="#">13</a>
<a href="#">RNA</a>	<a href="#">DNA Microarray</a>						<a href="#">1</a>	<a href="#">8</a>	<a href="#">3</a>
	<a href="#">Northern blot</a>							<a href="#">2</a>	<a href="#">1</a>
<a href="#">Protein</a>	<a href="#">Immunohistochemistry</a>						<a href="#">1</a>	<a href="#">17</a>	<a href="#">11</a>
	<a href="#">Mass Spec</a>								
	<a href="#">SELDI-TOF Mass Spectrometry</a>						<a href="#">1</a>	<a href="#">1</a>	<a href="#">1</a>
	<a href="#">Western blot</a>							<a href="#">5</a>	<a href="#">3</a>
	<a href="#">ELISA</a>								
<a href="#">Small molecules</a>	<a href="#">GC-MS</a>								
	<a href="#">NMR</a>								
<a href="#">Standard clinical analyses</a>	<a href="#">Clinical chemistry</a>								
	<a href="#">Hematology</a>								
<a href="#">Morphology</a>	<a href="#">Standard H-and-E microscopy</a>							<a href="#">5</a>	<a href="#">9</a>
	<a href="#">Subcellular localization</a>								
	<a href="#">Ultrastructure</a>								



[Simple Search](#) [Advanced Search](#)



# Navigating the BRD: Simple Search

HOME SEARCH



## Search the Biospecimen Network Repository (Simple Search)

Select one or more options below to find research studies for a biospecimen type and analytical platform then click the "Search" button.

Specimen

Biospecimen Type	Biospecimen Location
All <input type="button" value="v"/>	All <input type="button" value="v"/>

Diagnosis

All

Preservative Type

All

Analytical Platform

Technology Platform

All

[Quick Search](#) [Advanced Search](#)



# Navigating the BRD: Advanced Search

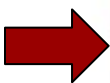
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**Biospecimen Research Database**

- Biospecimen Research Network (BRN)
- Network Events
- Scientific Literature
- Lifecycle of Biospecimens

NCI Biospecimen Resources >>>



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login

HOME SEARCH 

## Search the Biospecimen Network Repository (Advanced Search)

Specimen

<b>Biospecimen Type</b> Cell Fluid Tissue	<b>Biospecimen Location</b> Adipose Adrenal Gland Amniotic Fluid Aorta Appendix
<b>Diagnosis</b> AIDS/HIV-related Alzheimer's Disease Amyotrophic Lateral Sclerosis Arteriosclerosis Arthritis	<b>Diagnosis Subcategory</b> Benign Carcinoma Germ Cell Leukemia Lymphoma
<b>Preservative Type</b> Ethanol Formalin Frozen None (Fresh) OCT	



# Navigating the BRD: Advanced Search

Platform

Analyte	Technology Platform
Carbohydrate	Array CGH
Cell count/volume	CGH
<b>DNA</b>	Comet assay
Electrolyte/Metal	DNA Sequencing
Gas	Electrophoresis

Author(s)

Enter the author's name(s) in the format of last name followed by first initial (first initial is optional). Separate authors' names by a comma. Use "\*" as wildcard.  
Examples: Smith J, Doe L

## Paper Type

Review  Nonreview  All

## Experimental Factors

Classification	Factor
Platform Specific	Duration of proteinase K digestion
<b>Postacquisition</b>	Embedding medium
Preacquisition	<b>Freeze/thaw cycling</b>
	Freezing method
	Heterogeneity of specimen aliquots

Search

Clear

Cancel



# Navigating the BRD: Search Results

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**Biospecimen Research Database**

- Biospecimen Research Network (BRN)
- Network Events
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NCI Biospecimen Resources >>>

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login

HOME SEARCH



## Search Results

2 Study(s) Found

Page 1 of 1

[Chan K.C. A, Lui Wing-Bong, Rainter Timothy H, Lo Y.M. D](#)

Specimen: Fluid /Plasma /Frozen / Normal /

Platforms: DNA - Real-time qPCR /

Plasma samples that underwent three freeze thaw cycles had significantly decreased PCR amplicon size ratios (201 bp / 105 bp), suggesting possible DNA fragmentation.

*Clin Chem* ,2005 ,Vol. 51 ,Page 781

[Chan K.C. A, Lui Wing-Bong, Rainter Timothy H, Lo Y.M. D](#)

Specimen: Fluid /Plasma /Frozen / Normal /

Platforms: DNA - Real-time qPCR /

DNA concentration and relative expression of amplicon sizes were not affected by freeze thaw cycling up to three times.

