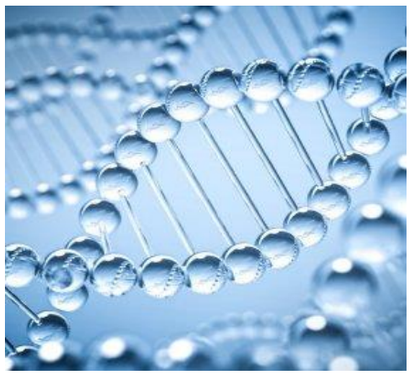
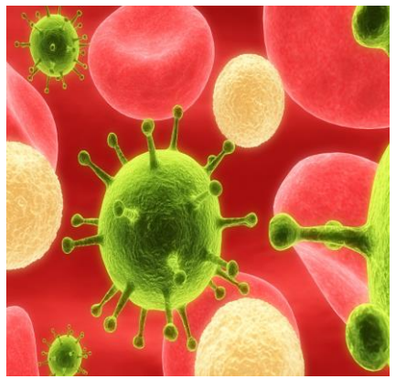
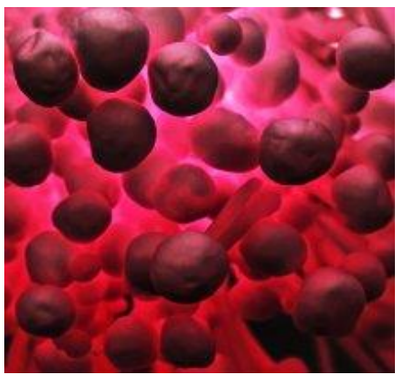
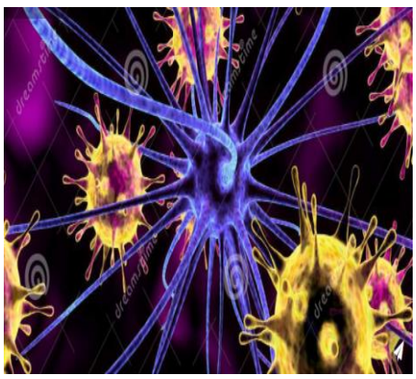
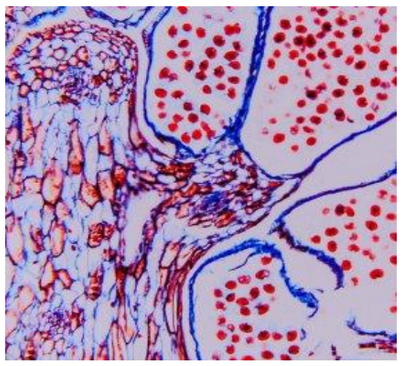
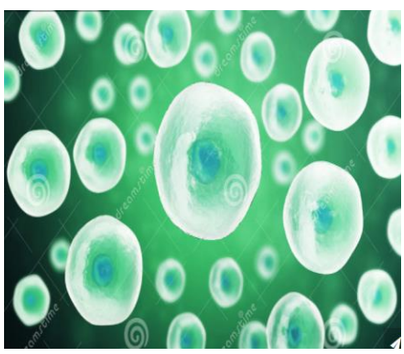







Commonwealth Health Research Board (CHRB)

