BC CHILDREN'S HOSPITAL BioBank

Annual Report

BC Children's Hospital BioBank

APRIL 1, 2023 – MARCH 31, 2024

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1.0 Overview

This is the eighth 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 2023 – March 2024.

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 – 14 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 15 – 18 describe the extensive list of PI driven studies that the BCCHB has been able to support over the years.

Dr. Vercauteren and Dr. Bush 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 2023 – March 2024.

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	246¨	2423¨	180 (5 NICU)	668 (67 NICU)	0	40	426	3131
Capacity to Consent	12	158	--		0	3	12	158
Declined	30*	114	19**	20	0	1	49	135
Withdrawn/Revoked	1	34	0	0	0	0	1	34
Consent rate	89.0%	94.0%	90.0%	97.0%	--		--	

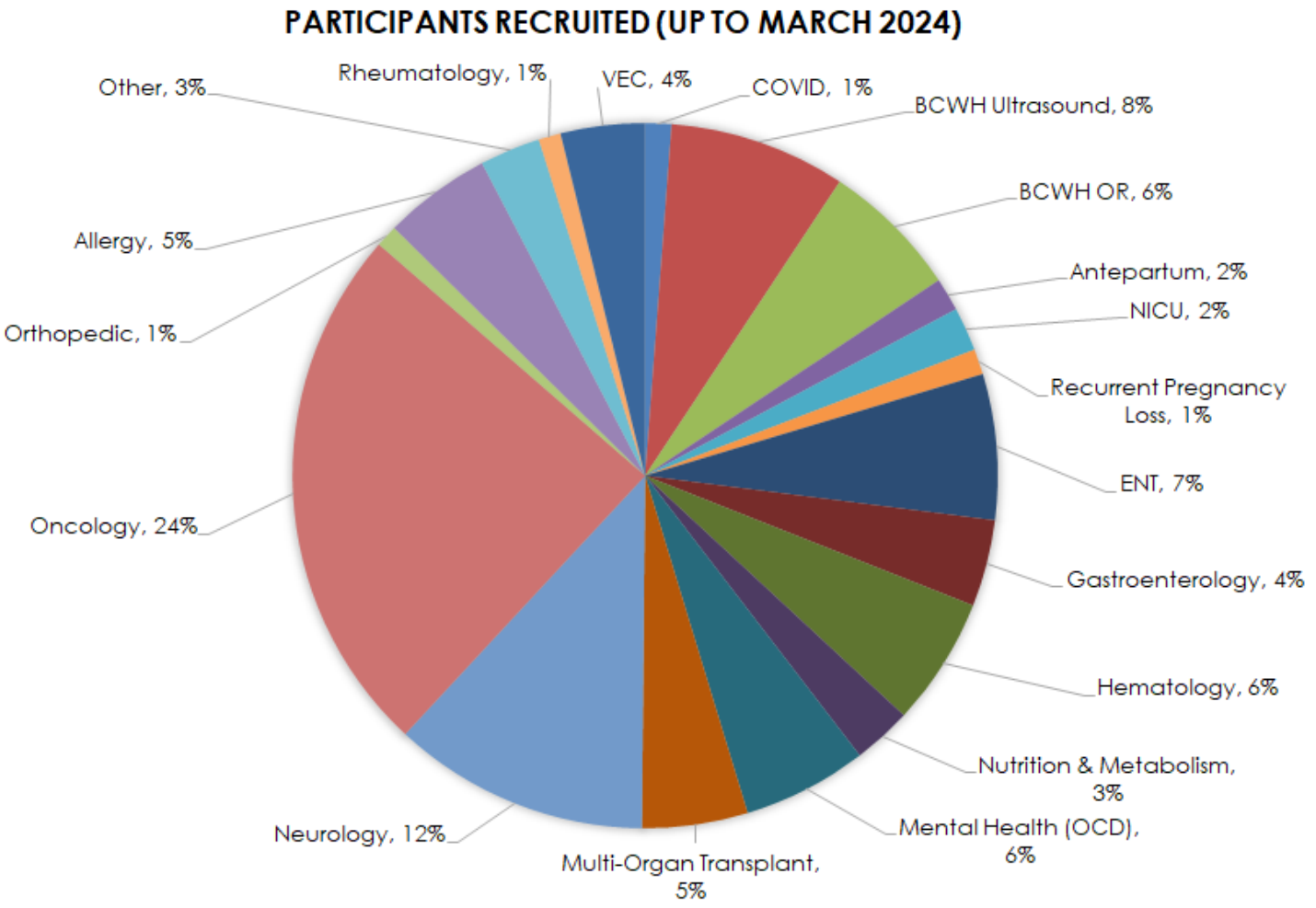
As per PHSA Privacy Guidelines, the BCCHB has moved to obtain full informed consent from all participants who are 14 and over as opposed to obtaining assent where applicable.

*The 2023-2024 decline counts from BCCH is largely contributed by patients who are approached by external departments with the option to donate biospecimens and clinical data to research. These patients are approached by trained staff outside of the BCCHB.

**The uptick of 2023-2024 decline counts from BCCHBW is largely contributed by a change in practice in tracking of patient declines.

