



Annual Report

BC Children's Hospital BioBank

APRIL 1, 2021 – MARCH 31, 2022

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1.0 Overview

This is the seventh annual report of the BC Children's Hospital BioBank (BCCHB), which has been operational since January 1, 2015 and made possible by a generous contribution from Mining for Miracles - the BC mining community's longstanding fundraising campaign for BC Children's Hospital. This report will cover operations and finance from April 2021 – March 2022.

The mission of the BCCH BioBank is to provide a comprehensive service for the collection, processing, storage, rapid access and retrieval of biospecimens and clinical information for research projects using a professional and compassionate approach to patient consenting that adheres to the highest standards of research ethics and patient privacy.

The BCCHB has a two-pronged approach to supporting research, "general biobanking" and "PI-driven research". In the general biobank, specimens are collected under the mandate of the BCCHB for future research. For PI driven research the BCCHB provide researchers with specified services to enable their own research.

Pages 12 – 15 of this report refer to projects that have utilized specimens from the general biobank. The BCCHB has released specimens to a range of projects from antibody research, immunity and responses to infections, cancer and rheumatic diseases.

Pages 16 – 20 describe the extensive list of PI driven studies that the BCCHB has been able to support over the years.

Dr. Vercauteren has continued to participate in a Pediatric Special Interest Group that she formed at the International Society of Biological and Environmental Repositories (ISBER). This is an international group, which is leading discussions specifically about pediatric biobanking.

Below are data and other achievements from April 2021 – March 2022.

2.0 Participation Rate – General BioBank

	BCCH+		BCWH*		COVID-19		Total (BCCH + BCWH)	
	This Year	Total	This Year	Total	This Year	Total	This Year	Total
Consent Obtained	146	1956	17 (13 NICU)	444 (51 NICU)	9	40	172	2440
Capacity to Consent	18	121	--		3	3	21	124
Declined[△]	2	77	0	1	0	1	2	79
Withdrawn/Revoke	1	32	0	0	0	0	1	32
Consent rate	98.0%	95.0%	--		--		--	

*BCWH recruitment has been minimized until a demand in maternal samples is observed.

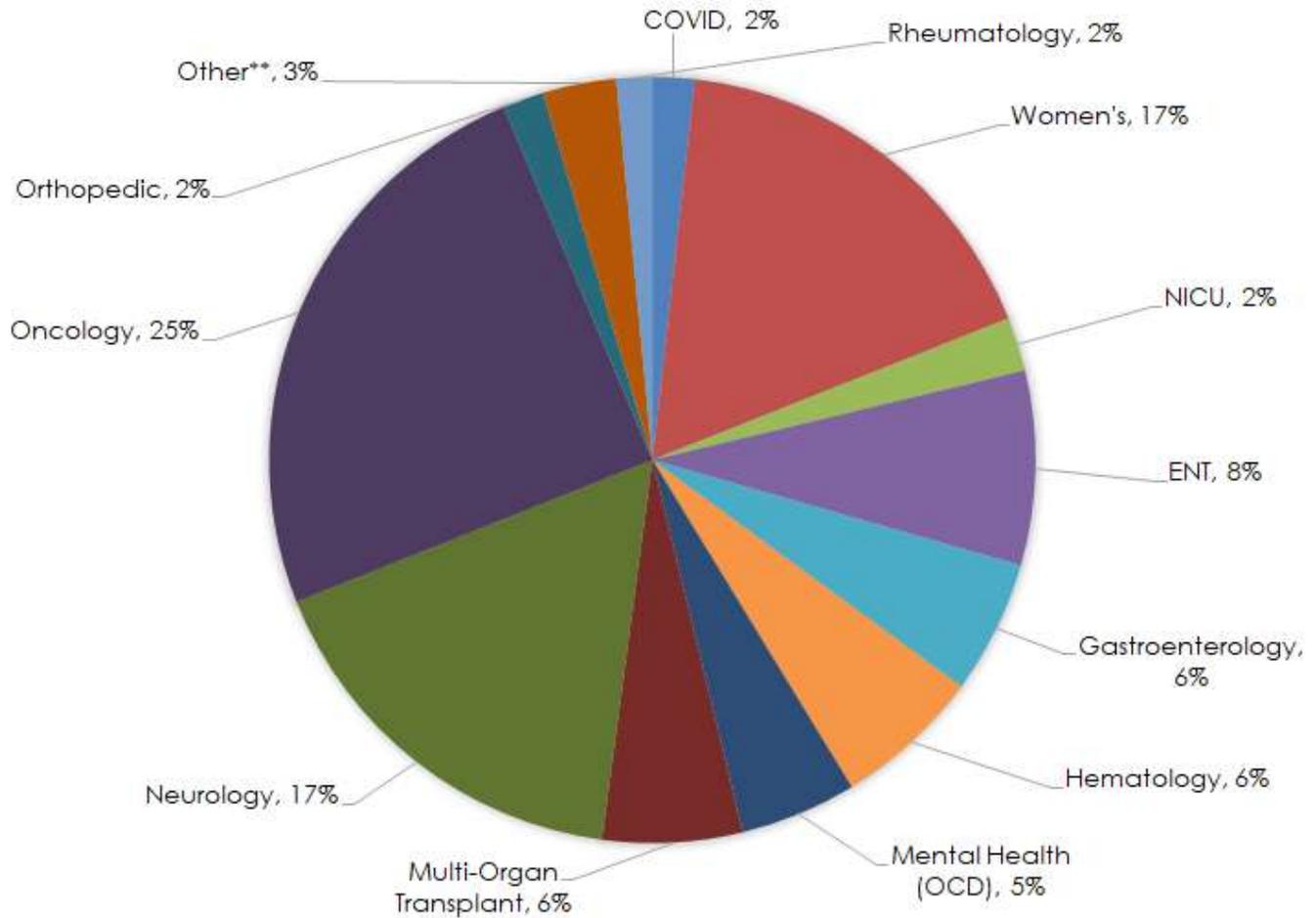
+BCCH and BCWH recruitment volume was lower than previous years due to COVID-19 patient interaction restrictions.

△Decline total counts have increased compared to the 2020-2021 Annual Report due to a change in practice in auditing and therefore affecting the overall consent rate. Consent rates for the period of 2021-2022 have not been affected.

As per PHSA Privacy Guidelines, the BCCHB has moved to obtain full informed consent from all participants who are 14 and over as opposed to obtaining assent where applicable.

