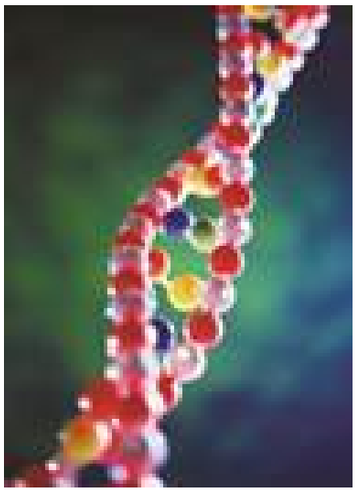

Commonwealth Health Research Board (CHRB)

2017/2018 Annual Report

Commonwealth Health Research CHRB [CHRB]
FY 2017/2018 Annual Report

Goals, Purposes and Accomplishments of the Commonwealth Health Research Board [CHRB]

The Commonwealth Health Research Board [CHRB or Board] was created by Virginia Code §32.1-162.23 to provide financial support—in the form of grants, donations, or other assistance— for research efforts having the potential of maximizing human health benefits for the citizens of the Commonwealth. Research efforts eligible for support by the Board may include traditional medical and biomedical research relating to the causes and cures of diseases, as well as research related to health services and the delivery of health care.

In accordance with Virginia Code §32.1-162.24, the Board encourages collaborative research efforts among two or more institutions or organizations, gives priority to those research efforts where Board support can be leveraged to foster contributions from federal agencies or other entities, and supports both new research efforts and the expansion or continuation of existing research efforts. CHRB grant recipients — for grant awards life-to-date — have leveraged over $32 million in additional private and federal grant funds to further their research studies. Additionally, numerous publications in peer-reviewed scientific journals and periodicals as well as presentations of the data at regional and national scientific meetings have resulted from CHRB grant funded research projects.

Commonwealth Health Research Fund [CHRF]

Pursuant to Virginia Code §32.1-162.28(E), Grant funding is calculated by an amount not to exceed six percent of the moving average of the market value of the CHRF calculated over the previous five years on a one-year delayed basis, net of any administrative fee assessed pursuant to subsection E of § 51.1-124.36. The amount may be expended in a calendar year for any purpose permitted by the CHRB/CHRF's governing statutes.

Assets of the Commonwealth Health Research Fund (CHRF) are pooled with the $74.4 billion Virginia Retirement System (VRS) investment fund (as of June 30, 2017). The estimated value of the CHRF as of June 30, 2017 was approximately $37.9 million. The current asset allocation for the VRS investment fund reflects: 41.3% public equity, 16.7% fixed income, 17.7% credit strategies, 12.6% real assets, 8.7% private equity, 2.5% strategic opportunities, and 0.5% cash.

The Department of Accounts serves as the fiscal agent for the Commonwealth Health Research Board through a Memorandum of Understanding. Audits are conducted every two years by the Auditor of Public Accounts.

Commonwealth Health Research CHRB [CHRB]
FY 2017/2018 Annual Report

Executive Summary of FY 2017/2018 Grant Process:

Institution/ Organization Identification #	Institution/Organization	Concept Papers Received	Full Proposals Requested	Presentations to the Board	Grant Awards
207	University of Virginia	15	6	4	1
208	Virginia Polytechnic Institute and State University	15	4	4	2
211	Virginia Military Institute	1	0	0	0
215	University of Mary Washington	1	0	0	0
216	James Madison University	5	0	0	0
221	Old Dominion University	4	0	0	0
236	Virginia Commonwealth University	15	3	1	1
242	Christopher Newport University	1	0	0	0
247	George Mason University	3	1	0	0
274	Eastern Virginia Medical School	15	7	3	1
319	Ferrum College	1	0	0	0
335	Hampton University	2	1	1	0
375	Hampden-Sydney College	1	1	1	1
804	Carilion Medical Center	1	1	1	0
811	McGuire Research Institute	1	0	0	0
860	Sentara Heart Hospital	1	0	0	0
	Total	82	24	15	6

CHRB Current and Historical Funding

Since its inception, the CHRB has made 202 grant awards totaling approximately $16.5 million in grant funding to institutions of higher education and other not-for-profit or nonprofit organizations that conduct health, or health-related research in Virginia. When the required 33% matching funds are added to the CHRB funded amount, the cumulative funding totals almost $24 million for health research in Virginia. More detailed information is provided by year in the chart below. For a description of past CHRB grant awards and abstracts, visit CHRB's website at www.chrb.org.