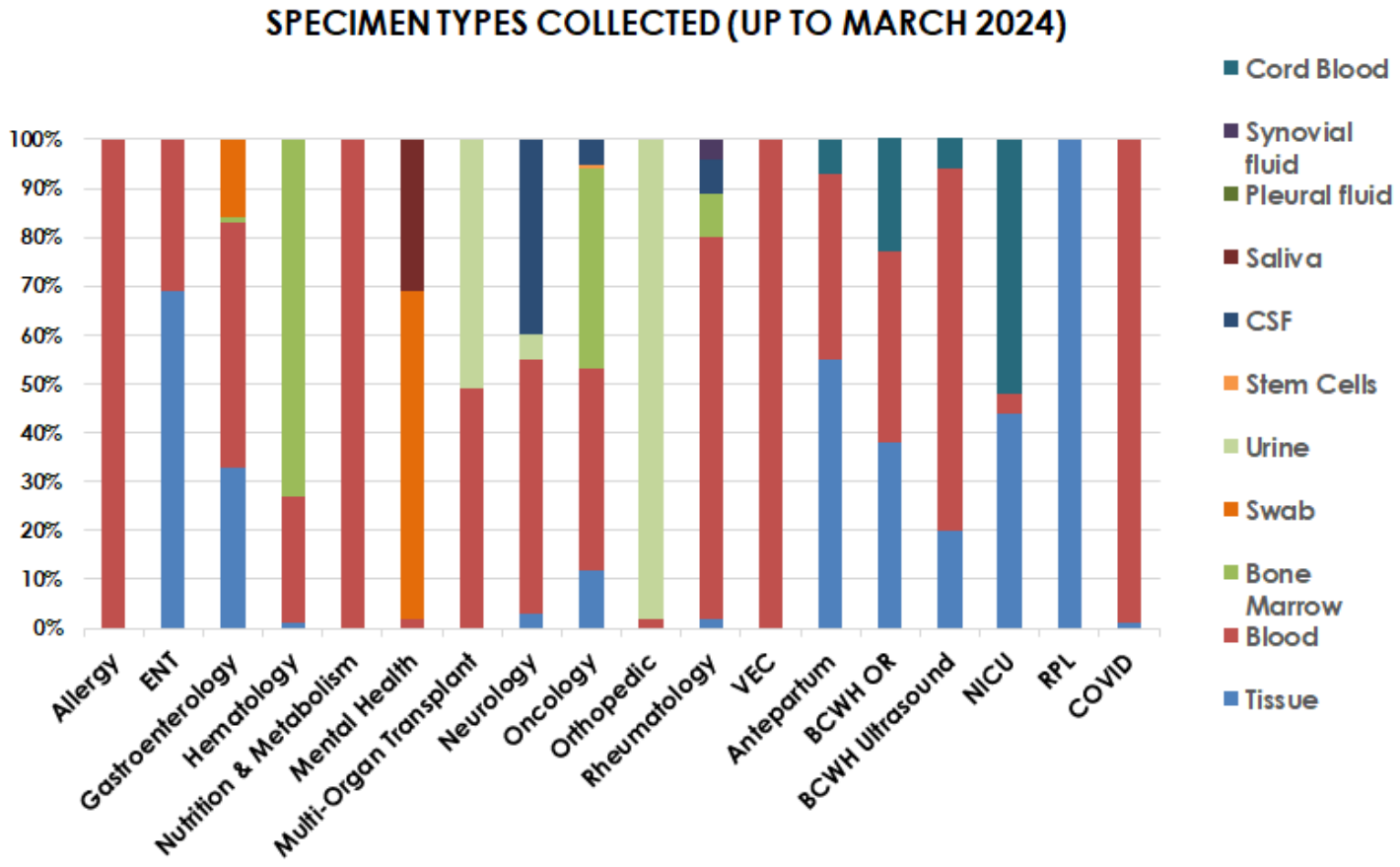
¨The 2023-2024 and total BCCH consents obtained additionally include (5) consents from the Immortalization of Cell Lines form