2024/2025 Annual Report







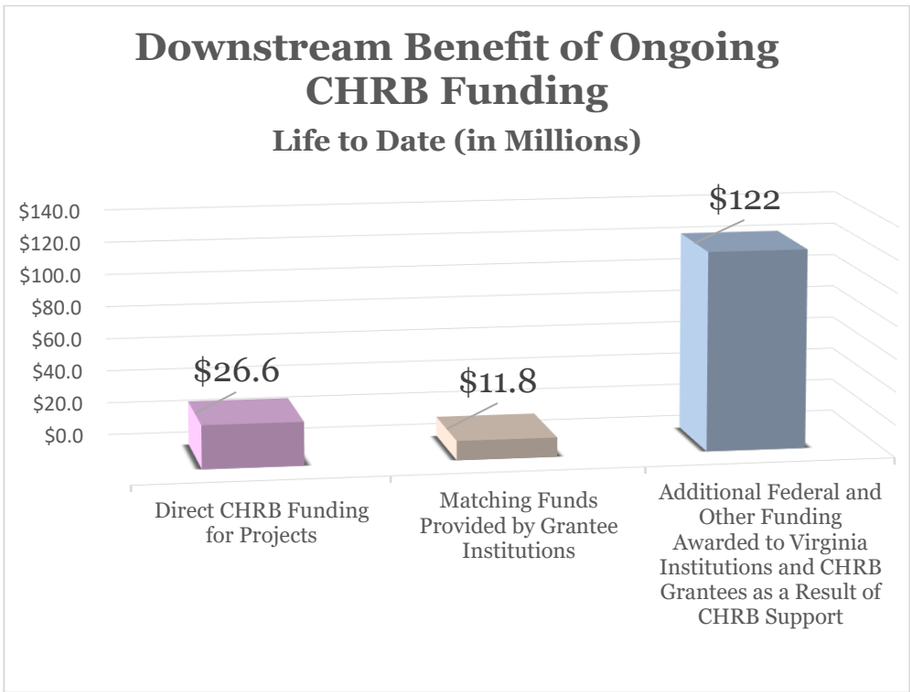

Commonwealth Health Research CHRB [CHRB]
FY 2024/2025 Annual Report

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.

Downstream Benefits of Ongoing CHRB Funding:

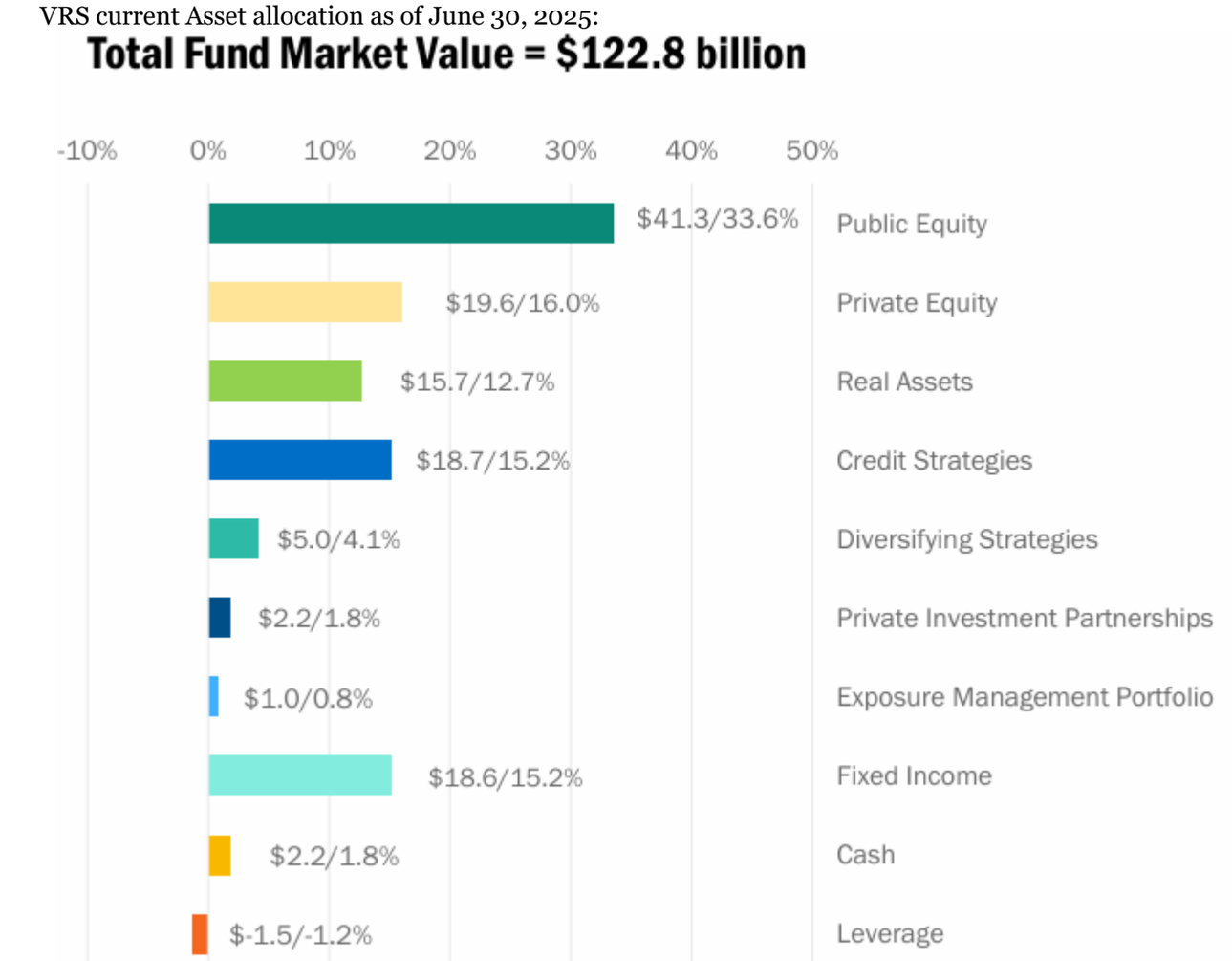
In accordance with ***Virginia Code* §32.1-162.24,** the Board encourages collaborative research efforts among two or more institutions or organizations, gives priority to those research efforts where Board support can be leveraged to foster contributions from federal agencies or other entities, and 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 **$122** million in additional private and federal grant funds to further their research studies. CHRB funds provide a vital conduit for Virginia scientists with nascent innovations by providing seed grants to generate the early data necessary to provide proof of concept for new ideas and then be competitive for NIH and next level grants.