Grant Year	Total Grant Awards	Number of New Grant Awards	Number of Ongoing Grant Awards [Year 2]	CHRB Grant Awards	Grantee Matching Funds	Total Project Funds
1999	9	9	0	$597,377	$272,041	$869,418
2000	11	11	0	$717,442	$305,309	$1,022,751
2001	13	13	0	$825,590	$344,954	$1,170,544
2002	12	12	0	$718,382	$344,603	$1,062,985
2003	8	8	0	$509,806	$199,999	$709,805
2004	14	10	4	$868,514	$367,202	$1,235,716
2005	10	6	4	$755,436	$305,909	$1,061,345
2006	12	8	4	$954,058	$451,983	$1,406,041
2007	12	7	5	$1,105,585	$512,493	$1,618,078
2008	12	8	4	$1,102,030	$446,400	$1,548,430
2009	8	2	6	$727,615	$310,338	$1,037,953
2010	9	7	2	$775,105	$312,808	$1,087,913
2011	11	5	6	$1,061,644	$397,212	$1,458,856
2012	8	6	2	$799,746	$327,186	$1,126,932
2013	8	5	3	$746,688	$372,766	$1,119,454
2014	11	6	5	$1,017,500	$558,485	$1,575,985
2015	13	7	6	$1,213,983	$645,285	$1,859,268
2016	11	6	5	$1,077,444	$526,569	$1,604,013
2017	10	5	5	$950,916	$422,614	$1,373,530
Cumulative Total	202	141	61	$16,524,861	$7,424,156	$23,949,017

Commonwealth Health Research CHRB [CHRB]
FY 2017/2018 Annual Report

Comparison of Grant Award Success Rates [based upon a five-year average]

Step 1: Concept Paper to Step 2: Submission of a Full Proposal	Step 2: Submission of a Full Proposal to Step 3: Presentation of the Full Proposal to the Board	Step 3: Presentation of Full Proposal to the Board to receiving a CHRB Grant Award
30%	49%	54%

Success rate from the submission of a Concept Paper to being awarded CHRB grant funding = 8%

Grants Cycle	Step 1: Concept Papers submitted	Step 2: Full Proposals requested	% success Full Proposals	Step 3: Full Proposals Presented	% success Presentations	New Grant Awards	% success Awards	From Step 1 to Awards
2017/2018**	66	21	32%	10	48%	6	60%	9%
2016/2017*	66	17	26%	9	53%	6	67%	9%
2015/2016	91	24	26%	10	42%	7	70%	8%
2014/2015	82	24	29%	15	63%	6	40%	7%
2013/2014	76	29	38%	12	41%	5	42%	7%
Cumulative from 2013/2014 to 2017/2018 [Five Year total]	381	115	30%	56	49%	30	54%	8%
Cumulative from 2013/2014 to 2017/2018 [Five Year average]	76	23	30%	11	49%	6	54%	8%

Please note:

[1] This chart excludes two-year grant awards that are approved for Year 2 funding.

[2] *Beginning with the FY2016/2017 CHRB Grant Process, the number of Concept Papers allowed for submission by any one institution or organization decreased from 15 to 10 submissions. Beginning with the FY 2018/2019 CHRB Grant Process, the number of Concept Papers allowed for submission will increase from 10 to 12 per institution or organization.

[3] **For FY2017/2018, six new grants were awarded; however, one grant award was declined making the total New Grant Award total = 5.

CHRB Grant Awards and Funded Types or Categories of Research

The chart below provides statistics concerning the number of CHRB Grant Awards funded by type or category of research, from 1999 to 2017.

Key Codes	Disease/Research Area	1999 to 2017 Grant Awards	1999 to 2017 Grant Awards in Dollars [CHRB]
AG	Aging and Diseases of the Aging	6	$710,675
BD	Behavioral Disorders	6	$734,039
BV	Bacterial and Viral Diseases and Treatments	19	$2,622,381
CA	Cancer and Cancer Treatment	31	$3,665,469
CB	Cartilage and Bone	5	$576,078
CV	Cardiovascular Disease	11	$1,227,393
DI	Diabetes	11	$1,280,685
DM	Drug Metabolism and Drug Addiction	3	$209,250
EE	Eye and Ear Diseases	6	$678,925
GI	Gastrointestinal Diseases	2	$179,494
HS	Health Services Research	3	$181,126
HE	Hematology	4	$120,983
KD	Kidney Disease	3	$340,927
LD	Lung Disease	6	$884,083
ME	Metabolism	7	$616,082
ND	Neurological Disorders	7	$1,270,238
WH	Women's Health	8	$751,560
PD	Psychiatric Diseases	1	$200,000
WO	Wound Healing	1	$76,373
ZZ	Other	1	$199,100
	Total	**141**	**$16,524,861**