3.0 Clinic Representation – General BioBank

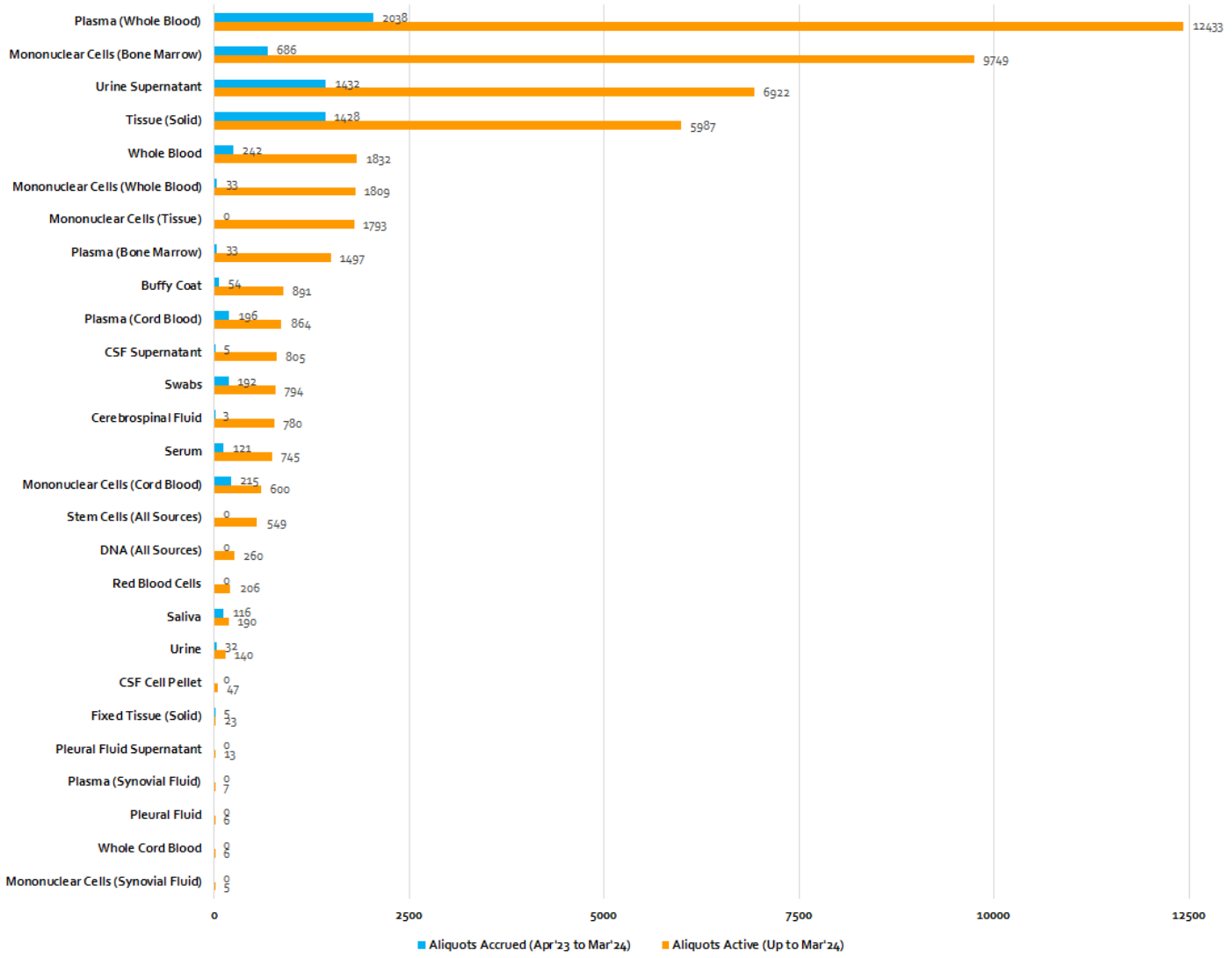


**Other clinics include BCCH ER, BCCH Clinic, Cardiology, Endocrinology, General Pediatrics, Medical Genetics, Internal Referral, External Referral, and Urgent Care Centre which have lower clinic representation compared to the above listed.

4.0 Specimen Collections – General BioBank



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
Kathryn Dewar	Senior Research Manager, WHRI
Janet Lyons	Senior Medical Director, Maternal Newborn Program, Department of Obstetrics and Gynecology , BCWH
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 – *retired June 2023*
David Goldfarb	Associate Head of Pathology and Laboratory Medicine at C&W (starting July 1, 2020)
Clare Beasley March 2023	
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
Qudrat Aujla	Research Assistant
Mackenzie Sturn	Research Assistant *September 2023;* Co-op Student
Jasleen Grewal	Summer Student *(May – August 2023)*
Seoyoung Chae	Co-op Student – *begin September 2023*
Sue Kang	Co-op Student – *begin September 2023*
Marissa Song	Research Assistant – *end August 2023*
Olivia Brigden	INSPIRE Student – *begin November 2023*

10.0 Applications & Biospecimen Release

Between April 2023 and March 2024, the BCCH BioBank received nine new applications for biospecimens. Applicants and their research project titles are displayed below.

1. Functional workup of a pediatric patient with a novel *ZBTB7B* variant. Dr. Stuart Turvey – specimens granted. ***13 control mononuclear cell samples.***

   Lay Summary: Primary immunodeficiency diseases (PIDs) are genetic disorders that harm the function and/or development of the immune system. Patients with PIDs are more susceptible to infections, inflammation, allergic disease, and malignancy. Dr. Turvey's study hypothesizes that a variant in the *ZBTB7B* gene may be related to the negative effects seen in patients with PIDs. The *ZBTB7B* gene encodes the protein ThPOK which helps in T cell development. This study will use mononuclear cell samples to test whether the *ZBTB7B* variant affects the development and function of T cells.

2. The Rare Disease Discovery Hub: A research investigation into understanding rare disease. Dr. Stuart Turvey – specimens granted. ***6 control mononuclear cell samples.***

   Lay Summary: Noonan's syndrome is associated with a PTPN11 gene mutation that results in the overactivation of the RAS/MAPK pathway. Treatments with trametinib have been known to reduce the harmful effects of the mutation, alleviating the symptoms of Noonan's syndrome. This study will use control mononuclear cell samples to analyze the efficacy of the trametinib treatment on Noonan's patients.

3. Mechanistic understanding of Fontan associated liver disease using single-cell multiomics. Children's Hospital of Philadelphia – specimens granted. ***1 control liver sample.***

   Lay Summary: Single ventricle congenital health disease (SVCHD) results in the heart having one functioning ventricle or pumping chamber. With surgery, newborns with SVCHD can survive to adulthood; however, they can often develop other complications such as Fontan associated liver disease (FALD). The factors that cause FALD are not clearly understood, therefore, this study seeks to use control liver samples to better understand the biological and molecular causes of this disease.

4. Evaluating the Utility of Adult-Defined Prognostic Biomarkers in Childhood Onset Primary Chronic Vasculitis. Dr. Kelly Brown – specimens granted. ***41 urine supernatant samples.***

   Lay Summary: In children, vasculitis, caused by the inflammation of blood vessels, can often result in kidney disease. In adult-onset vasculitis, specific biomarkers can be used to predict the risk of developing severe diseases, renal-involvements, and relapses. These biomarkers have also been used to guide treatments. Although biomarkers have been used in adult patients, it is unclear if these markers are useful in pediatric vasculitis. Using pediatric urine samples, this study will evaluate the usefulness of biomarkers in predicting severe renal disease.

5. Age-related differences in metabolome composition in a pediatric cohort. Dr. Tom Blydt-Hansen – specimens granted. ***44 control plasma samples.***

   Lay Summary: In recent studies by the Blydt-Hansen team, they discovered metabolites that varied by age in children with end-stage kidney failure. Dr. Blydt-Hansen's study hypothesizes that these metabolites in children change during development and puberty. This study aims to analyze the differences in the metabolome across different ages and stages of sexual maturation by studying the blood metabolome of healthy pediatric patients. In addition, the blood metabolome of children with kidney failure will be compared to the blood metabolome of healthy children, using control plasma samples.

6. Healthy Adult Control Samples for Immunological Assay Optimization. Dr. Manish Sadarangani – specimens granted. ***15 control mononuclear cell samples.***

   Lay Summary: Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection results in asymptomatic to severe coronavirus disease (COVID-19). Other than the spike protein targeted by SARS-CoV-2 vaccines, there are currently no other correlates of protection (CoP) against COVID-19. To study future protection against SARS-CoV-2, this study will analyze COVID-19 vaccine immune responses, using healthy pediatric samples as a control.

7. Generation of humanized SC mice. Dr. Marc Horwitz – specimens granted. ***5 blood bag samples.***

   Lay Summary: Epstein-Barr virus (EBV) infection is known to increase the risk of Multiple Sclerosis (MS). To assess EBV's role in MS development, this study developed a mouse model that imitates the human immune system. Using cells from donated blood bags, this study will analyze how the molecular and cellular changes associated with a EBV infection increases the susceptibility and progression of MS.