Commonwealth Health Research Fund [CHRF]

***Virginia Code* § 51.1-124.36** delegates the authority to invest and manage the assets of the Commonwealth Health Research Fund (CHRF) to the Virginia Retirement System (VRS). Assets of the CHRF are pooled with the **$122.8** billion VRS investment fund (as of June 30, 2025); however, the provision requires the VRS to maintain a separate accounting for the CHRF assets. The estimated value of the CHRF as of June 30, 2025, before year end income accruals, was almost **$53.3** million, per the Virginia Retirement System Finance Division Commonwealth Health Research Fund Activity Report.

VRS current Asset allocation as of June 30, 2025:



Source: https://www.varetire.org/media/shared/pdf/publications/investments-quarterly-report-6-30-25.pdf

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 2024/2025 Annual Report

Executive Summary of FY 2024/2025 Grant Process:

Institution/ Organization Identification #	Institution/Organization	Concept Papers Received	Full Proposals Requested	Presentations to the Board	Grant Awards
207	University of Virginia	4	2	0	0
208	Virginia Polytechnic Institute and State University	9	7	5	4
216	James Madison University	1	0	0	0
221	Old Dominion University Research Foundation	8	2	1	1
236	Virginia Commonwealth University	12	4	0	0
247	George Mason University	9	4	1	1
274	Eastern Virginia Medical School	12	6	3	1
302	The Edward Via College of Osteopathic Medicine	1	1	0	0
307	University of Richmond	1	0	0	0
371	Liberty University	1	1	0	0
375	Hampden-Sydney College	1	1	0	0
811	Richmond Institute for Veterans Research (formerly McGuire Research Institute)	5	2	0	0
	Total	**64**	**30**	**10**	**7**

Commonwealth Health Research CHRB [CHRB]
FY 2024/2025 Annual Report

CHRB Current and Historical Funding

Since its inception, the CHRB has made **306** grant awards totaling almost **$26.6 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 approximately **$38.4 million** for health research in Virginia.

Grant Year	Total Grant Awards	# New Grant Awards	# Ongoing Grant Awards	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	11	6	5	$1,019,696	$445,311	$1,465,007
2018	13	8	5	$1,251,185	$577,194	$1,828,379
2019	14	8	6	$1,399,997	$583,883	$1,983,880
2020	16	8	8	$1,517,067	$700,610	$2,217,677
2021	14	8	6	$1,400,000	$653,582	$2,053,582
2022	15	9	6	$1,500,000	$615,728	$2,115,728
2023	16	8	8	$1,541,750	$616,835	$2,158,585
2024	15	7	8	$1,431,175	$571,103	$2,002,278
Cumulative Total	**306**	**198**	**108**	**$26,634,815**	**$11,765,788**	**$38,400,603**

Commonwealth Health Research CHRB [CHRB]
FY 2024/2025 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
39%	50%	67%

Success rate from the submission of a Concept Paper to CHRB Grant Award = 13%

Grants Cycle	Step 1: Concept Papers submitted	Step 2: Full Proposals submitted	% Success Full Proposals	Step 3: Full Proposals Presented	% Success Present	New Grant Awards	% Success Awards	From Step 1 to Awards
2024/2025	64	29	45%	10	34%	7	70%	11%
2023/2024	48	21	44%	12	57%	8	67%	17%
2022/2023	49	24	49%	12	50%	9	75%	18%
2021/2022	69	22	32%	14	64%	8	57%	12%
2020/2021	74	22	30%	11	50%	8	73%	11%
Cumulative 5-year Total	304	118	39%	59	50%	40	68%	13%
Cumulative 5-year Average	61	24	39%	12	50%	8	67%	13%

Please note: This chart excludes two-year grant awards that are approved for Year 2 funding.

Commonwealth Health Research CHRB [CHRB]
FY 2024/2025 Annual Report

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 2024.