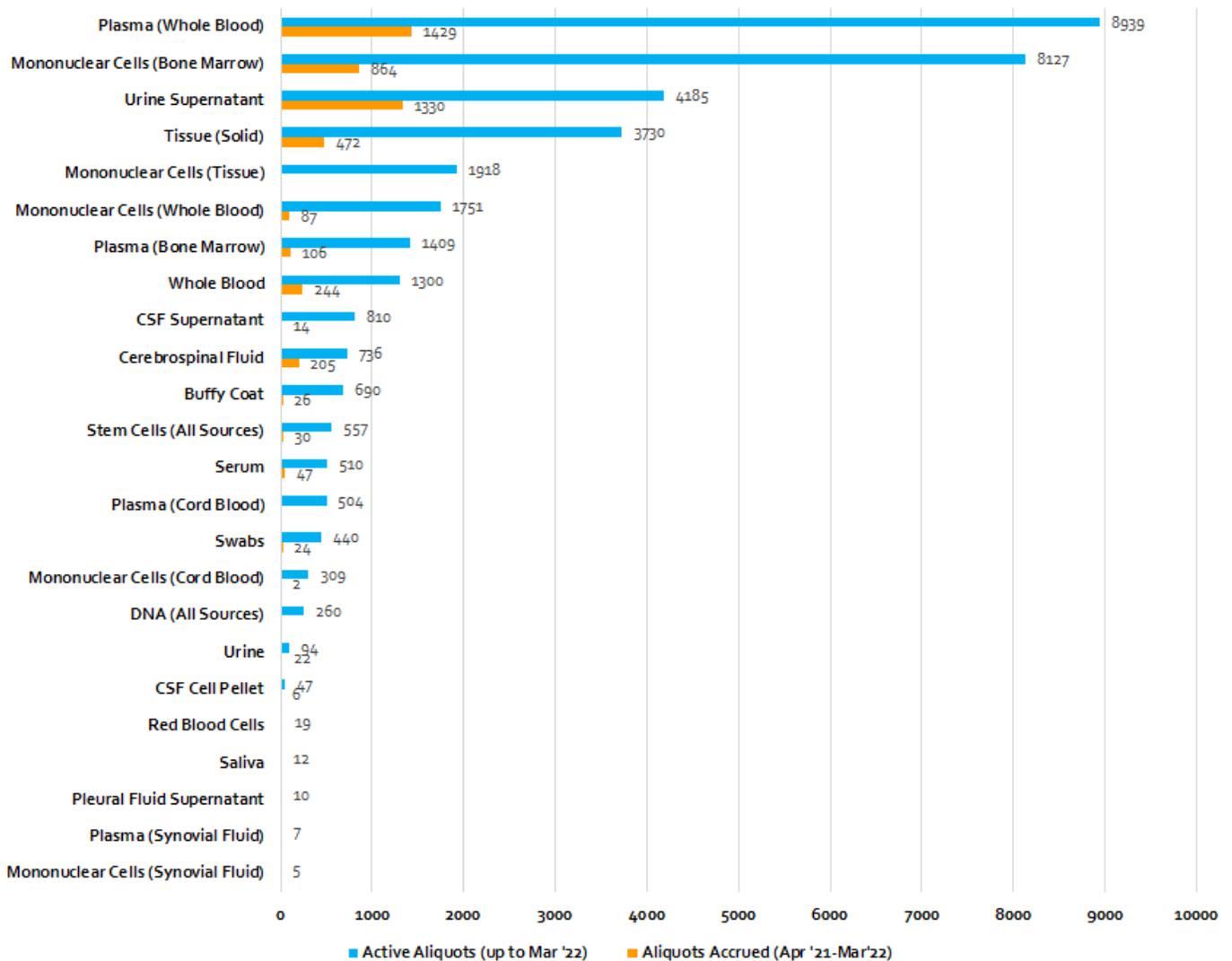
3.0 Clinic Representation – General BioBank

PARTICIPANTS RECRUITED (UP TO MARCH 2022)



**Other clinics include Allergy, BCCH ER, BCCH Clinic, Cardiology, Endocrinology, General Pediatrics, Medical Genetics, and Offsite clinics which have lower clinic representation compared to the above listed.

5.0 Aliquots Accrued and Aliquot Availability – General BioBank



6.0 BioBank Oversight Committee (BOC)

Suzanne Vercauteren Chair of BOC	Co-Director, BCCH BioBank
Jonathan Bush	Co-Director, BCCH BioBank
Cheryl Wellington	Vice Chair of Research, Department of Pathology and Laboratory Medicine, UBC - <i>beginning Mar 1 2022</i>
Kathryn Dewar	Senior Research Manager, WHRI
Ellen Giesbrecht	Department of Obstetrics and Gynecology, UBC (BCWH Site Head)
Michelle Demos	Representative for the Head of Pediatrics, UBC
Peter Watson	External Biobank Expert
Erik Skarsgard	Head of Department of Surgery at BCCH
Quynh Doan	BCCHR Director of Clinical Research
Mike Burgess	External Ethics Expert
David Goldfarb	Associate Head of Pathology and Laboratory Medicine at C&W (starting July 1, 2020)
Anthony Bailey	Professor and Chair of Child and Adolescent Psychiatry, UBC
Brenda Jackson	Representative for the Provincial Laboratory Medicine Services
Alice Virani	Director of the Clinical Ethics Service, PHSA
Ashton Ellis	Research Coordinator, BCCH BioBank (ex-officio)

7.0 BioBank Executive Committee (BEC)

Jonathan Bush Chair of BEC	Co-Director, BCCH BioBank
Suzanne Vercauteren	Co-Director, BCCH BioBank
Caron Strahlendorf	Member of Research Ethics Board
Wendy Robinson	Member of BCCHR
Sheila O'Donoghue	Representative from Biobanking and Biospecimen Research Services (BBRS)
Anna Lee	Pediatric and Perinatal Pathologist, Anatomical Pathology, BCCH
Tanya Nelson	Member of Pathology and Laboratory Medicine at C&W
Luis Nacul	Member of WHRI, Medical Director CCDP at BCWH
Gregor Reid	Member of BCCHR
Jennifer Claydon	Manager, Clinical Research Support Unit, BCCHR
Ashton Ellis	Research Coordinator, BCCH BioBank (ex-officio)

8.0 BioBank Biospecimen Advisory Committee (BAC)

William Gibson (Chair of BAC)	Member of BCCHR
Suzanne Vercauteren	Co-Director, BCCH BioBank
Jonathan Bush	Co-Director, BCCH BioBank
David Cabral	Member of BCCH
Helene Cote	Member of UBC
Jacob Rozmus	Member of BCCH
Anthony Cooper	Member of BCCH
Wee-Shian Chan	Member of BCWH
Clare Beasley	BC Mental Health and Addiction Services
Isabel Jordan	Founder of Rare Disease Foundation parent advocacy group
Jefferson Terry	Member of the Department of Pathology and Laboratory Medicine
Veronica Chow	Laboratory Manager, BCCH BioBank

