

**The State of Solid Tumor Biopsies : Innovative approaches to address and understand limited pediatric solid tumor samples and tumor data**

September 14, 2021

Biorepository Form and Function



## Background:

The annual CureSearch Summit serves as a unique platform for driving critical stakeholder collaborations to accelerate the pace of pediatric oncology drug development. The 2021 CureSearch Summit is a series of four virtual sessions focused on addressing the relative paucity of available pediatric cancer tissue and data.

To develop this topic, CureSearch convened a diverse set of stakeholders (Appendix 1) to identify a challenge to efficient pediatric drug development that could be addressed at the 2021 CureSearch Summit. The working group recommended solid tumor biopsies as a timely, relevant, and important topic for discussion.

More tumor tissue samples would accelerate the development of new therapies and diagnostics for pediatric solid tumors. Pediatric cancer is a rare disease; a limited patient pool requires concerted efforts towards efficient, effective, and open resource collection and sharing. It is imperative that innovative approaches to sample collection and sharing be identified and implemented with careful construction of pediatric clinical trial protocols.

## PRESENTERS

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The Summit Working Group identified four primary topics of discussion to address the issue of limited and/or inaccessible patient samples to advance pediatric cancer research. Wide ranging experts in the field contributed to session discussions and presentations including thought leaders from academia, the pharmaceutical industry, patient advocacy groups, patient families, and regulatory entities.

**Session 1: March 19, 2021** - New Technologies for Maximizing Analysis of Solid Tumors: A set of panelists from academia and industry will discuss the promise and challenges associated with incorporating liquid biopsies into widespread clinical practice.

**Session 2: May 14, 2021** - Blurred Lines: Therapeutic vs Research-only Biopsies This panel discussion will explore the factors that differentiate therapeutic biopsies from research-only biopsies and examine how new technologies and biomarkers are increasing the potential for therapeutic benefit.

**Session 3: July 13, 2021** - This session focuses on post-mortem tissue donation and the research potential for this tissue. Panelists discussed approaching families about tissue donation: the reasons these conversations are so important, the benefits donation confers to the entire community, and some suggested approaches to having these sensitive but critical conversations. We discussed ethical guidelines for post-mortem donation as well as the collection process and the applications for post-mortem tissue in research.

**Session 4: September 14, 2021** - This session provides insight into biorepositories, specifically how tissue is acquired, the types of samples and data that biorepositories house, and the accessibility of those samples and data.

This outcome-driven meeting aims to provide resources to the pediatric cancer community to promote increased biopsy use and data sharing to support and accelerate research in the field. A white paper will follow each of the four CureSearch Summit sessions. These white papers review the topic, highlight benefits and challenges to implementation of increased biopsy acquisition and data sharing in the pediatric cancer space, and identify future actions to address the challenges and increase pediatric-specific therapy development.

### ***Session 4- Biorepository Form and Function***

Session four of the 2021 CureSearch Summit was designed to provide a thorough overview of how biorepositories function, how they store and distribute both samples and data, and to share biorepository resources available for pediatric cancer research. Recognizing the valuable and limited nature of pediatric tumor tissue, panelists focused on maximizing tissue use, making appropriate tissue requests and incorporating digital pathology into biobanking-related procedures so that tissue is preserved while extracted data can be shared and analyzed. Panelists (Appendix 2) were selected based on their expertise with infrastructure, clinical, ethical, and technical aspects relating to biorepositories.

The session was designed around the individual experiences of each panelist to provide a balanced, inclusive, and informative discussion. This white paper provides an overview of the panel discussion and next steps for CureSearch as we aim to increase an understanding of how biorepositories work and how they may be optimized.

### **Introduction**

In the United States, as of 2021, nearly 1.9 million adults are diagnosed with cancer each year[1]; in comparison, only 17,000 children and teens, aged 0-19, are diagnosed with cancer each year [2]. Based solely on the limited number of patients and exacerbated by the rarity of pediatric tumor subtypes – of which there are over 100 – it is a challenge to effectively study pediatric cancer. In addition, because pediatric cancers are so different, in terms of their driver mutations and the tissues in which they develop, from those seen in adults, extrapolation of learnings from the adult space are very rarely possible for pediatric cancer. Collaboration is key to the success of pediatric cancer research and essential for the identification of new therapies for this collection of rare and ultra-rare diseases. Collaboration is not restricted to the research conducted but must also extend to the resources collected for research purposes, including biospecimens.