Key Codes	Disease/Research Area	1999 to 2024 Grant Awards	1999 to 2024 Grant Awards in CHRB Dollars
AG	Aging and Diseases of the Aging	6	$710,675
BD	Behavioral Disorders	7	$734,039
BV	Bacterial and Viral Diseases and Treatments	31	$5,174,681
CA	Cancer and Cancer Treatment	44	$5,856,520
CB	Cartilage and Bone	6	$776,078
CV	Cardiovascular Disease	15	$1,926,209
DI	Diabetes	12	$1,480,685
DM	Drug Metabolism	3	$225,900
DA	Drug Addiction and Alcoholism	1	$83,350
EE	Eye and Ear Diseases	5	$678,925
GI	Gastrointestinal Diseases	3	$248,274
GE	Genetics	0	$0
HS	Health Services Research	3	$181,126
HE	Hematology	5	$320,983
KD	Kidney Disease	3	$340,927
LD	Lung Disease	10	$1,484,083
ME	Metabolism	9	$916,082
ND	Neurological Disorders	17	$3,069,104
WH	Women's Health	10	$1,173,319
PD	Psychiatric Diseases	3	$378,382
WO	Wound Healing	1	$76,373
ZZ	Other	4	$799,100
	Total	**198**	**$26,634,815**

A one-year or two-year grant award is still considered one grant award for purposes of categorizing disease/research areas.

Commonwealth Health Research Board (CHRB) FY 2024/2025 Grant Awards

Planned Second-year funding for Two-Year Grant Awards

Principal Investigator	Submitting Institution/ Organization	Grant Award $	Recipient Matching $	Total Project $	Grant Title
Michel Audette, Ph.D.	Old Dominion University Research Foundation	$99,998	$33,000	$132,998	Intranatal Force-sensing And Patient-derived Anatomy and Kinematics Modeling For Real-time Virtual Reality Obstetrics Simulation
Swadesh Das, Ph.D.	Virginia Commonwealth University	$100,000	$33,000	$133,000	Appplications of Deep Learning to Predict Anti-Prostate Cancer Drug Synergy
Diane Duffy, Ph.D.	Eastern Virginia Medical School	$56,137	$28,068	$84,205	PCO or NO? Healthy Androgens and Ovulation
Robert Hinkle, Ph.D.	The College of William and Mary	$75,400	$25,133	$100,533	Synthesis and Biological Assessment of a Polyyne Library via Glaser-Hay Reactions
Sol Lim, Ph.D.	Virginia Polytechnic Institute & State University	$100,000	$51,022	$151,022	Enhancing Parkinson's Disease Rehabilitation Through Remote Haptic Guidance
Andrew Lowell, Ph.D.	Virginia Polytechnic Institute & State University	$100,000	$33,000	$133,000	Pioneering new routes for antibiotic development: Using computational modeling and medicinal chemistry to reconfigure cytotoxins as selective antibiotics
Alessandra Luchini, Ph.D.	George Mason University	$100,000	$33,000	$133,000	Host response mechanisms of neuroborreliosis
Michael McVoy, Ph.D.	Virginia Commonwealth University	$100,000	$33,000	$133,000	Substitution-inert charged coordination complexes: a novel class of broad spectrum antivirals
Amanda Morris, Ph.D.	Virginia Polytechnic Institute & State University	$100,000	$33,000	$133,000	Metal Organic Framework Smart Drug Delivery Vehicles for the Next Generation of Personalize Patient Care
Peter Pidcoe, Ph.D.	Virginia Commonwealth University	$99,638	$32,880	$132,518	iTreat - Improved Treatment using Advanced Technologies
Michael Schulz, Ph.D.	Virginia Polytechnic Institute & State University	$100,000	$33,000	$133,000	Developing Enhanced Sealants for Neurosurgery
Sharon Swanger, Ph.D.	Virginia Polytechnic Institute & State University	$100,000	$33,000	$133,000	Serotonin modulation of thalamocortical dysfunction in Dravet syndrome

(continued next page)

Commonwealth Health Research CHRB [CHRB]
FY 2024/2025 Annual Report

Principal Investigator	Submitting Institution/ Organization	Grant Award $	Recipient Matching $	Total Project $	Grant Title
Lifang Yang, M.D., Ph.D.	Eastern Virginia Medical School	$100,000	$50,000	$150,000	Detection of Minimal Residual Disease in Early-stage Triple-negative Breast Cancer through Extracellular Vesicle-based Liquid Biopsies
Zhaomin Yang, Ph.D.	Virginia Polytechnic Institute & State University	$100,000	$60,000	$160,000	Antivirulence -- new weapon against old foe: targeting type IV pilus of antibiotic resistant bacteria
Wei Zhou, Ph.D.	Virginia Polytechnic Institute & State University	$100,000	$60,000	$160,000	Wearable Bio-Nanophotonics Technology for Wound Biofilm Infection Management
		$1,431,173	**$571,103**	**$2,002,276**	

Commonwealth Health Research CHRB [CHRB]
FY 2024/2025 Annual Report

FY 2024/2025 Grant Award Project Summaries

The Commonwealth Health Research Board (CHRB) has awarded **$1,431,173** in grants to 15 medical and health researchers in Virginia. Of this amount, **$699,998** represents grants to seven medical and health researchers for new 2024 Grant Awards and **$731,175** represents continued second-year funding for eight grant awards initially approved in July 2023.