9.0 Staff

Suzanne Vercauteren	Co-director
Jonathan Bush	Co-director
Veronica Chow	Laboratory Manager
Ashton Ellis	Research Coordinator
Vi Nguyen	Research Technician
Kendall Plant	Research Technician
Sadaf Sediqi	Research Technician (CITF Project)
Qudrat Aujla	Undergraduate Research Assistant
Iryna Kayda	Research Technician (End August 2021)
Lise Rutherford	Summer Student (May – August 2021)
Jaeden Moerike	Summer Student (May – August 2021), Volunteer (End Sept 2021)
Sebastian Kondratowski	Co-op Student (begin January 2022)

10.0 Applications & Biospecimen Release

Between April 2021 and March 2022, the BCCH BioBank has received nine new applications for biospecimens. Applicants and their research project titles are displayed below.

1. Role of SLC43A3 in the therapeutic efficacy and adverse effects of 6-mercaptopurine.

Dr. James Hammond – specimens granted. *12 mononuclear cell samples from B-ALL patients.*

Lay Summary: Acute Lymphoblastic Leukemia (ALL) is the most common malignancy in pediatric patients from the developed world. Despite improvements in treatments there are still about 20% of patients who face relapse and lower survival rates due to a lack of response to treatment and this statistic increases with age. 6-mercaptopurine (6-MP) is a common chemotherapy drug for ALL patients, however, in spite of consistent dosage, the plasma bioavailability of 6-MP varies between patients. Dr. Hammond's study hypothesizes that the transporters encoded from gene SLC43A3 are vital to 6-MP treatment efficacy. SLC43A3 gene expression is shown to vary between pediatric patients, with lower gene expression affecting the ability of 6-MP chemotherapy to enter cells. This study will screen bone marrow mononuclear cell samples for the expression of SLC43A3, along with other genes linked to 6-MP effectiveness. These expression levels will then be correlated to the therapeutic outcome and to patient specific factors such as age, sex, remission/relapse times and chemotherapy dosage.

2. Can extracellular vesicles be used to detect high-risk pediatric acute lymphoblastic leukemia? Dr.

Sherri Christian – specimens granted. *5 plasma and mononuclear cell samples from B-ALL ETV subtype patients, 3 plasma and mononuclear cell samples from B-ALL Ph-like subtype, and 6 healthy plasma and mononuclear cell samples.*

Lay Summary: Minimal Residual Disease (MRD) is defined as the amount of cancerous leukemia cells present in the bone marrow, which are undetectable through microscopic examination. MRD is a major factor in evaluating a B-ALL patient's risk for relapse. Among patients with relapse, the survival rate is only 30-50%. While current MRD detection techniques are costly and complicated to access, this study proposes that a single blood draw can be used as a more accessible detection method. Dr. Christian's study hypothesizes that the small vesicles secreted from tumour cells can be identified in a variety of bodily fluids such as blood and cerebrospinal fluid, allowing clinicians to better identify cerebral spinal fluid disease- a disease state not accessible to systemic chemotherapy. This study will isolate vesicles from the blood of two B-ALL subtypes, high risk Ph-like and lower risk ETV6-RUNX1, and compare the miRNA profiles in order to identify specific signatures and indicators of high-risk disease.

3. Epigenetics of OCD in response to CBT treatment. Dr. Evelyn Stewart – specimens granted. *126 salivary swabs.*

Lay Summary: To date, available treatments for obsessive-compulsive disorder (OCD) are poorly understood. This study aims to identify if Cognitive Behavioural Therapy (CBT) causes any dynamic changes in childhood and adolescent patient epigenetic markers. Changes in epigenetic markers can be correlated to changes in OCD severity over the course of treatment. The epigenetic markers in question are genome wide DNA methylation events that can be characterised with the Illumina Infinium

Methylation Array. Dr. Stewart's study seeks to extract DNA from the buccal swabs of participants throughout CBT therapy in order to identify potential changes in epigenetic loci. The results of this study will allow an examination of deviations in patient's epigenetic age to be associated with CBT interventions.

4. Assessing the immunopathogenesis of novel germline variants in IKZF2. Dr. Stuart Turvey – specimens granted. *2 control peripheral blood mononuclear cell samples.*

Lay Summary: Patients with primary immunodeficiency or inborn errors of immunity are considered to have rare genetic disorders in which key elements of the immune system are absent. Patients with these conditions provide a rare opportunity to identify which genes are key players in immune responses through whole genome sequencing. Dr. Turvey's team identified an immunodeficiency patient with a hyperactive phenotype of T-cells and impaired *IKZF2* gene function. This gene encodes a protein and transcription factor called Helios, which plays a regulatory role in immune function. They hypothesize that this variant of impaired Helios protein causes dysregulated binding of gene promoter sites, resulting in an enrichment of proinflammatory pathways over tolerogenic pathways. The study team will carry out single cell RNA sequencing and compare the genetic differences between the Helios-deficient patient and the healthy controls.

5. Single cell profiling of hematopoietic stem and progenitor cells in pediatric aplastic anemia. Dr. Derek Chan – specimens granted. *10 mononuclear cell samples from Aplastic Anemia patients.*

Lay Summary: Aplastic Anemia (AA) in children predisposes the affected individuals to a heightened risk of mortality, relapse, and infections due to a lack of blood cells produced by the bone marrow. Current research believes AA is caused by the T-cell mediated autoimmune destruction of blood stem and progenitor cells. This study aims to uncover the underlying intrinsic defects within this primitive cell population. Since the majority of AA research has historically been done on adults, Dr. Chan's study has a goal of bridging the knowledge and clinical care gap for affected children. Using mononuclear cells from AA patients this study will map the biological pathways involved in blood cell production, alongside single cell RNA-sequencing, compared to healthy participants. Results from this study have the potential to address the sources of stem cell failure and how to provide longer term survival for affected children.