8. Human Innate Sensing Mechanisms of RNA formulations using human tonsil tissues as a model systems. Dr. Anna Blakney – specimens granted. ***1 frozen tonsil sample.***

   Lay Summary: Vaccines for COVID-19 are messenger ribonucleic acid (mRNA) vaccines. As RNA is unstable, these vaccines require vehicles for transport into cells. Current research suggests that these vehicles may cause an immune response, however, this mechanism is unclear. Using human tonsils as model systems, this study will analyze the immune mechanisms that recognize RNA vehicles in an effort to improve RNA vaccine delivery.

9. The genomics of aging in humans: Functional regulation of age-related genes. Dr. Mikael Mokkonen – specimens granted. ***10 whole blood samples.***

   Lay Summary: As the population continues to age, age-associated diseases are also expected to increase. Current research supports that there are genetic and environmental factors that determine age-associated disease susceptibility. For instance, specific genes have been linked to aging, and their expression can be studied by looking at DNA methylation. To study whether DNA methylation affects age-related gene expression, this study will compare methylation and gene expression status between individuals of different ages.

Over the period of April 2023 and March 2024, the following four projects requested additional specimens for their studies which had previously been approved.

1. Development of a human multi-cellular engineered living culture system. Amgen – specimens granted. ***41 fresh tonsil samples.***

   Lay Summary: Multi-cellular culture systems that represent human systems are important in antibody discovery and immunology research. In vitro, human tonsil tissue can form culture systems that model features of the human immune system, including immune cell maturation and antibody secretion. Amgen's study will use tonsil tissue samples to create and evaluate tonsil cell-based living culture systems for immunology research purposes.

2. Personalize Molecular Characterization. BRAvE. Dr. Gregor Reid, Dr. Chris Maxwell, Dr. James Lim, Dr. Kirk Schultz and Dr. Philipp Lange - specimens granted. ***14 cerebrospinal fluid samples and 1 mononuclear cell sample from B-ALL patients.***

   Lay summary: The aims for this study are to procure viable 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 diagnostic material and identification of new targets arising during treatment. The study team will extract DNA and RNA 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.

3. Enhanced immune monitoring in pediatric kidney transplant recipients (EnMo I). Dr. Tom-Blydt-Hansen - specimens granted. ***180 plasma 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. To address the efficacy of urinary biomarkers as an indicator of acute organ rejection, an adapted clinical trial design is required. 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.

4. Overcoming the barriers to successful immune therapy for acute leukemia. Gregor Reid – specimens granted. ***2 additional mononuclear cell samples.***

   Lay Summary: B cell precursor (BCP) acute lymphoblastic leukemia (ALL) is the most common childhood malignancy. Although cure rates have improved in recent decades, relapsed ALL is still one of the primary causes of death from childhood cancer. Based on recent findings, research suggests that targeting precursor leukemia cells, before they become cancerous, may decrease ALL risk and the incidence of relapse. Dr. Reid's goal is to study the mechanisms that control ALL progression and to use these findings for therapeutic benefit.

11.0 PI Driven Studies

Closed Studies:

#	Study Name	PI	Services Provided	Sample Processing	Storage
1.	CAN-TBI (recruitment closed)	Dr. William Panenka	Long-term storage	Plasma PBMC	- 80°C Liquid Nitrogen
2.	CROPS (recruitment closed)	Dr. Jan Dutz and Dr. Kevan Jacobson	Long-term storage	Serum Plasma PAX gene PBMC	- 80°C Liquid Nitrogen
3.	iPSC (recruitment closed)	Dr. Francis Lynn	Long-term storage	PBMC	Liquid Nitrogen
4.	P2RISM (recruitment closed)	Dr. Kate Chipperfield	Long-term storage	Plasma	- 80°C
5.	DBS (recruitment closed)	Dr. David Goldfarb	Long-term storage	Serum Plasma Blood spot cards	- 80°C
6.	PREVent (study closed)	Dr. Megan Levings	Labeling, recording, storage & processing	Serum Plasma PBMC	- 80°C Liquid nitrogen
7.	CAUSES (recruitment closed)	Dr. Jan Friedman	Long-term storage	Whole Blood DNA	- 80°C
8.	CPVT (recruitment closed)	Dr. Shubhayan Sanatani	Long-term storage	Blood spot card	Room Temp - 80°C
9.	Epilepsy & Genomics (EpGen) (recruitment closed)	Dr. Michelle Demos & Dr. Mary Connolly	Long-term storage	DNA Extraction	- 80°C
10	Schizophrenia BI (study closed)	Dr. Diane Fredrikson	Processing	Serum	Same-day Shipping
11	FASCD (study closed)	Dr. Crystal Karakochuk	Labeling, recording, storage & processing	Whole Blood Plasma Serum Buffy Coat	- 80°C
12	VitDalize (study closed)	Dr. Srinivas Murthy	Labeling, recording, storage & processing	Serum Urine	- 80°C

13	Kovaltry (study closed)	Dr. Mark Belletrutti	Labeling, recording, storage & processing	Plasma	- 80°C
14	VIRTUUS (study closed)	Dr. Tom Blydt-Hansen	Labeling, recording, storage & processing	Urine (supernatant, cell pellet)	- 80°C
15	Abcellera Adult (study closed)	Dr. David Goldfarb	Labeling, recording, storage & processing	Serum Plasma PBMC	- 80°C Liquid nitrogen
16	CITF (recruitment closed)	Dr. Brian Grunau Dr. Pascal Lavoie	Long-term storage	Serum	- 80°C
17	Merck (study closed)	Dr. Mark Chilvers	Processing	Serum	- 80°C
18	VMAP (study closed)	Dr. Edmond Chan	Processing	Plasma	- 80°C
19	CKD/BCCBN (recruitment closed)	Dr. Darryl Knight	Long-term storage	Serum	- 80°C
20	EPIK (study closed)	Dr. Mary Connolly	Processing	Serum, plasma	**-80C**

Ongoing Studies:

#	Study Name	PI	Services Provided	Sample Processing	Storage
1.	PedVas	Dr, Kelly Brown	Aliquoting, labeling, recording, Long-term storage	None	- 80°C Liquid Nitrogen Room Temp.
2.	BC-SICR	Dr. Srinivas Murthy	Labeling, recording, storage & processing	Whole blood aliquoting PBMC Plasma DNA	- 80°C Liquid Nitrogen
3.	SLED/CVD	Dr. Dina Panagiotopolous & Dr. Megan Levings	Processing & storage	Serum Plasma Buffy Coat PBMC	- 80°C Liquid Nitrogen
4.	PROFYLE	Dr. Rebecca Deyell	Labeling, recording, storage & processing	Urine Tissue Plasma	- 80°C