The National Cancer Institute (NCI) defines a biorepository as “a facility that collects, catalogs, and stores samples of biological material, such as urine, blood, tissue, cells, DNA, RNA and protein, from humans, animals or plants for laboratory research.” Added to this definition should be the crucial inclusion of the words “analyzes” and “distributes” because widespread collaborative research cannot be conducted without the sharing of data derived from the biospecimen or the biospecimen itself. Biorepositories are important sites for information sharing; while adult cancer research may benefit from different biobanking-based resources, including local cancer center biorepositories, by nature of the rarity of the disease, pediatric cancer requires a central biorepository and/or collaborative work.

The discussion that took place during session four of this series, Biorepository Form and Function, explored the structure and utility of biorepositories, presenting different examples of biorepositories and how certain practices can improve the breadth and depth of information that can be shared. Importantly, panelists presented their unique experiences in biospecimen procurement, processing, banking, and distribution efforts (including digitization of data and optimization of workflow) - all topics that contribute to a picture of how physicians and researchers can both contribute to and effectively draw information from biorepositories.

## **Biorepository Structure and Use**

To fully appreciate the cyclical nature of sample submission and derive utility from a biorepository, it is important to understand both biorepository structure and function. The general workflow of any biorepository should move in a specific manner. A biorepository can increase the potential for success by incorporating an engagement strategy that is developed by a range of stakeholders. Regulatory experts –an external scientific panel that includes experts in oncology, patient advocacy, cancer health disparities, communications and biobanking – can be engaged on a regular basis to provide input on all aspects of biobanking projects. Not only do they provide recommendations on patient engagement strategies, but they can also offer a range of perspectives on areas including protocol development, website content and consent wording. Patient recruitment and consent into a protocol that specifically addresses biospecimen collection is the first step to acquiring a sample. The consent must be clear and easily understood so that patients know what will happen to their sample once it is collected. Offering consents in electronic and paper versions enables patients and their parents to access the consent in a manner that is convenient and accessible to them. In addition, consents should be offered in the patient's family's preferred language. Once the decision to collect a sample is made, significant coordination is required to get to the point of actual tissue collection. How the sample is collected, assessed, and processed must be determined prior to the acquisition of the sample. The downstream uses of the biospecimen will determine how the sample is processed, be it fresh, frozen, formalin fixed, etc. After the tissue is collected, it enters the biorepository for standardized tissue processing, data entry, annotation and any molecular profiling and subsequent data processing is performed.

Significant infrastructure and personnel resources are required for a successful biobanking program. A primary requirement is space. Not only is storage space needed for freezers, liquid nitrogen tanks and tissue blocks, but space is also required for the processing of the samples. Embedding tissue in blocks for pathological assessment, processing for molecular profiling, and data collection and entry can all be performed within a biorepository, requiring space for the tools and personnel involved. Most importantly, biorepositories require dedicated staff management. The following list provides an overview of the human resources necessary for effective biobanking:

- *Clinicians and nursing staff*: Interface with the patient and identify opportunities for sample acquisition
- *Surgeons*: Collect tissue samples
- *Research coordinators*: Provide administrative oversight to the tissue collection process and coordinate the recruitment of patients, collection of clinical data, procurement of special biospecimen, and sample collection and transport
- *Pathologists*: Serve a range of roles that can include administrative oversight, identification/diagnosis, and quality control of biospecimens and acquisition of the appropriate sample

- *Researchers and technical staff:* Provide protocols and expertise on the mechanisms of sample collection, processing, and banking as they will be the end-users of the tissue
- *Informaticists:* Gather, annotate, and analyze biospecimen-derived data
- *Biospecimen access committees:* Oversee the distribution of data and samples, ensuring that the samples provided will serve the purpose of the proposed research and that there is sufficient sample remaining after the request is fulfilled