Commonwealth Health Research Board (CHRB) FY 2017/2018 Grant Awards

Principal Investigator	Submitting Institution/ Organization	Grant Award $	Recipient Matching $	Total Project Funds	Grant Title
Frank Castora, Ph.D.	EVMS	$ 100,000	$ 80,043	$ 180,043	*The role of differentially expressed mitochondrial energy production genes as regulators of amyloid precursor protein processing in Alzheimer's Disease*
Kathryn Cole, Ph.D.	CNU	$ 50,921	$ 22,574	$ 73,495	*Anticancer Drug Design: Structure and Function of New HDAC8 Depsipeptide Complexes*
Nicolas Farrell, Ph.D.	VCU	$ 100,000	$ 33,000	$ 133,000	*Targeting Triple Negative Breast Cancer*
Babette Fuss, Ph.D.	VCU	$ 100,000	$ 33,000	$ 133,000	*Regulation of myelin repair: the role of the actin cytoskeleton*
Matthew Hartman, Ph.D.	VCU	$ 100,000	$ 33,000	$ 133,000	*Development of an oxygen-independent strategy for targeted phototherapy of cancer*
Jia-Qiang He, Ph.D.	VCU	$ 99,995	$ 60,997	$ 160,992	*Biodegradable Microcapsules Containing Stem Cell Derived-Biological Pacemaker to Treat Mice with Bradycardia*
Masahiro Sakagami, Ph.D.	VCU	$ 100,000	$ 33,000	$ 133,000	*A salvianolic acid B derivative: HIF1a/STAT3-directed VEGF stimulation for lung repair in emphysema*
Weibin Shi, Ph.D.	UVA	$ 100,000	$ 33,000	$ 133,000	*Characterization of reticulocalbin 2 as a major gene contributing to atherosclerosis*
Erdem Topsakal, Ph.D.	VCU	$ 100,000	$ 33,000	$ 133,000	*Implantable Biosensors for Long-Term Continuous Glucose Monitoring*
Bin Xu, Ph.D.	VT	$ 100,000	$ 61,000	$ 161,000	*Molecular mechanisms of amylin as a novel contributor to Alzheimer's disease*
		$ 950,916	$ 422,614	$ 1,373,530	

Please note that for FY2017/2018, six new grants were awarded; however, one grant award was declined making the total New Grant Award total = 5 and thereby decreasing the total grant awards.

Kyle Friend, Ph.D.	WLU	$ 68,780	$ 22,697	$ 91,477	*Investigating enzyme activity-independent defects in metabolic disorders*
		$1,019,696	$445,311	$1,465,007	

FY 2017/2018 Grant Award Abstracts

Frank Castora, Ph.D., Eastern Virginia Medical School $100,000

The role of differentially expressed mitochondrial energy production genes as regulators of amyloid precursor protein processing in Alzheimer's disease

Project Summary: Alzheimer's Disease (AD) is the most common form of dementia in the elderly and within 10 years the number of Virginians with AD will climb to 160,000. Mitochondrial dysfunction is a critical component in the pathogenesis of AD where deficits in oxidative capacity and energy production have been reported. We have recently found abnormal expression of a number of genes critical to mitochondrial biogenesis and energy production in AD brains. These genes are involved in proteosomal degradation and aggregation of Aß peptides and senile plaques, hallmark features of AD. Using biochemical systems theory (BST), we have constructed a testable mathematical model for AD. We will confirm the role of these mitochondrial proteins in Aß aggregation and AD pathogenesis using CRISPR/Cas9 gene editing technology, with the goal of identifying new targets for therapeutic interventions designed to delay or modulate the onset of AD.

Kathryn Cole, Ph.D., Christopher Newport University $50,921

Anticancer Drug Design: Structure and Function of New HDAC8-Depsipeptide Complexes

Project Summary: Histone deacetylases (HDACs) play a critical role in the regulation of many biological processes, including cell differentiation, proliferation, senescence, and apoptosis. Aberrant HDAC activity has been implicated in a number of diseases, most notably cancer, making these enzymes validated targets for drug design. Indeed, four HDAC inhibitors (HDACi) have been FDA approved for the treatment of cancer. Depsipeptides are a new class of HDACi. These molecules bind to the catalytic zinc ion and make extensive binding interactions with the mouth of the enzyme active site, making them the most potent HDACi known to date. Spiruchostatin A and its synthetic derivative, Xyzistatin, are both analogs of one of the FDA approved HDACi. The research proposed herein investigates HDAC8 inhibition by Spiruchostatin A and Xyzistatin. We propose to measure HDAC8 inhibition and determine the structures of the HDAC8-inhibitor complexes to elucidate specific binding interactions and to develop more potent, second generation inhibitors.