				Buffy coat PBMC	
5.	Biobank for Skin and Adipose Tissue	Dr. Sarah Hedtrich	Consenting and coordinating	None	4°C
6.	AFII	Dr. Jefferson Terry	Labeling, recording, storage & processing	Plasma	- 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	Impact-BREATH	Dr. Jonathan Rayment	Processing	Sputum	- 80°C
11	GECKO	Dr. Michael Kobor	Storage		- 80°C
12	SLC6A8	Dr. Sylvia Stockler	Storage	PBMCs	- 80°C
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	ACCENT	Dr. Tom Blydt-Hansen	Processing	Serum Urine	- 80°C
16	EPIC 3	Dr. Wendy Robinson	Consenting	None	**None**
17	DIVA	Dr. Connie Yang	Processing	Serum Whole blood	- 80°C
18	CAN-Impact	Dr. Jonathan Rayment	Processing	Serum, Plasma, Buffy Coat, PaxGene Stool	- 80°C
19	CPEX	Dr. Jonathan Rayment	Processing	Serum, Plasma, PaxGene	- 80°C
20	DINOSAUR	Dr. Ann-Marie Schoos & Dr. Edmond Chan	Labeling, recording, storage & processing	Swabs, saliva, hair, urine, plasma, serum, PBMCs, whole blood	- 80°C
21	FAO-T Cell	Dr. Bojana Rakic	Processing	Plasma PBMCs	- 80°C Liquid Nitrogen
22	T1DI	Dr. Megan Levings	Processing	Serum Plasma PBMCs	- 80°C
23	Fit4Kid	Dr. Tom Blydt-Hansen	Processing	Serum Plasma	- 80°C

24	LDN	Dr. Luis Nacul	Accessioning, labeling & storage	Serum	-80C
25	Epi-Sign	Dr. Caitlin Chang	DNA extractions	DNA	4C
26	OpSip	Dr. Michelle Butler, Dr. David Goldfarb	Storage	DNA	**-80C**
27	VITESSE	Dr. Edmond Chan	Processing	Serum, Plasma, Whole blood	-80C
28	STIMULUS	Dr. Robert Rohling	Accessioning	Placenta	4C
29	CXCL10	Dr. Tom Blydt-Hansen, Dr. Li Wang	Validation, processing	Urine	4C, -80C
30	PIGF	Dr. Jessica Liauw	Accessioning, labelling & storage	Serum	-80C
31	NEPHR	Dr. Cherry Mammen	Processing	Serum, PBMCs	-80C, Liquid Nitrogen

12.0 Key Performance Indicators (KPI)

	Key Performance Indicators	April 1, 2019 – March 31, 2020	April 1, 2020 – March 31, 2021	April 1, 2021 – March 31, 2022	April 1, 2022 – March 31, 2023	April 1, 2023 – March 31, 2024
1	# of participants recruited	240 per year 20 per month	163 per year 14 per month	172 per year 14 per month	233 per year 19 per month	426[Δ] per year 35 per month
2	# of requests for specimens from general biobank	14	14	13	15	13
3	# of PI driven research projects supported (cumulative, some studies continue to store samples despite being closed)	36	44	51	64	51
4	# of aliquots released from General BioBank (per year)	467	659	449	384	372
5	Sample QC (two methods) i) Mononuclear cells *Recovery* *Viability* ii) DNA *A260/280* *A280/230*	 N/A* N/A* 1.84 1.64	 N/A* N/A* N/A+ N/A+	 73% 92% N/A+ N/A+	 74% 90% N/A+ N/A+	 76% 80% N/A+ N/A+
6	# of successful grants for BCCHB specific projects (per year)	1	0	0	1	0
7	# of successful grants/awards that proposed using BCCHB (per year)	4	0	2	0	0
8	# of publications with BCCHB specimens/data (per year)	3	3	3	5	5
9	# of conference presentations/posters (per year)	4	1	2	2	2
	*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. [Δ] Includes participants recruited in both BCCH and BCWH					

13.0 BioBank Lifetime Utilization

Clinic	# of Participants Consented	Sample Type	Aliquots Accrued	Aliquots Available	Aliquots Released	% Utilization
AllergyΔ	165	Fluid from Swab	1	1	0	
		Frozen Tissue Block	4	4	0	
		Mononuclear Cells	67	48	19	
		Plasma	390	335	55	
		Serum	33	33	0	
		Whole Blood	313	313	0	
		Total Aliquots	**808**	**734**	**74**	**9.16%**
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	223	Buffy Coat	1	1	0	
		Cell Culture	13	11	2	
		DNA	115	0	0	
		Fluid from Swab	1	1	0	
		Frozen Tissue Block	817	681	136	
		Mononuclear Cells	2178	1519	659	
		Plasma	373	37	336	
		RNA	167	167	0	
		Serum	98	69	29	
		Whole Blood	31	11	20	
		Total Aliquots	**3794**	**2497**	**1182**	**31.15%**
GastroenterologyΔ	133	Buffy Coat	5	4	1	
		Fluid from Swab	46	44	2	
		Frozen Tissue Block	201	161	40	
		Mononuclear Cells	35	33	2	
		Plasma	201	148	53	
		RNA	1	1	0	
		Whole Blood	134	97	37	
		Total Aliquots	**623**	**488**	**135**	**21.67%**
		Buffy Coat	22	22	0	
		Frozen Tissue Block	4	2	2	