Finally, biorepository accreditation programs, such as the College of American Pathologists Biorepository Accreditation Program (CAP BAP), promote the quality and consistency of biorepositories. The CAP BAP has drawn on best practices from the International Society for Biological and Environmental Repositories (ISBER), the NCI Best Practices for Biospecimen Resources, the Organization for Economic Co-operation and Development (OECD), the Centers for Medicare & Medicaid Services (CMS) and the CAP Laboratory Accreditation Program to provide requirements for standardization of processes that result in high-quality biospecimens and genetic material to support research. For more information on CAP accreditation, visit the CAP website. In addition, diagnostic testing must be performed within a Clinical Laboratory Improvement Amendments (CLIA) certified laboratory. The objective of the CLIA program is to ensure quality laboratory testing. CLIA certification is required if laboratory results will be returned to patients, an aim that could be the goal of biorepositories with complex operations (see *Completing the Circle – Returning Information to Patients and Providers*).

Biorepositories exist for the purpose of collection, processing (e.g., cataloging, analysis), storage and distribution of biological samples for research use. When requesting data and/or samples from a biorepository, it is important to remember that biospecimens are valuable material that can be incredibly rare. Forethought regarding researcher need, how they will be using the samples and how the samples being requested will all contribute to answering the specific research question is essential. The below questions should be considered when making a biorepository request:

- *What do you need in addition to the biospecimens?*
  - Do you need clinical data? Do you need to know if the sample was collected pre- or post-treatment, post radiation, etc.? Biospecimens, like those in the Children's Oncology Group (COG) biorepository, are very well annotated. Thus, they are of particular interest for research that requires clinical annotation.
  - Do you need specimen data? Is there need for the surgical pathology report? Is there a need to understand the timing of sample collection and processing? Will an older sample work for your research or do you need samples that have been collected more recently? What kind of molecular data do you need to be associated with that sample? Many times, older samples will not be annotated with the latest marker or molecular test that is currently associated with diagnosis.



- *What type of biospecimens do you need? Do you need biospecimens that represent the disease or the tumor type that you are looking for, or do you need paired specimens, for example, sections of tumor and normal tissue or blood? Paired samples, though more frequently collected today, will not always be available.*
- *How much tissue or body fluid do you need? Ensure that the amount of material requested does not exceed what is needed to complete the research project.*
- *What is the quality of the sample that you are expecting? Particularly pure tumor samples can be difficult to collect at the biorepository level and can represent very valuable biospecimens. In addition, based on the nature of the tumor - particularly with tumors that are very aggressive and undergo necrosis - it can be difficult to find a sample with a large proportion of tumor and small proportion of necrosis. You may want to select a sample type on which post-annotation macrodissection or laser capture microdissection can be performed.*
- *Do you want virtual images? A virtual image of a digitally scanned conventional glass slide with representative tumor tissue is considered data, not a biospecimen. As such, the process for requesting images is different than for requesting biospecimens.*
- *Do you want specimens from a surgical resection or autopsy? Some biospecimens can only be collected at the time of autopsy, depending on the disease and whether the tumor can be accessed surgically while a patient is alive. It is important to understand that not all autopsies are rapid autopsies and the molecular characterization performed from these biospecimens may be limited due to a longer duration between sample acquisition and processing.*
- *What is your budget? By US law, biorepositories do not charge for tissue. Because there can be a significant staff requirement for pulling samples out of the biorepository, a fee is charged for the service. The more information or samples that are requested, the more the service can cost. In addition, does your budget have an expiration date? If you need large numbers of samples, you must provide the biorepository with the time needed to pull those samples. A grant that runs out in three weeks will not be able to support the acquisition of 300 samples that need complex processing (e.g., microscopic evaluation of tumor content prior to distribution).*

## **Optimizing Biobanking**

*A biospecimen-based initiative could be the underlying foundation that strives to support a vision where no child dies or suffers from tumors in the future through accelerated research, open science, and global inclusion. – Adam Resnick, PhD*

Beyond the basic requirements of a biorepository, there are considerations that, if implemented early and consistently, will improve the functioning of the biorepository and the quality and utility of the samples. The subsequent section will review some of the most important factors to optimizing biobanking, especially considering the limited number of patients with pediatric cancer and the vast array of tumor subtypes that make pediatric cancers rare and ultra-rare diseases. It is an ethical obligation that researchers use the biospecimens that patients have donated. Collaborating to improve the numbers of samples available for a given diagnosis, collecting, and harmonizing data and making it easy to share, and ensuring the quality of biospecimens are a few of the ways that biorepositories can maximize tissue gifts provided by patients.