Nicholas Farrell, Ph.D., Virginia Commonwealth University $100,000

Targeting Triple Negative Breast Cancer

Project Summary: This proposal aims to meet the overarching challenge of eliminating the mortality associated with metastatic triple negative breast cancer. This achievement will also meet the secondary overarching challenge to revolutionize treatment regimens by developing safe and effective interventions. A major goal of cancer research is to prevent metastasis and limit the primary tumor to a relatively localized site, allowing for more effective intervention at that site. The effectiveness of chemotherapy is limited by metastasis when the tumor spreads away from the primary site of occurrence, sometimes years later. The new treatment conceptualized is based on drugs that can act on multiple levels overcoming limitations of as single-targeted drugs. Development of new medicines which may simultaneously attack a range of targets, and with potential for personalized medicine based on genetic profile, would represent a significant addition to the anti-cancer armamentarium as adjuvant therapy in triple negative breast cancer.

Babette Fuss, Ph.D., Virginia Commonwealth University $100,000

Regulation of myelin repair: the role of the actin cytoskeleton

Project Summary: Stimulation of endogenous progenitor cells represents a promising but yet unavailable therapeutic strategy for diseases in which the central nervous system (CNS) myelin sheath is affected. The most prominent of such diseases is Multiple Sclerosis (MS) but myelin injury may also play an important role in a number of neuropsychiatric diseases. Our studies proposed here investigate a conceptually novel molecular mechanism, namely the role of a calcium/calmodulin-dependent protein kinase IIß (CaMKIIß)-actin cytoskeleton axis, in regulating myelin repair in the CNS. These studies are pioneering in the sense that actin cytoskeleton regulatory mechanisms as part of the regulation of CNS remyelination are a highly understudied area, despite known defects in such mechanisms in MS. In the long-term, we anticipate these studies to lead to the identification of novel therapeutic targets for stimulating CNS repair under pathologic conditions that involve injury to the myelin sheath.

Matthew Hartman, Ph.D., Virginia Commonwealth University $100,000
Development of an oxygen-independent strategy for targeted phototherapy of cancer

Project Summary: Patients undergoing cancer chemotherapy treatments suffer from many severe side effects that would be diminished if the anticancer drug could be activated only in the vicinity of the tumor. In this proposal, we aim to develop a technology that will enable local release of a known anticancer drug, doxorubicin, at the site of a tumor using red light. The proposal itself will involve chemical synthesis of a form of doxorubicin that is blocked from activity because it cannot enter cells. Upon illumination the blocking group will be removed and the drug will enter the cancer cells to exert its antitumor effect.

Jia-Qiang He, Ph.D., Virginia Polytechnic Institute and State University $99,995
Biodegradable Microcapsules Containing Stem Cell Derived-Biological Pacemaker to Treat Mice with Bradycardia

Project Summary: Cardiovascular disease is one of the most prevalent and chronic illnesses in Virginia. In 2011, ~5.9% (~365,842) of Virginians was diagnosed with cardiovascular diseases, which was responsible for 13,332 deaths in our State (www.vahealth.org). Despite a better understanding of the systemic nature of cardiac arrhythmia and improved application of implantable electronic pacemaker devices, there are significant side effects associated with electronic pacemaker devices and no effective permanent means of treating these diseases. The proposed stem cell-derived beating biological pacemakers in combination with microencapsulation techniques are a highly innovative regenerative medicine strategy for the treatment of cardiac arrhythmias. Successful completion of the proposed study will establish the fundamental basis for stem cell/biomaterial-based personalized regenerative medicine to treat cardiovascular diseases and the approach can be potentially transferred to remedy other types of disorders, such as traumatic brain injury, thus offering enormous therapeutic potential for patients.