HematologyΔ	197	Mononuclear Cells	1009	987	22	
		Plasma	285	251	34	
		Red Blood Cells	9	9	0	
		Serum	54	23	31	
		Stem Cells	29	20	9	
		Urine	3	3	0	
		Whole Blood	40	40	0	
		Total Aliquots	**1455**	**1357**	**98**	**6.74%**
Mental Health (OCD)	191	Buffy Coat	5	5	0	
		Fluid from Swab	593	469	124	
		Plasma	18	17	1	
		Saliva	140	96	44	
		Whole Blood	25	25	0	
		Total Aliquots	**781**	**612**	**169**	**21.64%**
Multi-Organ Transplant	162	Buffy Coat	165	139	26	
		Frozen Cell Pellet	1	1	0	
		Frozen Tissue Block	12	10	2	
		Mononuclear Cells	500	484	16	
		Plasma	3574	3190	384	
		Serum	62	62	0	
		Urine	138	105	33	
		Urine, Supernatant	5757	4956	799	
		Whole Blood	4	4	0	
		Total Aliquots	**10213**	**8951**	**1260**	**12.34%**
NeurologyΔ	393	Buffy Coat	9	9	0	
		Cerebrospinal Fluid	504	496	8	
		Cerebrospinal Fluid, Supernatant	5	5	0	
		DNA	70	70	0	
		Frozen Cell Pellet	1	1	0	
		Frozen Tissue Block	57	56	1	
		Mononuclear Cells	85	43	42	
		Plasma	353	167	186	
		Serum	18	8	10	
		Urine, Supernatant	54	54	0	
		Whole Blood	439	428	11	
		Total Aliquots	**1595**	**1337**	**258**	**16.18%**
		Buffy Coat	186	181	5	
		Cerebrospinal Fluid	24	19	5	
		Cerebrospinal Fluid, Cells	15	14	1	
		Cerebrospinal Fluid, Supernatant	592	546	46	

OncologyΔ	818	Expanded Cells	257	180	77	
		Mononuclear Cells	7708	7024	684	
		Fixed Tissue Block	6	6	0	
		Fixed Tissue Slide	12	12	0	
		Frozen Cell Pellet	41	38	3	
		Frozen Tissue Block	1049	981	68	
		Organoid	8	8	0	
		Plasma	4685	4413	272	
		Pleural Fluid	5	5	0	
		Pleural Fluid, Cells	4	4	0	
		Pleural Fluid, Supernatant	9	9	0	
		Red Blood Cells	1	1	0	
		RNA	1	1	0	
		Serum	16	14	2	
		Stem Cells	496	448	48	
		Urine, Supernatant	27	27	0	
		Whole Blood	202	199	3	
		Total Aliquots	**15344**	**14130**	**1214**	**7.91%**
OrthopedicΔ	34	Frozen Tissue Block	4	0	4	
		Mononuclear Cells	2	2	0	
		Plasma	8	6	2	
		Whole Bone Marrow	1	1	0	
		Urine, Supernatant	253	253	0	
		Total Aliquots	**268**	**262**	**6**	**2.24%**
RheumatologyΔ	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	88	82	6	
		Whole Blood	14	14	0	
		Total Aliquots	**196**	**190**	**6**	**3.06%**
VEC	129	Serum	134	134	0	
		Total Aliquots	**134**	**134**	**0**	**0.00%**
Other	93	Buffy Coat	4	4	0	
		DNA	3	3	0	
		Frozen Tissue Block	120	110	10	
		Mononuclear Cells	186	161	25	
		Plasma	150	146	4	
		Serum	18	18	0	

		Stem Cells	7	5	2	
		Whole Blood	52	48	4	
		Total Aliquots	**540**	**495**	**45**	**8.33%**
Antepartum	51	Cord Blood	5	5	0	
		Frozen Tissue Block	65	65	0	
		Mononuclear Cells	8	8	0	
		Plasma	61	61	0	
		Total Aliquots	**139**	**139**	**0**	**0.00%**
BCWH ORΔ	212	Buffy Coat	1	1	0	
		Frozen Tissue Block	1892	1842	50	
		Mononuclear Cells	313	312	1	
		Plasma	574	444	130	
		Whole Blood	47	42	5	
		Total Aliquots	**2827**	**2641**	**186**	**6.58%**
BCWH UltrasoundΔ	271	Buffy Coat	5	5	0	
		Frozen Tissue Block	552	552	0	
		Mononuclear Cells	133	123	10	
		Plasma	249	241	8	
		Serum	146	127	19	
		Whole Blood	6	6	0	
		Total Aliquots	**1091**	**1054**	**37**	**3.39%**
NICUΔ	67	Frozen Tissue Block	245	245	0	
		Mononuclear Cells	71	71	0	
		Plasma	291	273	18	
		Total Aliquots	**607**	**589**	**18**	**2.97%**
Nutrition & Metabolism	90	Buffy Coat (Pediatric)	38	38	0	
		Buffy Coat (Maternal)	40	40	0	
		Plasma (Pediatric)	150	150	0	
		Plasma (Maternal)	135	135	0	
		Red Blood Cells (Pediatric)	41	41	0	
		Red Blood Cells (Maternal)	76	76	0	
		Total Aliquots	**480**	**480**	**0**	**0.00%**
RPL□	39	Frozen Tissue Block	15	15	0	
		Total Aliquots	**15**	**15**	**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

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 soon.

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

A paper about British Columbia high school students' opinions about research, biobanking, and COVID-19 is in the early stages of being written.

Publications Acknowledging the BCCHB

The following peer-reviewed publications have acknowledged the BCCHB for services, the utilization of general biobank specimens, and/or clinical data in their research:

The following peer-reviewed publications have acknowledged the BCCHB for the utilization of our services:

Banoei MM, Lee CH, Hutchison J, Panenka W, Wellington C, Wishart DS, Winston BW. Using metabolomics to predict severe traumatic brain injury outcome (GOSE) at 3 and 12 months. Critical Care. 2023 Jul 22;27(1):295.

Bowers SM, Ng B, Abdossamadi S, Kariminia A, Cabral DA, Cuvelier GD, Schultz KR, Brown KL. Elevated ADA2 Enzyme Activity at the Onset of Chronic Graft-versus-Host Disease in Children. Transplantation and Cellular Therapy. 2023 May 1;29(5):303-e1.

Khan A, Inkster AM, Peñaherrera MS, King S, Kildea S, Oberlander TF, Olson DM, Vaillancourt C, Brain U, Beraldo EO, Beristain AG. The application of epiphenotyping approaches to DNA methylation array studies of the human placenta. Epigenetics & Chromatin. 2023 Oct 4;16(1):37.