Michel Audette, Ph.D., Old Dominion University Research Foundation
Intranatal Force-sensing And Patient-derived Anatomy and Kinematics Modeling For Real-time Virtual Reality Obstetrics Simulation

Project Summary: The US egregiously underperforms in obstetrics practice in relation to other developed countries. Poorer hospitals have complication rates double or worse those of richer hospitals in vaginal deliveries. Maternity health care services are limited or absent in a third of rural counties. Our long-term objective is to achieve a virtual reality (VR) simulation based on bimanual haptic gloves, anatomical models of the fetus and maternal pelvis derived from fetal MRI, and interactive biomechanics, to train obgyns, and rural physicians and midwives, to develop safe practices for difficult cases such as shoulder dystocia. Yet to eradicate deleterious practices, we must ask: what is a tolerable force in a delivery? This project consists of I) a prenatal and intranatal phase, and II) a VR simulation phase. Phase I will characterize safe practices that lead to healthy labor outcomes. Phase II will achieve VR-based simulation that also builds on anatomical modeling of the fetus and maternal pelvis, haptics-driven skeletal dynamics, and real-time soft tissue simulation. Bimanual haptics based on grounded forcerendering gloves will be developed downstream of this project. Aim 1 will establish a reference for excessive force, we will achieve a means of acquiring intranatal forces, with Pliance force-transducing gloves worn by an obstetrician (under latex gloves). Aim 2 will provide a detailed personalized anatomy will be achieved by registering an anatomist-drawn CAD model to fetal MRI datasets. This detailed anatomy will represent the neonate during birth as imaged intranatally and provide the anatomy model input to the VR simulation.

Swadesh Das, Ph.D., Virginia Commonwealth University
Applications of Deep Learning to Predict Anti-Prostate Cancer Drug Synergy

Project Summary: Clinically localized prostate cancer (PC) when diagnosed early can be effectively treated, whereas advanced PC is resistant to current therapies. However, responses to standards of care are not always durable, and most patients eventually progress to a hormone-refractory stage, which emphasizes the mandate to develop innovative, more efficacious treatments. Drug combinations are a mainstay of modern cancer therapy, potentially reducing side effects associated with high doses of a single drug, presenting opportunities for more precise disease control. Our proposal embodies screening data from 1971 FDA-approved drugs, with documented biological activities, which are merged with a multidisciplinary machine learning process to predict drug-synergisms leading to the development of novel approaches to treat men with lethal PC. Beyond its primary predictions in identifying drugs that synergize with IL-24 and its modified enhanced version IL-24S, our approach will also provide potential new drugs that can be repurposed to treat PC.

Diane Duffy, Ph.D., Eastern Virginia Medical School
PCO or No? Healthy Androgens and Ovulation

Project Summary: Polycystic ovary syndrome (PCOS) is the most common female endocrine disorder. Over 300,000 Virginia women live with negative health impacts of PCOS, including type 2 diabetes and failure to ovulate (infertility). Elevated androgens are implicated in PCOS, but no one understands how androgens affect ovulation. Our pilot data show that 1) androgens are needed to produce oocytes capable of fertilization, and 2) the “classical” androgen receptor (AR) and a novel androgen receptor (SLC39A9) are present in cells of primate ovulatory follicles. We hypothesize that androgens act through AR, SLC39A9, or both to promote follicle maturation and healthy oocyte release. In this CHRB-funded project, we will use single-cell RNA-sequencing to identify actions of androgens via AR and SLC39A9 in the ovulatory follicle. These studies, leveraged by pilot studies funded by EVMS and others, will likely identify one or both receptors as druggable targets to improve fertility for women, especially PCOS women.