Masahiro Sakagami, Ph.D., Virginia Commonwealth University $100,000
A salvianolic acid B-derivative: HIF1a/STAT3-directed VEGF stimulation for lung repair in emphysema

Project Summary: Emphysema progressively destroys lung's alveolar structures, leading to death, yet remains incurable, as no drug can repair its damaged lungs. With a new pathobiologic concept of epigenetic "vascular endothelial growth factor (VEGF) deficiency" that impairs adaptive angiogenesis/vasculogenesis and induces apoptosis in emphysematous lungs, we hypothesize that a methyl ester of salvianolic acid B derivative [**SMND309-ME**] is a novel dual-mechanistic VEGF-stimulating molecule for lung repair to reverse emphysema through modulation of upstream transcription factors, hypoxia-inducible factor-1*a* (HIF1*a*) and signal transducer and activator of transcription 3 (STAT3). This 2-year project will therefore examine SMND309-ME's HIF1*a*/STAT3-mediated 1) VEGF stimulation, 2) anti-apoptopsis, 3) promoted cell proliferation, migration and differentiation, and 4) functional and lung morphological recovery using in vitro lung cell (**Aim 1**) and in vivo animal (**Aim 2**) systems. Successful completion will offer SMND309-ME as a novel drug candidate and prove its HIF1*a*/STAT3-directed VEG stimulation strategy for lung repair to reverse emphysema.

Weibin Shi, Ph.D., University of Virginia $100,000
Characterization of reticulocalbin 2 as a major gene contributing to atherosclerosis

Project Summary: Atherosclerosis is the primary cause of heart attack and stroke. Inflammatory responses initiated by oxidation of LDL (bad cholesterol) trapped in the arterial wall are a central feature of atherosclerosis, but no effective medicines are available to intervene the inflammatory process due to lack of appropriate targets. Using mouse strains, we identified a major locus, Ath29, on chromosome 9 for atherosclerosis. Combined genetic and genome-wide gene expression analysis pinned Rcn2 down as a promising candidate for Ath29. RNA interference uncovered a crucial role for Rcn2 in both basal and oxidized lipid-induced inflammatory gene production in arterial wall cells. **Objective:** Test the hypothesis that Rcn2 is a major gene contributing to atherosclerosis. **Approach:** We will make and characterize arterial cell-specific knockout mice to define the role of Rcn2 in atherosclerosis and arterial inflammatory responses.
Impact: Successful completion of this aim may derive a novel therapeutic target for treatment of atherosclerosis.

Erdem Topsakal, Ph.D., Virginia Commonwealth University $100,000
Implantable Biosensors for Long-Term Continuous Glucose Monitoring

Project Summary: Our goal is to design and implement subcutaneous, ultra-sensitive, miniature ZnO-based sensors for long-term continuous glucose monitoring. Owing to their direct contact with the interstitial fluid and excellent biocompatibility, these sensors will remain in the body fully functional for up to a year or more without any adverse effects. Moreover, these sensors will offer very high sensitivities (<< 1 *u*g/dL) compared to the current sensors (Enlite ™, Medtronic). The prolonged lifetime will eliminate frequent sensor replacement and increase the quality of lives of those living with Diabetes Mellitus. The proposed technology, based on patterned surfaces and nanostructures that significantly enhance sensitivity due to large surface-to-volume ratio, would allow miniaturization of sensing devices, thereby eliminating the extreme discomfort associated with the current bulky sensor technologies. To achieve our goal, we will explore different crystal orientations and forms, surface morphologies, and structures of ZnO for engineering sensors with controlled biodegradation and desired longevity.

Bin Xu, Ph.D., Virginia Polytechnic Institute and State University $100,000
Molecular mechanisms of amylin as a novel contributor to Alzheimer's disease

Project Summary: Epidemiological studies have shown close link between obesity-related type 2 diabetes and the risk for Alzheimer's disease, but as yet the biological processes connecting these two diseases are not understood. Very recently studies have demonstrated that amylin peptides, typically formed in the pancreas, can possibly travel to the brain where they can form aggregates termed amylin amyloids. The link between the two diseases serves as the basis for the research outlined in this proposal. In particular, we will apply an interdisciplinary approach involving cellular, biochemical, animal model, medicinal chemistry, and computational methods to perform mechanistic studies of amylin amyloid-induced toxicity towards human neurons and toxicity inhibition by rationally designed small molecule inhibitors in cells and in an animal model. The outcomes from this project will serve as basis for a major research program to elucidate molecular connections between diabetes and Alzheimer's disease as well as to devise potential treatment strategies.