6. Genomic and epigenomic sequencing to understand resistance and relapse in AML. Dr. Aly Karsan – specimens granted. *20 mononuclear cell samples from Acute Myeloid Leukemia (AML) patients, and 3 mononuclear cell controls.*

Lay Summary: For patients with AML, disease relapse and resistance is impacted by factors including epigenomic and epitranscriptomic changes, as well as the immune micro-environment. Single-cell therapies combined with high dose chemotherapy only provide minor prolongation of survival due to the heterogeneity of AML and the varied immune environments of the patient. Dr. Karsan's study hypothesizes that single cell RNA-sequencing will allow researchers to better identify patients at risk to

disease relapse or resistance. In the future, such predictive information could be combined with therapy for a more effective treatment of AML. Using mononuclear cells from AML patients at the time of diagnosis and relapse, this study will look for modifications to mRNA that contribute to leukemic progression. Further, the study will use DNA-sequencing to identify gene variants that are recurring within myeloid cells as a potential contributor of recurrent relapse.

7. Prevalence of A1AT deficiency variant alleles in pregnancies affected by COVID-19 syndrome. Dr. Andre Mattman – specimens granted. *2 serum samples from pregnant women infected with COVID-19.*

Lay Summary: Individuals who are pregnant have shown an upregulation of serum A1AT as a physiological change. Interestingly, A1AT deficiency is hypothesized to be a risk factor for contracting SARS-CoV2 viral infection. This study seeks to examine the possibility that pregnant adults with upregulated A1AT would have added protection from infection. However, pregnant adults with an A1AT “Z” variant may not have the same protection as the normal variant patients. Dr. Mattman’s study will use serum from pregnant individuals with COVID-19 infections to identify the “Z” allele variant frequency and compare any findings to the provincial rates of “Z” alleles in SARS-CoV2 infected pregnancies.

8. Biomarker development for clinical diagnosis of stage and response to treatment in inflammatory bowel diseases. Dr. Kevan Jacobson – specimens granted. *50 control plasma samples.*

Lay Summary: Patients affected by Inflammatory Bowel Disease (IBD) face a condition which is currently not curable, and often very unpredictable. Current therapies for IBS do not provide every patient with the same remission times or reduction of symptoms. This study seeks to identify biomarkers that could be used as an assessment of disease activity in order to provide more personal and strategic therapies. Dr. Jacobson’s study will use plasma samples to identify novel biomarkers for IBD using HPLC/Mass Spectroscopy that would predict disease stage and progression, in a minimally invasive way for patients.

9. Evaluation of the impact of chronic graft versus host disease and graft versus leukemia on the marrow microenvironment after hemopoietic stem cell transplant in pediatric ALL patients. Dr. Kirk Shultz – specimens granted. *17 mononuclear cells from stem cell transplant patients with ALL.*

Lay Summary: For patients with ALL, hematopoietic stem cell transplants (HSCT) serve as a potential therapy when conventional chemotherapy or CAR-T therapies fail. HSCT is however limited by chronic graft vs host disease (cGvHD) which puts patients at risk for disability and increased mortality. cGvHD is immune mediated but poorly understood, however, this team has previously identified unique populations of Treg, NKreg and transitional B-cells that correlate strongly with cGvHD. The goal of Dr. Shultz’s study is to better understand the immune environment of this disease in order to reduce the burden on transplant patients. Using mononuclear cells from ALL patients this study will correlate the post HSCT bone marrow micro-environment with the development of cGvHD and relapse.

Over the period of April 2021 and March 2022, the following three projects requested additional specimens for their studies which had previously been approved.

1. Personalize Molecular Characterization. BRAvE. Dr. Gregor Reid, Dr. Chris Maxwell, Dr. James Lim, Dr. Kirk Schultz and Dr. Philipp Lange - specimens granted. ***23 cerebrospinal fluid samples and 13 mononuclear cell samples from B-ALL patients.***

Lay summary: The aims for this study are to procure viable HR tumor tissues, B- and T- acute lymphoblastic leukemia (ALL) and acute myeloid leukemia (AML) bone marrow, and PDX samples available through BCCH BioBank. The requested samples will include those obtained at diagnosis and, if available in the BioBank, later points during therapy. This will enable assessment of the robustness of original targetable lesions and identification of new targets arising during treatment. The study team will extract DNA and RNA as per standard protocols and perform targeted sequencing for selected genomic alterations (e.g., single-nucleotide variant, INDELS, fusion mutations) and gene expression changes known to be associated with pediatric cancers.

2. Enhanced immune monitoring in pediatric kidney transplant recipients (EnMo I). Dr. Tom-Blydt-Hansen - specimens granted. ***32 plasma samples and 81 urine samples from solid organ transplant patients.***

Lay summary: Urinary biomarkers such as CXCL10 have been validated for their ability to predict acute organ rejection, but not tested yet for clinical utility. These markers must build upon the existing framework for clinical decision-making to be useful as clinical tools. For the diagnosis of rejection, they must be superior to existing surveillance at indicating a need for biopsy, such that they may reduce the requirement for biopsy surveillance. To address the efficacy of urinary biomarkers, an adapted clinical trial design is required. The interpretation of a biomarker level will be made in the context of existing clinical information. The biopsy result will be used to determine the accuracy with which rejection is predicted. Prior to conducting a clinical trial, preliminary data is needed to guide trial design. The study team proposes a pilot feasibility study to establish the groundwork for a definitive clinical trial in children with kidney transplantation to test the hypothesis that real-time, enhanced monitoring with urine biomarkers is superior to standard monitoring for identifying risk of rejection.

3. Childhood Leukemia: transcriptomics-based point of care rapid diagnosis. Dr. Cielle Wachnian – specimens granted. ***24 mononuclear cell samples from B-ALL patients.***

Lay summary: Leukemia genomics are used for diagnosis, and are required for risk stratification and may provide evidence to support targeted therapy that may improve survival. A fast, low-cost, and accurate point of care method of detecting RNA/DNA rearrangements would allow for risk stratification, and the potential of added targeted therapy in patients with high-risk disease in low-income countries. This project aims to create a low-cost, accurate, and efficient point of care test, using Nanopore sequencing, to diagnose and provide genomic information on acute leukemia. By extracting RNA from leukemia samples, this project will demonstrate that Nanopore sequencing can be used to recognize B-cell, T-cell, or myeloid leukemia, and will identify common driver genomic events.