### Biospecimen Quality Control

Biospecimen quality is incredibly important for downstream research. Biorepositories require space, time, and money so an important early step in the biorepository timeline is to perform quality control so that stored samples meet research needs. Therefore, at the time of tissue acquisition, pathologists should be engaged. First, the pathologist determines how much tissue will be available for banking. Sufficient high-quality tumor tissue is required for a diagnosis and that piece of tissue must be prioritized. The remaining sample to be banked should also be assessed for quality. Histological quality control of the sample, determination of the extent of tumor tissue vs normal or necrotic, is important to ensure that the tissue retained has sufficient malignant cells to be useful for in-depth characterization. It is also important that molecular integrity and protein quality are checked since many downstream applications, including sequencing, and metabolomic testing, require these features.

### Biospecimen Annotation

While a vast amount of information can be gathered from a tumor sample, context is incredibly important for understanding the complete story. Preanalytical and clinical annotation provides the context necessary to understand the steps that preceded sample acquisition. As noted in the prior section, sample quality is dependent on the steps that take place during the sample's collection and processing. Knowledge of information such as the time required for sample collection, the exact collection conditions, and the source and type of biospecimen enable more reproducible research and better diagnostic tests. For example, a sample that takes more than four hours to collect, such as an autopsy sample, may not be useable for messenger RNA (mRNA) analysis because mRNA degrades quickly. In fact, mRNA, phosphorylated proteins, and peptides require the most stringent quality parameters because either the molecules break down more readily or the technologies used for their evaluation are currently not robust enough to allow for variation in biospecimen preparation. Annotation of the collection conditions and timing is important to ensure that resulting analyses reflect the tumor's molecular features accurately, and the CAP has determined some of the most important information to collect in an effort to standardize preanalytical data elements [3].

Information about the initial clinical features, the treatment and the outcome of a patient from whom a sample has been collected dramatically increases the value of the specimen to investigators. As noted by the NCI Biorepositories & Biospecimen Research Branch (BBRB), information linked to biospecimens may include demographic data, lifestyle factors, environmental and occupational exposures, cancer history, structured pathology data, additional diagnostic studies, information on initial staging procedure, treatment data and data relevant to tracking a research participant's clinical outcome. Recommended common data elements to be collected and associated with every biospecimen, if possible, can be found on the NCI BBRB website [4]. The ultimate goal of patient sample research is to inform patient treatment to improve outcomes. Knowledge of the clinical features of the patient from whom a sample has been acquired enables a thorough understanding of the individual properties of the tumor and patient that inform the research process. Knowledge of a therapy that a patient underwent prior to tumor collection, for example, enables researchers to understand how that tumor evaded therapy and what treatments may be more effective in the future. As precision medicine moves to the forefront of pediatric cancer treatment, the characteristics of a single patient's tumor become more important. Moreover, with the small number of pediatric cancers further subdivided based on molecular characteristics, the more data available on a given patient, the more value can be drawn from that single tumor.



### Paired and Longitudinal Sample Collection

Sample context can also be derived from linked samples that are collected from the same patient but either from a different source (normal tissue, blood, urine, etc.) or at a different time, such as would be the case of a sample obtained from a recurrent tumor. There is significant statistical value in paired samples when performing genomic studies [5] and determination of cancer biomarkers, and research on liquid biopsies are greatly enhanced by, if not reliant on, the collection of fluids such as blood and urine. These samples are difficult to collect retrospectively, so it is best to be prepared for all potential biospecimen needs by thinking ahead and collecting and storing paired samples, especially ones that are easily accessible by non-invasive means.

In addition to paired samples, longitudinal samples – collected sequentially from the same patient over time – provide important information about a tumor's response to therapy. For example, a goal of the NCI Cancer Moonshot Biobank is to procure longitudinal patient biospecimens for cancer research. The Biobank will enroll 1,000 patients with locally advanced or metastatic solid tumors or hematologic malignancies and collect longitudinal samples to understand how cancer changes over time, especially in cases where cancer becomes resistant to treatment. In the case of the longitudinal collection of samples, longitudinal data collection is also incredibly important. Alignment of tumor samples with timelines, diagnoses, imaging, molecular characterization and treatment information can provide researchers with a more complete understanding of the lifecycle of a tumor and better inform treatment decisions for patients that share features.