Robert Hinkle, Ph.D., The College of William and Mary
Synthesis and Biological Assessment of a Polyyne Library via Glaser-Hay Reactions

Project Summary: The polyyne (multiple C≡C bonds) core of linear, electron-rich, highly conjugated alkynes has been demonstrated to be selectively potent in a wide range of biological systems; however, its true potential has yet to be realized due to challenges with their synthetic preparation. As a result, the polyyne scaffold represents a prime opportunity for the fusion of organic synthesis and biochemical application. This collaborative, symbiotic approach integrates the expertise of the co-PIs to facilitate rapid

preparation of diverse, targeted, polyynes for systematic biological screening to identify how structural alterations impact biological potential and molecular stability. Additionally, the rapid and efficient nature of the project is optimal for utilization with undergraduate researchers as a training platform. Ultimately, this research aims to develop novel, simple polyynes that have been thoughtfully designed to maximize their potential biological activity and exploit the unexplored potential of the polyyne core.

Sol Lim, Ph.D., Virginia Polytechnic Institute and State University
Enhancing Parkinson's Disease Rehabilitation Through Remote Haptic Guidance

Project Summary: Individuals with Parkinson's disease (PD) experience declining motor symptoms that disrupt their daily activities and quality of life. Effective physical rehabilitation can slow the progression of these symptoms. Nevertheless, it remains quite difficult to deliver such rehabilitation in an accessible and cost-effective manner, largely due to both individual-level and system barriers within healthcare services. To help overcome these barriers, there is growing interest in at-home, technology-based rehabilitation programs that can reduce therapy costs and enhance accessibility. However, critical obstacles to implementing such programs are the important challenges of remotely assessing and guiding patient movements while providing essential hands-on assistance. Our project will address these challenges by integrating a new low-cost haptic-guidance approach into an at-home rehabilitation system for PD patients. Our aims are to: 1) Evaluate the efficacy of the haptic-guided rehabilitation system in lab-based user testing; and 2) Determine the effects of the new haptic-guided remote rehabilitation system on diverse motor functions among PD patients, using a randomized controlled trial. Our team has broad expertise– in intelligent physical training systems, biomechanical performance modeling, and haptic interfaces– and we will collaborate closely with healthcare partners. This collaboration will ensure that our work helps improve the delivery of physical rehabilitation, by making it more accessible and effective for a broader spectrum of PD patients.

Andrew Lowell, Ph.D., Virginia Polytechnic Institute and State University
Pioneering new routes for antibiotic development: Using computational modeling and medicinal chemistry to reconfigure cytotoxins as selective antibiotics

Project Summary: Our work develops treatments for antimicrobial resistant (AMR) pathogens by creating new antibiotics from existing, potent drugs. To achieve this goal, we use a combination of cutting-edge molecular modeling and medicinal chemistry techniques to convert broadly cytotoxic agents into bacteria-specific antibiotics. Comparisons of general cytotoxicity to antibacterial activity were used previously to identify antibiotic candidates, but no attempts were made using medicinal chemistry to perturb this continuum. Aiding in the development of this novel area is our innovative application of large-scale biochemical modeling to the ribosome, providing atom-level binding and interaction details not previously achievable for this target. Our work will result in new classes of potent antibiotics and first-in-field software applications for the analysis of large organelles, both being commercialize for ribosome drug targeting and computational analysis of other complex biological systems. Comprehensively, this work will mitigate the growing impact of AMR infections in the Commonwealth and nationwide.

Alessandra Luchini, Ph.D., George Mason University
Host response mechanisms of neuroborreliosis

Project Summary: Purpose: In Virginia, an estimated 192,000 individuals grapple with Lyme disease, and new cases are on the rise. Neuroborreliosis, the neurological impact of Lyme disease on the brain and nerves, causes significant suffering, yet its underlying causes are still unknown. Our goal is to investigate previously unexplored cellular and molecular mechanisms contributing to brain damage in Lyme disease patients. We hypothesize that bacterial extracellular vesicles (BEVs), released by the Lyme disease-causing Borrelia, trigger the activation of microglia, the immune cells in the central nervous system, leading to long-term brain dysfunction. Using a direct test developed through a multi-year clinical study, we identified Borrelia-derived proteins in the urine of over 400 Lyme disease patients. These proteins, originating from the spirochete's functional machinery, may play a role in the damage inflicted on patients. Methods. We will generate and characterize BEVs produced by Borrelia, studying their direct effects on human microglia cells, and confirming the presence of Borrelia BEV markers in urine samples from Lyme disease patients. Populations: We will study banked urine collected from 50 Lyme disease patients who previously participated in our clinical study. Expected outcomes: Insights gained from this study will pave the way for innovative therapeutic strategies to alleviate the neurological suffering caused by Lyme disease including inhibitors of bacterial vesicle production and neuroinflammation suppression compounds. Additionally, the research may contribute to the development of new diagnostic tests for early identification and prompt antibiotic treatment.