Longjohn MN, Hudson JA, Peña-Castillo L, Cormier RP, Hannay B, Chacko S, Lewis SM, Moorehead PC, Christian SL. Extracellular vesicle small RNA cargo discriminates non-cancer donors from pediatric Bcell acute lymphoblastic leukemia patients. Frontiers in Oncology. 2023 Nov 13;13:1272883.

Lorentzian AC, Rever J, Ergin EK, Guo M, Akella NM, Rolf N, James Lim C, Reid GS, Maxwell CA, Lange PF. Targetable lesions and proteomes predict therapy sensitivity through disease evolution in pediatric acute lymphoblastic leukemia. Nature Communications. 2023 Nov 21;14(1):7161.

Prusinkiewicz MA, Sediqi S, Li YJ, Goldfarb DM, Asamoah-Boaheng M, Wall N, Lavoie PM, Grunau B. Effect of vaccine dosing intervals on Omicron surrogate neutralization after three doses of BNT162b2. Heliyon. 2023 Jun 1;9(6).

Sharlandjieva V, Beristain AG, Terry J. Assessment of the human placental microbiome in early pregnancy. Frontiers in Medicine. 2023 Jan 19;10:1096262.

Watts AW, Mâsse LC, Goldfarb DM, Irvine MA, Hutchison SM, Muttucomaroe L, Poon B, Barakauskas VE, O'Reilly C, Bosman E, Reicherz F. SARS-CoV-2 cross-sectional seroprevalence study among public school staff in Metro Vancouver after the first Omicron wave in British Columbia, Canada. BMJ open. 2023 Jun 1;13(6):e071228.

Yap J, Kayda I, Asamoah-Boaheng M, Haig S, Kirkham T, Cheskes S, Demers P, Goldfarb D, Grunau BE. The relationship between the number of COVID-19 vaccines and infection with Omicron ACE2 inhibition at 18-months post initial vaccination in an adult cohort of Canadian paramedics. Access Microbiology. 2023 Nov 1;5(11):000725-v3.

The following peer-reviewed publications have utilized the BCCHB for our services:

Asamoah-Boaheng M, Grunau B, Karim ME, Kirkham TL, Demers PA, MacDonald C, Goldfarb DM. The Association of Post-COVID-19–Related Symptoms and Preceding Severe Acute Respiratory Syndrome Coronavirus 2 Infection Among Fully Vaccinated Paramedics in Canada. The Journal of Infectious Diseases. 2024 Apr 15;229(4):1019-25.

Asamoah-Boaheng M, Grunau B, Haig S, Karim ME, Kirkham T, Lavoie PM, Sediqi S, Drews SJ, O'Brien SF, Barakauskas V, Marquez AC. Eleven-month SARS-CoV-2 binding antibody decay, and associated factors, among mRNA vaccinees: implications for booster vaccination. Access Microbiology. 2023 Nov 1;5(11):000678-v3.

Asamoah-Boaheng M, Grunau B, Karim ME, Kayda I, Yap J, Bessai K, Goldfarb DM. Investigating the Antibody Imprinting Hypothesis among Canadian Paramedics after SARS-CoV-2 Omicron Variant Circulation. ImmunoHorizons. 2024 Feb 1;8(2):193-7.

Asamoah-Boaheng M, Grunau B, Karim ME, Kayda I, Yap J, Bessai K, Goldfarb DM. Investigating the Antibody Imprinting Hypothesis among Canadian Paramedics after SARS-CoV-2 Omicron Variant Circulation. ImmunoHorizons. 2024 Feb 1;8(2):193-7.

Barnabas GD, Goebeler V, Tsui J, Bush JW, Lange PF. ASAP— Automated Sonication-Free Acid-Assisted Proteomes— from Cells and FFPE Tissues. Analytical Chemistry. 2023 Feb 1;95(6):3291-9.

Barrett‐Chan E, Wang L, Bone J, Thachil A, Vytlingam K, Blydt‐Hansen T. Optimizing the approach to monitoring allograft inflammation using serial urinary CXCL10/creatinine testing in pediatric kidney transplant recipients. Pediatric Transplantation. 2024 May;28(3):e14718.

Golding L, Watts A, Shew J, Paramo, MV, Masse LC, Goldfarb DM, Abu-Raya B, Lavoie PM. A Novel Anti-nucleocapsid Antibody Avidity Method for Identifying SARS-CoV-2 Reinfections. Journal of Infectious Diseases. 2024. doi: 10.1093/infdis/jiae072

Hutchison AM, De-Jongh Gonzalez O, Watts AW, Oberle E, Gadermann A, Goldfarb DM, Oberlander TF, Lavoie PM, Masse LC. Anxiety symptoms, psychological distress, and optimism in school staff: Testing associations with stressors and coping during the second year of the COVID-19 pandemic. Journal of Affective Disorders Reports. 2023; 14.

Presentations Acknowledging the BCCHB

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

1. IOCDF Research Symposium 2023 - San Francisco CA. July 2023. "Nature vs Nurture in Childhood-Onset OCD: An Outdated Dichotomy in 2023?" Stewart SE. Oral presentation.

2. SIOP, Ottawa. 2023. Nanapore BioBank Results. Cielle Stapleton, Patrice Edyoux, Caron Strahlendorf.

3. Canadian Public Health Association Virtual Conference. June 21, 2023. SARS-CoV-2 transmission in childcare and K-12 settings in the Vancouver Coastal Health Region: lessons from the COVID-19 pandemic.

4. BC Children's Hospital Research Institute Student Poster Day. June 27, 2023. Post-Covid outcomes among education workers. Poster.

5. Haematology Research Day, Division of Haematology/Oncology, Department of Paediatrics, University of Toronto, November 15, 2023. Single cell profiling of hematopoietic stem and progenitor cells in pediatric acquired aplastic anemia. Chan D, Momur M, Lin D, Wasserman W, Karsan A, Vercauteren S. Oral presentation.

Research Activities

The BCCHB is planning to conduct a survey aiming to gather patient opinions on the consent experience and compare the paper vs. electronic consent methods for in-person recruitment. Data collection will begin summer 2023 and continue until sufficient data has been collected.