11.0 PI Driven Studies

Closed Studies:

#	Study Name	PI	Services Provided	Sample Processing	Storage
1.	Adult SLED (study closed)	Dr. Jan Dutz	Receiving, labeling, recording, and processing the specimen Long-term storage	Serum Plasma Buffy Coat PBMC	- 80°C Liquid Nitrogen
2.	Epilepsy & Genomics (EpGen) (study closed)	Dr. Michelle Demos & Dr. Mary Connolly	Receiving, labeling, recording, and aliquoting the specimen Long-term storage	DNA Extraction	- 80°C
3.	SWAVE-U (study closed)	Dr. Jefferson Terry	Consenting patients and delivering the placenta to Anatomical Pathology	None	Store in the BioBank box in AP
4.	mTOR (study closed)	Dr. Rebecca Deyell	Receiving, labeling, recording, and processing the specimen	Protein Lysate (PBMC)	Temporary storage only (-80°C)
5.	UST1D (study closed)	Dr. Jan Dutz	Receiving, labeling, recording, and processing the specimens Long-term storage	Serum Plasma PBMC Whole blood	- 80°C Liquid Nitrogen
6.	Genome wide assessment of genetic alterations in pediatric acute leukemia (LBRWN) (study closed)	Dr. Lindsay Brown	Consenting and data collection	None	None
7.	TREASURE (study closed)	Dr. Suzanne Vercauteren	Consenting	None	None
8.	Vitamin B12 status in South-Asian and European pregnant women and their newborns (study closed)	Dr. Hilary Vallance	Labeling, recording, storage	None	- 80°C

9. A randomized controlled pilot study to examine the effects of goal-directed fluid therapy on post-operative outcomes in children undergoing scoliosis repair (study closed)	Dr. Zoe Brown	Labeling, recording, storage	None	- 80°C
10 Kingella Kingae (study closed)	Dr. Ghada Al-Rawahi	Identifying eligible patients, deliver kits, consent patients	None	None
11 Broady Lab (study closed)	Dr. Raewyn Broady	Labeling, recording, storage	None	Liquid Nitrogen
12 EoE (study closed)	Dr. Edmond Chan	Labeling, recording, storage	Freezing Tissue Whole Blood Plasma PAX gene	- 80°C
13 AKI (study closed)	Dr. Cherry Mammen	Processing, aliquoting, labeling, recording, storage	Urine (aliquoting)	- 80°C
14 POG cf DNA (study closed)	Dr. Ryan Morin	Processing	Plasma Buffy Coat	- 80°C
15 BC-SICR (study closed)	Dr. Srinivas Murthy	Labeling, recording, storage & processing	Whole blood aliquoting PBMC Plasma DNA	- 80°C Liquid Nitrogen
16 CAN-TBI (study closed)	Dr. William Panenka	Labeling, recording & processing Long-term storage	Plasma PBMC	- 80°C Liquid Nitrogen
17 CROPS (study closed)	Dr. Jan Dutz and Dr. Kevan Jacobson	Labeling, recording, storage & processing	Serum Plasma PAX gene PBMC	- 80°C Liquid Nitrogen
18 iPSC (study closed)	Dr. Francis Lynn	Labeling, recording, storage & processing	PBMC	Liquid Nitrogen
19 Rheumatology (study closed)	Dr. David Cabral and Dr. Kelly Brown	Labeling, recording, storage & processing	Whole blood aliquot Plasma PBMC	- 80°C Liquid Nitrogen
20 ABLE-Glyconet (study closed)	Dr. Kirk Schultz	Consenting and coordinating	None	None

21	SPACEY (study closed)	Dr. Sian Spacey	Labeling, recording, storage & processing	Whole Blood DNA extractions	- 80°C
22	PRISM (study closed)	Dr. Vilte Barakauskas	Storage, coordinating	None	- 80°C
23	P ² RISM (study closed)	Dr. Kate Chipperfield	Consenting, coordinating, labeling, recording & storage	Plasma	- 80°C
24	PRIMED (study closed)	Dr. Vikram Sabhaney	Labeling, recording, storage & processing	Tempus Plasma Serum Urine (supernatant)	- 80°C
25	OncNut (study closed)	Dr. Paul Rogers	Labeling, recording & storage	Whole Blood	- 80°C
26	CUDDLE (study closed)	Dr. Wee-Shian Chan	Consenting and Coordinating	None	None
27	AbCellera (pediatric) (study closed)	Dr. Dewi Schrader	Consenting, coordinating, labeling, recording, storage & processing	Serum Plasma PBMC	- 80°C Liquid nitrogen
28	DBS (study closed)	Dr. David Goldfarb	Labeling, recording, storage & processing	Serum Plasma Bloodspotting	- 80°C
29	SLED (recruitment paused)	Dr. Dina Panagiotopolous & Dr. Megan Levings	Receiving, labeling, recording, & processing the specimen Long-term storage	Serum Plasma Buffy Coat PBMC	- 80°C Liquid Nitrogen
30	CAUSES (study closed)	Dr. Jan Friedman	Receiving, labeling, recording, and aliquoting the specimen Long-term storage	Storage of whole Blood	- 80°C
31	Understanding the risk of sudden death in families: cascade screening in CPVT (CARDIO)	Dr. Shubhayan Sanatani	Coordinating the collection of patient blood samples to FTA blood spot cards Long-term storage	Blood spot card DNA extractions	Room Temp - 80°C

Ongoing Studies:

#	Study Name	PI	Services Provided	Sample Processing	Storage
1.	Overcoming the barriers to successful immune therapy for acute leukemia	Dr. Gregor Reid (Dr. Nina Rolf)	Consenting	None	None
2.	PedVas	Dr Kelly Brown	Aliquoting, labeling, recording, Long-term storage	None	- 80°C Liquid Nitrogen Room Temp.
3.	VIRTUUS	Dr. Tom Blydt-Hansen	Labeling, recording, storage & processing	Urine (supernatant, cell pellet)	- 80°C
4.	PROFYLE	Dr. Rebecca Deyell	Labeling, recording, storage & processing	Urine (supernatant, cell pellet) Tissue Plasma Buffy coat PBMC	- 80°C
5.	Biobank for Skin and Adipose Tissue	Dr. Sarah Hedtrich	Consenting and coordinating	None	4°C
6.	FASCD	Dr. Crystal Karakochuk	Labeling, recording, storage & processing	Whole Blood Plasma Seru, Buffy Coat	- 80°C
7.	UST1D Phase 2	Dr. Jan Dutz	Labeling, recording, storage & processing	Plasma PBMC Whole Blood Tempus Feces	- 80°C Liquid nitrogen
8.	CAR-CF	Dr. Mark Chilvers	Labeling, recording, storage & processing	Serum	- 80°C
9.	HiRO + ARVC-B	Dr. Shu Sanatani	Labeling, recording, storage & processing	Serum Whole Blood	- 80°C
10	CITF	Dr. Pascal Lav oie	Labeling, recording, storage & processing	Serum	- 80°C
11	Abcellera Adult	Dr. David Goldfarb	Labeling, recording, storage & processing	Serum Plasma PBMC	- 80°C Liquid nitrogen
12	PREVent	Dr. Megan Lev ings	Labeling, recording, storage & processing	Serum Plasma PBMC	- 80°C Liquid nitrogen
13	PREVent-Peds	Dr. Hana Mitchell	Labeling, recording, storage & processing	Serum Plasma PBMC	- 80°C Liquid nitrogen
14	UCAN CAN DU	Dr. Lori Tucker	Processing	Whole Blood	4°C