Michael McVoy, Ph.D., Virginia Commonwealth University
Substitution-inert charged coordination complexes: a novel class of broad spectrum antivirals

Project Summary: The majority of pathogenic viruses initiate infection by binding to cell surface glycosaminoglycans (GAGs). Inhibitors that disrupt virion-GAG interactions are therefore anticipated to have broad spectrum antiviral activity. This proposal seeks to develop a novel class of broad-spectrum antivirals based on substitution-inert charged coordination complexes (CCCs) that target GAGs to inhibit viral attachment and entry. The proposed studies, focused on SARS-CoV-2, are designed to establish proof-of-concept that CCCs can serve as bona fide antivirals worthy of further development. Two Specific Aims will (1) use in vitro cell culture models to identify CCCs with minimal toxicity and maximal antiviral activity against SARS-CoV-2; and (2) use in vivo (mouse) models to define toxicity, pharmacokinetics, and antiviral therapeutic efficacy of lead CCCs for treatment of SARSCoV-2 infection. Completion of these studies will establish CCCs as a novel class of antivirals and will leverage support for future preclinical and clinical development of lead candidates.

Amanda Morris, Ph.D., Virginia Polytechnic Institute and State University
Metal Organic Framework Smart Drug Delivery Vehicles for the Next Generation of Personalize Patient Care

Project Summary: Drug discovery over the past several decades has led to the development of numerous therapeutic agents for a wide variety of diseases. However, the clinical application of many of these drugs is limited by unwanted side effects, off-target accumulation, and poor pharmacokinetics. *To fully realize the potential of this immense amount of work, there is a critical need to develop tools to control the localization and delivery of therapeutics*. We have developed a one-of-a-kind, metal-organic framework (MOF) drug delivery vehicle (DDV) for the photo-controlled release of therapeutics with simultaneous breakdown of the carrier into small molecules, Fig. 1. 1–5 In contrast to other known DDVs, such as inorganic nanoparticles, liposomes, and polymeric micelles, our MOF DDV is comprised of components with *low toxicity*, exhibits *high drug loading capacities*, demonstrates *favorable pharmacokinetics*, delivers drug in a controllable fashion in response to an *external stimulus*, and has an *easily modifiable surface for advanced targeting*. The proposed work aims to optimize our proof-of concept MOF for clinical translation with light absorption properties, drug loading (including cocktails), and drug release rates amenable for patient care through a combined and iterative computational and experimental approach. Our proposed work holds the potential to provide a unique platform to deliver therapeutics in line with the “holy grail” of personalized medicine, i.e., the duration of treatment, therapeutic dose, and therapeutic cocktail (one drug or multi-drug administration) can be tuned to match each patient’s determined treatment plan.

Peter Pidcoe, PT, DPT, Ph.D., Virginia Commonwealth University
iTreat – Improved Treatment using Advanced Technologies

Project Summary: The purpose of this proposal is to implement a non-intrusive, easily deployed, scalable system that uses wireless sensing to produce an accurate measure of therapeutic rehabilitation dose for patients who have suffered a Cerebrovascular Accident (CVA or stroke). Since structured intensity plays a key role in recovery, the accurate assessment of rehabilitation dose is needed to infer its relationship to outcome and drive future practice patterns. This system will be deployed in three Richmond clinical sites to assess efficacy and validity.

Michael Schulz, Ph.D., Virginia Polytechnic Institute and State University
Developing Enhanced Sealants for Neurosurgery

Project Summary: Dural tears are one of the most challenging complications during neurosurgery, resulting in cerebral spinal fluid leakage and increased risk of infections and complications. To mitigate these issues, numerous dural sealants have been developed, but their efficacy is limited. Consequently, a highly effective dural sealant remains an unmet medical need. Partnering with practicing neurosurgeons, the goal of this work is to design and synthesize improved materials for sealing dural tears. By tuning the molecular structure of polyester/polyurethane adhesives, we will produce materials that balance resistance to cerebral spinal fluid leakage with strong adhesion to dura, while maintaining ease of use, biocompatibility, and biodegradability. Candidate materials will be evaluated to determine water uptake (swelling), tensile strength, modulus, curing kinetics, and degradability, as well as their adhesive properties (adhesion strength and mode of failure) and biocompatibility. Ultimately, this project will produce enhanced surgical sealants for neurosurgery applications.