### Asset Digitization

Pediatric tissue sample rarity requires that, for optimum benefit, the maximum amount of information is pulled from samples and then shared in the most consistent manner. There is an opportunity to think of specimens as data storage vehicles. Large-scale and comprehensive data generation means that molecules extracted from small portions of biospecimens can be analyzed and shared to support research without requiring small pieces of tissue to be shipped to each lab that requests samples for research. With sample digitization, scale is at our disposal, especially in the rare disease space, where we have an opportunity to analyze smaller cohorts that are deeply and originally characterized, providing connectivity, not just within a disease, but across diseases and times. Biorepositories can maximize samples by transforming them into the richest data set possible, as quickly as possible, so that they can be used by as many people as possible. When the digital information from a sample is connected to other sample datasets, the model of utilization is altered for those samples in ways that enforce collaborative research requirements as well as the infrastructure that drives use.

The collection, storage and distribution of comprehensive raw data also provides means for iterative discovery. For example, when samples are collected in such a way that you can perform whole genome sequencing on them, though we may not know how to interpret 95% of the genomic variations in the data at this time, we can return to the data after more foundational research has been performed on pediatric cancer mutations and develop a clearer understanding of the molecular changes within the malignancy and how they may have driven malignancy. With the digitization of biospecimens we can be more strategic about specimen utilization, creating foundational layers of data that can then support new hypothesis generation. In addition, the widespread sharing of this data reduces duplication of effort. Pieces of a single sample shipped to four different laboratories for molecular characterization is a much less beneficial use for the tissue than initially characterizing the tumor, sharing the data with the four laboratories and saving the remaining sample for characterization with new technologies that provide the opportunity for a deeper understanding of the tumor.

### **Case Study 1: The Gabriella Miller Kids First Data Resource Center**

The NIH Common Fund-supported Gabriella Miller Kids First Data Resource Center (DRC) enables researchers, clinicians, and patients to accelerate research and promote new discoveries for children affected with cancer and structural birth defects. DNA and RNA data from more than 11,000 samples – and growing – is available through a searchable data portal to empower research. Of note, collaborators such as the Children's Brain Tumor Network (CBTN), can also submit their data to the Kids First DRC, increasing the number of samples and statistical power of the data sets. The CBTN Pediatric Brain Tumor Atlas has enrolled nearly 4,000 subjects and, along with molecular data, pathology reports, histology images and preanalytical data can be accessed, all related to specific biospecimens. The capacity of users to re-query, ask additional questions and attach additional information to that biospecimen adds more data to the cohort.

### **Collaboration**

Pediatric cancer research is a game of numbers. Collaboration amongst researchers, oncologists, pathologists, institutional biorepositories and larger cooperative biorepositories is key to guaranteeing statistically and medically significant discoveries. It is important for individual institutions to perform biobanking, but even the biggest institution will not be able to answer all the critical questions. While they will be able to perform some basic biology work, larger patient numbers are required to answer questions that will impact treatment such as whether a biomarker is associated with an outcome or how common a certain abnormality is amongst a specific population of patients. Centralized biorepositories like the ones for the COG and the Children's Brain Tumor Tissue Consortium (CBTTC) Repository, as well as collaborations among multiple institutional biorepositories support the compilation of more biospecimens and larger data sets.