15	CKD/BCCBN	Dr. Daryl Knight	Labeling, recording & storage	Serum	- 80°C
16	Schizophrenia BI	Dr. Diane Fredrikson	Processing	Serum	
17	VitDalize	Dr. Sriniv as Murthy	Labeling, recording, storage & processing	Serum Urine	- 80°C
18	Kov altry	Dr. Mark Belletrutti	Labeling, recording, storage & processing	Plasma	- 80°C
19	Merck	Dr. Mark Chilv ers	Processing	Serum	- 80°C
20	Afil	Dr. Jefferson Terry	Labeling, recording, storage & processing	Plasma	- 80°C

12.0 Key Performance Indicators (KPI)

	Key Performance Indicators	April 1, 2018 – March 31, 2019	April 1, 2019 – March 31, 2020	April 1, 2020 – March 31, 2021	April 1, 2021 – March 31, 2022
1	# of participants recruited	334 per year 28 per month	240 per year 20 per month	163 per year 14 per month	172 per year 14 per month
2	# of requests for specimens from general biobank	14 per year 1.2 per month	14 per year 1.2 per month	14 per year 1.2 per month	13 per year 1.1 per month
3	# of PI driven research projects supported (cumulative, some studies continue to store samples despite being closed)	29	36	44	51
4	# of aliquots released from General BioBank (per year)	624	467	659	449
5	Sample QC (two methods) i) Mononuclear cells Recovery Viability ii) DNA A260/280 A280/230	59.3%* 73.4%*	N/A* N/A*	N/A* N/A*	73% 92%
6	# of successful grants for BCCHB specific projects (per year)	4	1	0	0
7	# of successful grants/awards that proposed using BCCHB (per year)	3	4	0	2
8	# of publications with BCCHB specimens/data (per year)	4	3	3	3
9	# of conference presentations/posters (per year)	3	4	1	2
<p>*Recovery and viability were self-reported by researchers on fewer released mononuclear cells than in previous years, and could not be accurately measured from a significantly smaller sample size. †Studies during this fiscal year did not require Nanodrop QC readings from DNA extractions.</p>					

13.0 BioBank Lifetime Utilization

Clinic	# of Participants Consented	Sample Type	Aliquots Accrued	Aliquots Available	Aliquots Released	% Utilization
Allergy*	6	Mononuclear Cells	2	2	0	
		Plasma	14	14	0	
		Whole Blood	12	12	0	
		Total Aliquots	28	28	0	0.00%
Post-COVID Recovery	40	Frozen Tissue Block	12	12	0	
		Mononuclear Cells	48	48	0	
		Plasma	131	131	0	
		Serum	88	84	4	
		Whole Blood	3	3	0	
		Total Aliquots	282	278	4	1.42%
ENTΔ	185	Buffy Coat	1	1	0	
		Cell Culture	13	11	2	
		DNA	115	0	0	
		Fluid from Swab	1	1	0	
		Frozen Tissue Block	786	690	96	
		Mononuclear Cells	2187	1649	538	
		Plasma	365	36	329	
		RNA	168	168	0	
		Serum	47	19	28	
		Whole Blood	32	16	16	
		Total Aliquots	3715	2591	1009	27.16%
GastroenterologyΔ	127	Buffy Coat	5	4	1	
		Fluid from Swab	45	43	2	
		Frozen Tissue Block	188	151	37	
		Mononuclear Cells	16	16	0	
		Plasma	179	144	35	
		Whole Blood	118	82	36	
		Total Aliquots	551	440	111	20.15%
HematologyΔ	140	Buffy Coat	23	23	0	
		Frozen Tissue Block	1	1	0	
		Mononuclear Cells	846	828	18	
		Plasma	246	213	33	
		Red Blood Cells	9	9	0	
		Serum	54	23	31	
		Stem Cells	41	34	7	
		Urine	3	3	0	
		Whole Blood	38	38	0	
		Total Aliquots	1261	1172	89	7.06%
		Fluid from Swab	358	234	124	

Mental Health (OCD)	111	Plasma	5	4	1	
		Saliva	50	6	44	
		Total Aliquots	413	244	169	40.92%
Multi-Organ Transplant	133	Buffy Coat	142	116	26	
		Frozen Cell Pellet	1	1	0	
		Frozen Tissue Block	12	10	2	
		Mononuclear Cells	457	449	8	
		Plasma	2299	2262	37	
		Serum	10	10	0	
		Urine	102	69	33	
		Urine, Supernatant	3596	2884	712	
		Whole Blood	3	3	0	
		Total Aliquots	6622	5804	818	12.35%
Neurology Δ	380	Buffy Coat	9	9	0	
		Cerebrospinal Fluid	466	466	0	
		Cerebrospinal Fluid, Supernatant	5	5	0	
		DNA	70	70	0	
		Frozen Cell Pellet	1	1	0	
		Frozen Tissue Block	21	21	0	
		Mononuclear Cells	82	60	22	
		Plasma	290	148	142	
		Serum	17	7	10	
		Urine, Supernatant	38	38	0	
		Whole Blood	411	400	11	
		Total Aliquots	1410	1225	185	13.12%
Oncology	557	Buffy Coat	181	178	3	
		Cerebrospinal Fluid	20	17	3	
		Cerebrospinal Fluid, Cells	15	14	1	
		Cerebrospinal Fluid, Supernatant	588	552	36	
		Mononuclear Cells	6823	6083	740	
		Fixed Tissue Block	14	14	0	
		Frozen Cell Pellet	41	38	3	
		Frozen Tissue Block	550	506	44	
		Plasma	4087	4366	261	
		Pleural Fluid	5	5	0	
		Pleural Fluid, Cells	4	4	0	
		Pleural Fluid, Supernatant	9	9	0	
		RNA	1	1	0	
		Serum	16	14	2	
		Stem Cells	496	453	43	
		Whole Blood	201	197	4	