*Clin Chem* ,2005 ,Vol. 51 ,Page 781

2 Study(s) Found



Page 1 of 1



# Navigating the BRD: Paper Details

## Paper and Study Details

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PubMed ID: 15708950  

Chan K.C. A, Lui Wing-Bong, Rainter Timothy H, Lo Y.M. D

Effects of Preanalytical Factors on the Molecular Size of Cell-Free DNA in Blood.

*Clin Chem*, 2005, Vol. 51, Page 781

Review Paper? No

**Purpose of Paper:** To investigate the impact of (1) clotting, (2) delayed separation of blood cells from plasma, (3 and 4) freeze thaw cycling of both plasma and DNA samples, and (5) prolonged frozen storage on the integrity of circulating DNA in plasma collected from healthy volunteers.

**Conclusion of Paper:** The integrity (yield and DNA size) of circulating DNA was impacted by clotting (serum vs. plasma), sample storage at room temperature or 4 degrees C for 6 h or more, and repeated freeze/thaw cycling of plasma but not DNA samples. The authors recommend processing blood samples within 6 h, aliquoting samples, and extracting DNA prior to long term frozen storage.

## Studies

[Detail](#)

Specimen: Fluid / Blood / None (Fresh) / Normal

Platform: DNA - Real-time qPCR /

Findings : Fresh serum samples had a significantly greater DNA yield (leptin gene) compared to plasma samples. Further, the ratio of amplicons of differing size (201 bp/ 105 bp) was greater in serum samples, indicating an increase in the size of circulating DNA.



# Navigating the BRD: Study Details

## Study Details

PubMed ID: 15708950 [PubMed](#)

Chan K.C. A, Lui Wing-Bong, Rainter Timothy H, Lo Y.M. D

Effects of Preanalytical Factors on the Molecular Size of Cell-Free DNA in Blood.

*Clin Chem*, 2005, Vol. 51, Page 781

Review Paper? No

### Study Purpose

To determine if the number of freeze thaw cycles of plasma samples affects the integrity of circulating DNA.

### Specimen

Biospecimen Type: Fluid      Biospecimen Location: Plasma

Diagnoses: Normal

Preservative Type: Frozen

### Platform

Analyte: DNA      Technology Platform: Real-time qPCR

### Experimental Factors

Classification	Factor	Value(s)
Postacquisition	Freeze/thaw cycling	0 cycles 1 cycle 3 cycles
Platform Specific	PCR/ Length of gene fragment	105 bp 201 bp

### Summary of Findings

Plasma samples that underwent three freeze thaw cycles had significantly decreased PCR amplicon size ratios (201 bp / 105 bp), suggesting possible DNA fragmentation.

[Back to Paper Details](#)



## How the BRD Can Serve You

**OBBR** Office of Biorepositories  
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- **Experimental Design**
  - Provides a literature framework for the identification of confounding variables based upon criteria of your choosing
    - Tissue type
    - Preservative
    - Diagnoses
    - Analyte
    - Technology Platform
    - Specific variables
- **Data Interpretation**
  - Serves as a trouble shooting reference when unexpected or irreproducible data are encountered
- **Vehicle to Awareness**
  - Increased awareness → Improved practices → Faster and more trustworthy results



## The Future of the BRD: Content

**OBBR** Office of Biorepositories  
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- **Continual population of the BRD with pertinent and new research topics**
- **Meta-analysis of curated papers**
  - Consensus
  - Recommendations
  - Development of Standard Operating Procedures
- **User growth**
  - Expansion of the user population
  - User-friendly features
    - User registration
    - Ability to save searches
    - User comments displayed with paper curations
    - User blogs for general discussion



## The Future of the BRD: Functionality

**OBBR** Office of Biorepositories  
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- **Support Standard Operating Procedures (and Protocols)**
  - Exchange structured protocols with biorepositories systems
- **Integration with caBIG™ tools**
  - caDSR
  - caTissue
  - CSM
- **Linkage to data from Biospecimen Research Network (BRN) studies**



## Acknowledgments

**OBBR** Office of Biorepositories  
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### Curation

Dr. Helen Moore  
Dr. Mark Lim  
Dr. Kelly Bonner Engel  
Dr. Andrea Kelly  
Dr. Asha Collins

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Charles Yaghmour

Please submit relevant  
papers to us at

[biospecimens@mail.nih.gov](mailto:biospecimens@mail.nih.gov)





# We need your input!

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- **Website:**

<http://biospecimens.cancer.gov>

- **Email:**

[biospecimens@mail.nih.gov](mailto:biospecimens@mail.nih.gov)