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.

- **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.micyrn.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.

- **PRecision 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/)

- **Neuromuscular Disease Network for Canada (NMD4C):** the pan-Canadian network that brings together the country's leading clinical, scientific, technical, and patient expertise to improve care, research, and collaboration in neuromuscular disease. (https://neuromuscularnetwork.ca/)

16.0 Grants (awarded in 2023/2024)

BCCHR Summer Studentship Award – Jasleen Grewal, awarded: $ 3,937.

BioTalent Student Work Placement Program – co-op funding: $ 18,961.

BC Children's Hospital Research Institute contribution to support biobanking operations on campus, $210,000.

17.0 Presentations (2023/2024)

International Presentations:

- Aujla, Q. International Society for Biological and Environmental Repositories 2024 Annual General Meeting, The Westin Seattle, Seattle, WA. *A survey of adolescents regarding their opinion of research and vaccination during the COVID-19 Pandemic* (May 4, 2023). Platform Presentation.
- Ellis, A. North America Placenta Lab Meeting: *How the BCCHB can support your placental & perinatal research!* (January 23, 2024)

Local Presentations:

- Vercauteren, S., Ellis, A., Aujla, Q. C&W Department of Pathology Rounds: *Patient Engagement in the BCCH BioBank and BCCH Pathology and Lab Medicine* (November 7, 2023)
- Aujla, Q. PITCH: *BCCHB Fueling Future Research* (March 13, 2024)
- Ellis, A. Connecting BC BioBankers: *BCCHB Recruitment Strategies* (March 26, 2024)

Local Information Sessions:

- Ellis, A. WHRI Monthly Staff Meeting: *Biobanking at BCWH & BCCH and how we can support your research* (June 28, 2023)
- Aujla, Q., Chow, V., Nguyen, V. Discovery Day booth for high school students (November 1, 2023)
- Aujla, Q., Chow, V. HemPath Fellows Presentation (November 15, 2023)

18.0 Communication

Website: www.bcchbiobank.ca

YouTube

- 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-8dQshuQ

Our BCCHB Superhero YouTube video about the BCCHB has been viewed 3513 times since it was published on December 4, 2015. Closed captioning in Simplified Chinese and Punjabi were added in March 2022, and Arabic captions were added in September 2022.

The Learn About the BC Children's Hospital BioBank YouTube video has been viewed 392 times since it was published on December 11, 2020.

Our Placenta Processing and Storage video was published on May 18, 2021, intended for internal use and educational purposes only. We continue to refer back to this video when onboarding and training new staff. A new video that aligns with our updated SOP is in progress.

BCCHB Newsletters: Spring 2023, December 2023

External Newsletters:

- Women's Health Research Institute Events + Opportunities Newsletter (November 24, 2023)

19.0 Financials

Full financial details for financial year ending March 2023:

	Q1	Q2	Q3	Q4	Grand total
	Consolidated	*Consolidated*	*Consolidated*	*Consolidated*	*Consolidated*
Opening Balance ($)	**222,814**	**236,489**	**158,304**	**78,684**	**222,814**
Total Revenue ($)	**116,130**	**39,375**	**51,427**	**96,072**	**303,003**
BCCHR grant ($)	**-**	**-**	**-**	**210,000**	**210,000**
Total Salaries ($)	**96,498**	**104,271**	**112,963**	**102,070**	**415,802**
Total Operating Expenses ($)	**5,957**	**13,289**	**18,084**	**32,151**	**69,480**
Total Expenses ($)	**102,454**	**117,560**	**131,047**	**134,221**	**485,282**
Unexpended Balance ($)	**236,489**	**158,304**	**78,684**	**250,534**	**250,534**

*Increased operating expense in this quarter due to payment for licensing for OpenSpecimen database for years 2021 and 2022, paid for in this fiscal year

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

	FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	FY 2020/21	FY 2021/22
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

	FY 2022/23	FY 2023/24
Actual	385,264	487,060
Predicted	377,535	418,477

Income

	FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	FY 2020/21	FY 2021/22
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

	FY 2022/23	FY 2023/24
Actual	229,627	303,002
Predicted	200,000	180,000

20.0 Quality Management Activities

BCCHB conducts a series of audits throughout the year to ensure quality and accurate biobanking practices.

1. **Pending Formal Consent:** Query for consents with Formal Consent Status 'Pending'
2. **Empty Formal Consent Fields (BCCH):** Query for BCCH consents where Formal Consent Status is 'Obtained' OR 'Interrupted' OR 'Denied' OR 'Withdrawn' OR 'Not Obtained' and export as CSV file. Filter for only blank Person Consenting OR Date of Formal Consent.
3. **Empty Formal Consent Fields (BCWH):** Query for BCWH consents where Formal Consent Status is 'Obtained' OR 'Interrupted' OR 'Denied' OR 'Withdrawn' OR 'Not Obtained' and export as CSV file. Filter for only blank Person Consenting OR Date of Formal Consent.
4. **Denied Consent with Samples:** Perform checks on specific cases that should not occur**.** Query for all aliquots then browse consents with filter of Formal Consent Status 'Denied'
5. **Aliquot Storage Location:** Query for aliquots with In Stock as 'Yes & Available' OR 'Yes & Not Available' AND created in previous year. Export as CSV file and filter for only aliquots without storage location.
6. **Review Affected Existing Records by ATiM Updates:** With the creation of new fields or new mandatory fields, a good practice is to go back and update existing records to keep the data clean and organized.

   **Note: This process is not required monthly. Perform this audit with every ATiM update.*

		January	February	March	April	May	June	July	August	September	October	November	December
1	**Pending Formal Consent**												
2	**Empty Formal Consent Fields (BCCH)**												
3	**Empty Formal Consent Fields (BCWH)**												
4	**Denied Consent with Samples**												
5	**Aliquot Storage Location**												
6	**Review Existing Records Affected by Open Specimen Updates***												

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, Mackenzie Sturn, 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

_____ June 20, 2024 _____

Suzanne Vercauteren Date

_____ June 20, 2024 _____

Jonathan Bush Date