		Total Aliquots	13051	12451	1140	8.73%
Orthopedic Δ	39	Frozen Tissue Block	4	0	4	
		Mononuclear Cells	3	3	0	
		Plasma	8	6	2	
		Urine, Supernatant	269	269	0	
		Total Aliquots	284	278	6	2.11%
Rheumatology Δ	34	Buffy Coat	10	10	0	
		Cerebrospinal Fluid	20	20	0	
		Cerebrospinal Fluid, Cells	4	4	0	
		Cerebrospinal Fluid, Supernatant	15	15	0	
		Frozen Tissue Block	2	2	0	
		Mononuclear Cells	43	43	0	
		Plasma	87	82	5	
		Whole Blood	14	14	0	
		Total Aliquots	195	190	5	2.56%
Other	64	Buffy Coat	5	5	0	
		DNA	3	3	0	
		Frozen Tissue Block	43	33	10	
		Mononuclear Cells	125	112	13	
		Plasma	122	119	3	
		Serum	5	5	0	
		Stem Cells	7	7	0	
		Whole Blood	49	1	48	
		Total Aliquots	359	285	74	20.61%
Women's Δ	388	Buffy Coat	5	5	0	
		Frozen Tissue Block	1265	1265	0	
		Mononuclear Cells	276	273	3	
		Plasma	497	487	10	
		Serum	155	136	19	
		Whole Blood	53	53	0	
		Total Aliquots	2251	2219	32	1.42%
NICU	51	Frozen Tissue Block	116	116	0	
		Mononuclear Cells	47	47	0	
		Plasma	221	221	0	
		Total Aliquots	384	384	0	0.00%

Δ Samples from these clinics were re-aliquoted in-house and returned to BCCHB inventory.

* A new referral department which we would not anticipate a high utilization rate at this time.

14.0 BCCHB Publications

Tarling TE, Goldenberg A, Ellis A, Chow V, Velenosi A, Vercauteren SM. [Ethical Challenges for Pediatric Biobanks](#), Biopreserv Biobank. 2021 Apr 12 ;19(2):101-105. doi: 10.1089/bio.2020.0116

Kong MC, Shih J, Tarling TE, Kong CC, van Tassel H, Dittrick M, Vercauteren SM. [BioBank Awareness Changes Opinions of Adolescents and Parents on Participation and Practices](#). Biopreserv Biobank. 2021 June 28. doi: 10.1089/bio.2020.0157 Online ahead of print. PMID: 34319789

Dr. Vercauteren is co-editor on a special pediatric edition of Biopreservation and Biobanking, which was published in the spring of 2021.

<https://www.liebertpub.com/doi/10.1089/bio.2021.29083.djc>

A paper about the patient survey at BCWH that gathered opinions about consenting, biobanking, and research is currently being written and expected to be completed by winter 2022.

A paper about the creation and implementation of the BCCHB e-consent platform is currently being written, and expected to be completed by winter 2022.

Publications Acknowledging the BCCHB

The following peer-reviewed publications have acknowledged the BCCHB for the utilization of general biobank specimens and clinical data in their research.

Rolf N, Liu LYT, Tsang A, Lange PF, Lim CJ, Maxwell CA, Vercauteren SM, Reid GSD. Cytometry Part A. June 2021. doi [httpsdoi.org/10.1002/cyto.a.2](https://doi.org/10.1002/cyto.a.2)

Majdoubi A, Michalski C, O'Connell SE, Dada S, Narpala S, Gelinis J, Mehta D, Cheung C, Winkler DF, Basappa M, Liu AC. A majority of uninfected adults show preexisting antibody reactivity against SARS-CoV-2. JCI insight. 2021 Apr 22;6(8).

Williams BA, Mayer C, McCartney H, Devlin AM, Lamers Y, Vercauteren SM, Wu JK, Karakochuk CD. Detectable Unmetabolized Folic Acid and Elevated Folate Concentrations in Folic Acid-Supplemented Canadian Children With Sickle Cell Disease. Frontiers in Nutrition. 2021 Apr 21;8:175.

The following posters and abstracts have acknowledged the BCCHB for the utilization of biobank services in their research:

Barakauskas VE, Sun K, Tran A, Ellis A, Dittrick M, Osioviich H, Vercauteren S, Adeli K, Chan WS, Jung B. (2021) Reference intervals for hs-cTnT, NT-proBNP and plasma lactate in Vancouver mothers

near the time of delivery. Poster presented at the Annual Meeting of the American and Canadian Societies for Clinical Chemistry, Atlanta GA and Virtually, September 2021.

Tran A, Barakauskas V, Jung B, Au N, Chipperfield K, Ellis A, Dittrick M, Vercauteren S, Osiovich H, Adeli K, Chan WS. (2021). Peripartum Reference Intervals for Coagulation Parameters Derived in a Healthy, Multicultural Cohort of Mothers as part of the Pregnancy Reference Intervals for Safe Medicine (PRISM) Study. Poster presented at the Annual Meeting of the American and Canadian Societies for Clinical Chemistry, Atlanta GA and Virtually, September 2021.

Kung S, Kinsella M, Chan WS, Chipperfield K, Barakauskas VE. Engaging mothers and newborn babies in laboratory reference interval studies.

Research Activities

The BCCHB is currently conducting a survey aiming to gather secondary school students' perceptions on current events and topics related to COVID-19. Data collection will continue until the end of the 2022 school year. Data analysis will happen over the summer.

15.0 Relationships and Networks

The BCCHB aims to be a collaborative resource both locally and abroad. Over the years, we have established professional relationships with various research groups. We look forward to continued partnerships.

- **BC COVID Biobank Network (BCCBN):** a province-wide network of partner biospecimen collection sites. Biospecimens with annotated data related to COVID-19 are formally coordinated together as one unified resource. (<https://crci.med.ubc.ca/bc-covid-19-biobank-network/>)
- **BCCHR Clinical Research Support Unit:** an institutional initiative that provides consultative and practical support for researchers conducting sponsor-initiated or investigator-initiated clinical trials (<https://www.bcchr.ca/about-us/how-we-support-research/clinical-research-support>)
- **Maternal Infant Child and Youth Research Network (MICYRN):** a federal not-for-profit, charitable organization founded in 2006 to build capacity for high-quality applied health research. It now links 21 maternal and child health research organizations based at academic health centres in Canada; is affiliated with more than 20 practice-based research networks; provides support to new and emerging teams; and has established strong national and international partnerships. (<https://www.micym.ca/>)
- **Pediatric Outcome Improvement through Coordination of Research Networks (POPCORN):** a large collaboration of pediatric researchers across Canada using serology testing combined with contemporaneous rates of transmission, hospitalization, vaccination and use of public health measures, to inform public health policy.
- **PRrecision Oncology For Young People (PROFYLE):** a pan-Canadian project that gives eligible patient access to tumour molecular profiling that improves and expands their treatment options and may change the outcome of their cancer. (<https://www.tfri.ca/profyle>)
- **UBC Women's Health Research Cluster:** an international network of multidisciplinary professionals that collectively strive to create a future where women can live equitably healthy lives from birth to old age. We promote, expand and catalyze women's health research because we believe it holds the key to better lives—not just for women, but for all people. (<https://womenshealthresearch.ubc.ca/>)

16.0 Grants (awarded in 2021/2022)

While there were no grants awarded specifically to the BCCHB, the BC Children's Hospital Research Institute contributed \$200,000 to support biobanking operations on campus.