In a collaborative effort between the Commonwealth Health Research Board (CHRB) and the Virginia Biosciences Health Research Corporation (VBHRC), the following joint project was funded:

Eastern Virginia Medical School and George Mason University
Principal Investigator: Jerry Nadler, Ph.D., Eastern Virginia Medical School
Grant Award – Funding from CHRB: $200,000
Grant Title: ***Characterization of GUT Microbiome and Liver Cell Populations to Accelerate Commercialization of the Diamond Mouse Model***

Project Summary: This new grant will support Dr. Jerry Nadler's research on nonalcoholic fatty liver disease (NAFLD) and its serious progression to non-alcoholic Steatohepatitis (NASH), which constitute a major public health problem. There are no approved therapies. An impediment to research progress is the lack of an animal model that develops a disease resembling human NAFLD and NASH. Dr. Nadler and his team will conduct studies on a promising animal model, the DIAMONDTM mouse, which exhibits key components of NAFLD and NASH in humans including being triggered by the high-fat, high-sugar "Western" diet. The research to be funded will detail molecular and cellular changes in live liver cells and map disease progression in the gut microbiome and metabolome. It is hoped that results will further validate this disease model and permit testing of new therapies.

Commonwealth Health Research CHRB [CHRB]
FY 2017/2018 Annual Report

Commonwealth Health Research Funds available for 2017 Grant Awards

Calendar Year		Market Value as of 12/31/xx	
January 11 - December 31, 2011	Year 1	$27,511,097.32	Source: VRS Finance Division Analysis of CHRF Activity for CY 2011 through December 2011
January 1 - December 31, 2012	Year 2	$29,885,251.45	Source: VRS Finance Division Analysis of CHRF Activity Report through December 2012
January 1 - December 31, 2013	Year 3	$33,153,077.91	Source: VRS Finance Division Activity Report through December 31, 2013
January 1 - December 31, 2014	Year 4	$34,600,580.37	Source: VRS Finance Division Activity Report through December 31, 2014
January 1 - December 31, 2015	Year 5	$34,052,161.12	Source: VRS Finance Division Activity Report through December 31, 2015
	Total	$159,202,168.17	
	Average Market Value	$31,840,433.63	
Funds available for 2017 grants based on 5% of the average market value	5.00%	$1,592,022	
Less Administrative Expenses:			
Less Operating Expenses		$244,465	
Less VRS Administrative Fees		$2,600	
Total Administrative Expenses		$247,065	
Funds Available for 2017 grants less estimated expenses:		$1,344,957	

Investment of Funds

Assets of the Commonwealth Health Research Fund (CHRF) are pooled with the $74.4 billion Virginia Retirement System (VRS) investment fund (as of June 30, 2017). The estimated value of the CHRF as of June 30, 2017 was approximately $37.9 million. The current asset allocation for the VRS investment fund reflects: 41.3% public equity, 16.7% fixed income, 17.7% credit strategies, 12.6% real assets, 8.7% private equity, 2.5% strategic opportunities, and 0.5% cash.

Source of CHRF balance: VRS Finance Division CHRF Activity Report through June 30, 2017 shows CHRF balance at $37,868,884.18 Barry Faison, CPA, CGMA, Chief Financial Officer, VRS

Source of VRS Total Fund market value: Performance and Asset Allocation as of June 30, 2017 = $74.4 billion www.varetire.org/investments/ index

Source of VRS Total Fund market value: Performance and Asset Allocation as of June 30, 2017 www.varetire.org/investments/ index

Commonwealth Health Research Board (CHRB)
Summary of FINAL FY 2017/2018 Administrative and Grant Expenses:

FINAL FY 2016/2017 (July 1, 2016 - June 30, 2017) CHRB Administrative & Grants Expenses

[Per the Commonwealth's CARDINAL accounting system]

FY 2016/2017 Revenue and Cash Balance

CHRB Revenue and Cash Balance as of June 30, 2017	$ 272,494.77

FY 2016/2017 Final Expenses

CHRB Final Expenses as of June 30, 2017	Approved	Expenses	Difference
Administrative	$ 217,329.55	$ 238,997.84	$ (21,668.29)
Grant Disbursements	$1,213,983.00	$1,130,626.19	$ 83,356.81

The majority of the shortfall was related to expenses in the Attorney Services and Department of Accounts (DOA) Fiscal Services categories. The Budget shortfall in the Attorney Services category resulted from a change in the manner of paying for services from a one-year lag in billing to paying a retainer advance with a cap of $10,000. The increase in expenses in the DOA Fiscal Services category resulted from the cost of developing the Grants Application Management Electronic System (GAMES); the CHRB's new automated grants submission process.

Commonwealth Health Research Board (CHRB) Members

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