### **Case Study 2: The Biorepository for the Children's Oncology Group**

The COG was formed in 2000 by the merger of four legacy groups: the Children's Cancer Group, the Pediatric Oncology Group, the Intergroup Rhabdomyosarcoma Study Group and the National Wilms' Tumor Study Group. The COG is the NCI-funded national pediatric cancer clinical trials network group that now includes more than 200 member institutions, most of them the United States, but also in Canada, Australia, New Zealand and Saudi Arabia. As most children in the United States with cancer are treated at a COG institution, it is an optimal organization to sponsor a biorepository. The geographic diversity of sites is what allows researchers to overcome some of the issues associated with pediatric cancer rarity. A study set up in 2015, called Project:EveryChild, is a mechanism to consent for collection of biospecimens and gather information about the initial clinical features associated with a child's cancer diagnosis, as well as outcome. In addition, this project acquires permission for future patient contact, which is essential for epidemiological studies. It is estimated that through Project:EveryChild, 45% of children, age 0-14, with cancer in the United States have been enrolled. Importantly, Project:EveryChild depends entirely upon philanthropic support to fund the institutional costs of biospecimen contribution and clinical annotation. Large, centralized biorepositories like the COG biorepository provide economy of scale. Biorepositories are expensive endeavors, and it is not possible for every institution to house its own. Centralized processing, dedicated biorepository staff and consistent biospecimen processing are additional benefits of central biorepositories.

The most significant headway can be made by returning the results of a clinical assay directly to patients and to their providers. The more linked research is to clinical care, the more cross-subsidization and value-added resources come to bear. The Children's Cancer Data Initiative (CCDI) aims to promote this idea on a large scale. The goal of the CCDI is to perform whole exome analysis in a CLIA setting that can potentially support treatment decisions for the tissue donor. Not only does this benefit the patient and our understanding of how molecular characterization can contribute to more personalized and hopefully, effective treatments, but there are benefits to the research community as well. This rapid molecular characterization protocol removes the need for a researcher to perform whole exome sequencing on that sample down the road and already provides some level of richness on the sample before it is even stored for a few weeks. Radical transparency and making families and patients co-investors in the research process are incredibly valuable.

### Completing the Circle – Returning Information to Patient Families and Providers

It is only through patient consent to donate their biospecimens that biorepositories are possible. The organization of a biorepository should not be a one-way street. Patients and their families have the right to understand where their sample has gone and how it is being used. This is, perhaps, the most difficult task for researchers and biorepositories, but the return of biospecimen-derived information to patients and/or their providers is paramount to trust in the research process and many times, the patient's well-being. Consent is an implicit contract with a subject to do everything in your power to accelerate discovery and develop new therapies for patients. Patients can have an empowered narrative, which sometimes is a much more salient voice when promoting biobanking and research. Their belief in the system can promote the expansion of biobanking. Therefore, it is beneficial to ensure that they understand how their donations are used.

### **Conclusion**

Biorepositories, especially collaborative, centralized repositories are pivotal to the success of pediatric cancer research. Small patient populations, further subdivided by the varied diagnoses that fall under the umbrella term "pediatric cancer", mean that information sharing is critical. The questions that we need to consider as we think about optimizing biobanking are: (1) how can we incentivize centralization or linking of biorepositories? (2) how do we promote biospecimen donation by patients and submission by institutions? And (3) how do we maximize specimen usage? The Summit session Biorepository Form and Function gathered the top minds in the field to address these questions and share their perspectives on gaps that still need to be filled.

We need to start thinking about biorepositories as optimizing for time as a variable of scaled use that leverages tight coordination in ways that are standardized but built towards accelerated use and translation in the context of a platform. One way to do so is to recognize that biorepositories are also a data storage infrastructure, that each biospecimen is storing petabytes of data and our job is to transform it and share it widely with the research community. Efforts like the CCDI provide entirely new ways of implementing workflows that are tightly linked to real-time use of data at the clinical interface and on behalf of patients.

## Shared Resources

Key to the utilization of biorepository resources is a knowledge of the assets that exist and how they can be accessed. Session presenters provided a list of resources, shared below, that provide access to biospecimens:

- COG Biospecimen Bank: The Biorepository for the Children's Oncology Group is located at The Abigail Wexner Research Institute of Nationwide Children's Hospital. This resource maintains the largest pediatric cancer biospecimen bank in the nation. The Biorepository contains samples (e.g., tissue, body fluids) from more than 32,000 children with childhood cancer and related diseases.
  - Application form: <https://childrensoncologygroup.org/obtainingbiospecimens>
  - Submit application: [specimens@childrensoncologygroup.org](mailto:specimens@childrensoncologygroup.org)
- Gabriella Miller Kids First Data Resource Center: The Kids First DRC is a collaborative pediatric research effort created to accelerate data-driven discoveries and the development of novel precision-based approaches for children diagnosed with cancer or a structural birth defect using large genomic datasets. <https://kidsfirstdrc.org/>
- NCI National Clinical Trials Network (NCTN) Navigator: The NCTN Navigator is a resource for investigators who have conducted exploratory correlative analyses and are seeking specimens to validate their hypotheses.
  - National Clinical Trials Network: <https://www.cancer.gov/research/infrastructure/clinical-trials/nctn>
  - NCTN Navigator Clinical Trials Specimen Resource: <https://navigator.ctsu.org/navigator/login>
  - Information about the biospecimens inventoried in Navigator and the query, LOI, and proposal submission process: <https://navigator.ctsu.org/>
  - All submission formats require that the proposal PI be a CTEP registered investigator: [https://ctep.cancer.gov/investigatorResources/investigator\\_registration.htm](https://ctep.cancer.gov/investigatorResources/investigator_registration.htm)
- Cooperative Human Tissue Network: The CHTN is an NCI-supported resource that provides human tissues and body fluids from routine procedures to investigators for research. Unlike tissue banks, the CHTN works prospectively with each investigator to tailor specimen acquisition and processing to meet their specific project requirements. <https://www.chtn.org/>
- NCI Specimen Resource Locator: The Specimen Resource Locator (SRL) is a biospecimen resource database designed to help researchers locate resources that may have the samples needed for their investigational use. This publicly searchable database includes information about biospecimen banks and sample procurement services. <https://specimens.cancer.gov/>



## **Next Steps**

By convening a community of stakeholders in the pediatric cancer ecosystem, CureSearch provides a platform to think strategically and work collaboratively. CureSearch is in a unique position to compile information across stakeholders and disseminate outcomes and lessons learned to the broader community. Scientific and drug discovery opportunities lie in providing platforms for discussion amongst academia, industry, patient families, advocacy groups and regulatory bodies. After the annual Summit, CureSearch works collaboratively with meeting participants and contributors to identify action items and move the topic toward resolutions for the challenges discussed.

The optimal scenario for promotion of biorepositories will require significant funding and a biobanking-related centralized infrastructure which is out of scope for CureSearch but within the capabilities of consortia of dedicated funders. CureSearch will work to raise awareness of extant resources through the distribution of this white paper and development of a resource web page on [curesearch.org](http://curesearch.org). Additional educational opportunities with patients and families around donation of biospecimens will be explored through a patient-centric biospecimen working group. CureSearch staff are also participating in CCDI working groups with an aim to promote CCDI initiatives within the pediatric cancer ecosystem and better understand the role that philanthropic organizations can play in the promotion of biospecimen donation and biorepository development and optimization.

An action plan, updated quarterly to track progress, will be provided to 2021 Summit participants in 2022.

CureSearch would like to thank panelists and attendees for their contributions to this session of the 2021 virtual CureSearch Summit. The success of this meeting would not have been possible without the engagement of all participants.

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Appendix 1. Summit topic working group members

WORKING GROUP MEMBER	DESIGNATION	AFFILIATION
Richard Drachtman, MD	Clinical Section Chief, Pediatric Hematology/Oncology Sequencing	Rutgers Cancer Institute of New Jersey
	Professor of Pediatrics	Rutgers-Robert Wood Johnson Medical School
	Chair	Pediatric Central Institutional Review Board
Lia Gore, MD	Co-Director, Developmental Therapeutics Program	University of Colorado Cancer Center
	Ergen Family Chair in Pediatric Oncology - Section Head, Pediatric Hematology/Oncology/BMT	Children's Hospital Colorado
Amanda Jacobson, PhD	Associate Director, Clinician, Early Clinical Development Oncology	Pfizer
Su Young Kim, MD, PhD	Senior Medical Director	AbbVie
Donald Very, PhD	President and CEO	Naviter Bioanalytics, LLC
	Parent	Stage IV osteosarcoma survivor

Appendix 2. Panelist representation for the CureSearch Summit session Blurred Lines: Therapeutic vs Research-only Biopsies.

PANELIST	DESIGNATION	AFFILIATION
Christine Fuller, MD	Professor of Pathology, Director of Neuropathology/Muscle Pathology	SUNY Upstate Medical University
Douglas S. Hawkins, MD	Professor of Pediatrics, Hematology/Oncology Division	Seattle Children's Hospital
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