Successful grants or awards that proposed using BCCHB

- Dr. Kelly Brown & Dr. Cherry Mammen, '*Evaluating the utility of adult-defined prognostic biomarkers: are they appropriate in childhood onset primary chronic vasculitis*'. Canadian Institutes of Health Research Project Fall 2021
- Dr. Karina Top, '*Optimizing COVID-19 immunization in patients with adverse events following immunization and patients with immunosuppression in the Special Immunization Clinic Network*'. COVID-19 Immunity Task Force Project Grant
- Dr. Jeff Terry '*Maternal Serum Biomarkers of Acute Chorioamnionitis (AFII Biomarkers)*.' BCCHR Healthy Starts Grant, January 2021 (previous fiscal year, was not documented on 2020-2021 Annual Report)

17.0 Presentations (2021/2022)

International Presentations:

- Aujla, Q. *Survey of Adolescents Regarding their Opinion of Research and Vaccination During the COVID-19 Pandemic* ISBER 2021 Virtual Symposium, Poster Presentation (October 4, 2021).
- Rutherford L, Bhat T, Chow V, Vercauteren S, Lim CJ, **Bush JW**. Comparing temperature-controlled and direct-to-freezer cryopreservation on cell viability and PDX engraftment in Wilms tumor. *Pediatric and Developmental Pathology*. 2021; 24(6): Abstract 14. Presented at the Fall 2021 Society for Pediatric Pathology Fall 2021 Meeting (Oct 7-9, 2021) Virtual.

Local Presentations:

- Chow, V. Lunch and Learn Q&A BC Children's Hospital Research Institute Resources. (September 29, 2021)
- Ellis, A. BC Children's Hospital Research Institute BCCHR Resources (October 21, 2021).
- Aujla, Q. *A survey of pregnant women and new moms regarding their opinion of research, biobanking, and the consent process*. Tri-Cluster Research Day at UBC for Women's Research, Poster Presentation (November 26, 2021).

18.0 Communication

Website: www.bcchbiobank.ca

You Tube

- BC Children's Hospital BioBank – Superhero Video
<https://www.youtube.com/channel/UCS1LxeGRjTRiejLRXw9heMw>
- Learn About the BC Children's Hospital BioBank
<https://www.youtube.com/watch?v=YaT-8dOshuQ>

Our BCCHB Superhero YouTube video about the BCCHB has been viewed 3239 times since it was published on December 4, 2015. Closed captioning in Simplified Chinese and Punjabi were added in March 2022, with plans to add Arabic captions in the next fiscal year.

The Learn About the BC Children's Hospital BioBank YouTube video has been viewed 330 times since it was published on December 11, 2020.

[Our newly added Placenta Processing and Storage video was published on May 18, 2021, intended for internal use and educational purposes only.](#)

BCCHB Newsletters: [Spring 2021](#), [Winter 2022](#)

External Newsletters:

- Maternal Infant Child and Youth Research Network (MICYRN) [Autumn 2021 Newsletter](#) (October 21, 2021)
- UBC Women's Health Research Cluster [November 2021 Newsletter](#) (November 10, 2021)

19.0 Financials

Full financial details for financial year ending March 2021:

	Q1	Q2	Q3	Q4	Grand total
	<i>Consolidated</i>	<i>Consolidated</i>	<i>Consolidated</i>	<i>Consolidated</i>	<i>Consolidated</i>
Opening Balance (\$)	\$107,249	\$50,379	\$33,537	\$44,376	\$107,249
Total Revenue (\$)	\$24,257	\$60,185	\$75,422	\$41,427	\$201,290
BCCHF grant (\$)	-	-	-	\$200,000	\$200,000
Total Salaries (\$)	\$71,584	\$70,952	\$56,821	\$96,030	\$295,386
Total Operating Expenses (\$)	\$9,543	\$6,075	\$7,762	\$16,423	\$39,803
Total Expenses (\$)	\$81,126	\$77,027	\$64,583	\$112,453	\$335,189
Unexpended Balance (\$)	50,379	33,537	44,376	173,351	173,351

Comment on Financial status:

All operating expenses and salaries are now paid for from the UBC income account.

A comparison of predicted and actual expenditure and income is shown below:

Expenditure

	<u>FY 2015/16</u>	<u>FY 2016/17</u>	<u>FY 2017/18</u>	<u>FY 2018/19</u>	<u>FY 2019/20</u>	<u>FY 2020/21</u>	<u>FY 2021/22</u>
Actual	474,664	680,428	291,442	365,338	315,328	232,205	335,189
Predicted	313,000	592,500	433,200	415,000	311,897	358,197	324,619

Income

	<u>FY 2015/16</u>	<u>FY 2016/17</u>	<u>FY 2017/18</u>	<u>FY 2018/19</u>	<u>FY 2019/20</u>	<u>FY 2020/21</u>	<u>FY 2021/22</u>
Actual	48,536	79,476	117,966	97,371	177,910	232,205	201,290
Predicted	35,000	70,000	100,000	140,000	135,000	130,00	141,103

21.0 Abbreviations

BCCHB – BC Children's Hospital BioBank

BCCH – BC Children's Hospital

BCWH – BC Women's Hospital

PHSA – Provincial Health Services Authority

UBC – University of British Columbia

WHRI – Women's Health Research Institute

REB – Research Ethics Board

CITF – COVID-19 Immunity Task Force

22.0 Sign Off

Report compiled for the BCCH BioBank by:

Veronica Chow, Vi Nguyen, Kendall Plant, Ashton Ellis



Report reviewed by:

Suzanne Vercauteren & Jon Bush, BCCH BioBank Co-Directors



Approved by:

BCCH BioBank Oversight Committee



Report signed off on behalf of the BCCH BioBank Oversight Committee by:

Suzanne Vercauteren & Jon Bush, BCCH BioBank Co-Directors



Suzanne Vercauteren

October 4 2022
Date



Jonathan Bush

Sept 27, 2022
Date