Sharon Swanger, Ph.D., Virginia Polytechnic Institute and State University
Serotonin modulation of thalamocortical dysfunction in Dravet syndrome

Project Summary: In 2020, fenfluramine became the first serotonin-based therapy approved for epilepsy. Fenfluramine enhances serotonin signaling in the brain and is approved only for Dravet syndrome (DS), an infantile-onset epilepsy. This was a major advance for DS treatment, but decades of preclinical research suggest a wider patient population may benefit from enhanced serotonin signaling. Approximately 1% of the U.S. population has active epilepsy, including ~85,000 people in Virginia, but less than 0.5% of epilepsy patients have DS. Our long-term goal is to determine how modulating serotonin signaling can be broadly applied to improve human health. Epilepsy has diverse causes, but similar disease pathology occurs in seizure-prone brain areas. Therapies targeting these areas could be applied broadly for epilepsy. To predict which patient populations will benefit from serotonin therapies, we need to understand the neurobiological mechanisms by which serotonin suppresses seizures. We will utilize a DS mouse model to define how fenfluramine and enhanced serotonin release affect neuronal activity in the thalamus, a brain area that generates seizures. We hypothesize that enhanced serotonin signaling will correct vital aspects of thalamus physiology disrupted in DS and many other epilepsies. The project outcomes will support long-term funding proposals aimed at broadly advancing serotonin-based therapies for epilepsy.

Lifang Yang, M.D., Ph.D., Eastern Virginia Medical School
Detection of Minimal Residual Disease in Early-stage Triple-negative Breast Cancer through Extracellular Vesicle-based Liquid Biopsies

Project Summary: Tumor relapse from minimal residual disease (MRD) is a major clinical challenge that accounts for more than 1,000 breast cancer-related deaths annually in Virginia, particularly in women with aggressive triple-negative breast cancer (TNBC). Therefore, the ability to predict and monitor MRD after primary treatment is a key determinant of survival outcomes for patients with early-stage TNBC. Currently there are no robust tests in the clinic to accurately and reproducibly identify TNBC patients with MRD following curative-intent therapy, leading to relatively uniform treatment algorithms that cannot trade off efficacy and toxicity well. To address this gap, we have developed innovative approaches for isolation and molecular analysis of tumor-shed small extracellular vesicles (sEV) derived from human biofluids, which harbor tumor state-specific information in their cargo molecules. In this project, we will use prospectively collected TNBC blood samples and our developed tools to identify sEV-based molecular (proteogenomic) signatures for reliable prediction and timely detection of residual TNBC noninvasively. If successful, the findings of our project will advance fine-tuning of personalized medicine in the management of TNBC which ultimately improve patient-centric outcomes and quality of life.

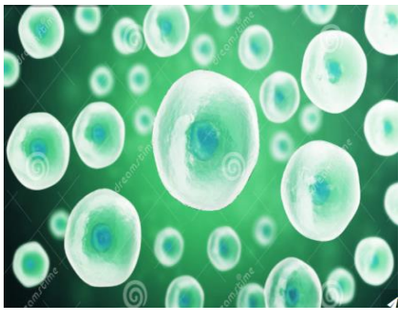
Zhaomin Yang, Ph.D., Virginia Polytechnic Institute and State University
Antivirulence – new weapon against old foe: targeting type IV pilus of antibiotic resistant bacteria

Project Summary: Antivirulence is a promising new strategy for fighting the global antibiotic resistance pandemic. Bacterial pathogens have armors and weapons that allow them to defeat our immune system and do harm. Antivirulence is to strip them of their menacing arsenals. Once disarmed, they are no more than the normal human microflora that generally provides health benefits. Unlike antibiotics, antivirulence measures do not apply a life-death selection on bacteria. As such, their resistance is not expected to develop and spread, making antivirulence an attractive approach for combating antibiotic resistance. In this proposal, we focus on developing small molecules targeting the bacterial type IV pilus, one of the most potent weapons of bacterial pathogens. The success of our work will lead to novel therapeutics that will impact not only the citizens of Virginia, but also human health worldwide.

Wei Zhou, Ph.D., Virginia Polytechnic Institute and State University
Wearable Bio-Nanophotonics Technology for Wound Biofilm Infection Management

Project Summary: The project is an innovative venture to revolutionize the detection and treatment of chronic wound infections. Chronic wounds, often seen in diabetic, elderly, and immobile patients, are prone to biofilm formation, leading to increased infection risks and slower healing. The core of this technology is a wearable nanoplasmonic bio-mesh designed for combined molecular Raman fingerprinting detection and photothermal/acoustics-enhanced treatment of wound biofilm conditions. It employs spatiotemporal plasmon-enhanced Raman spectroscopy (PERS) to detect biofilm presence at the wound site without requiring invasive procedures. In parallel, the technology leverages bio-mesh surface plasmon-induced photothermal/acoustics effects to generate localized heat and micro- /nanocavitation in combination with standard antimicrobial therapies, effectively disrupting and eradicating biofilms. This project leverages our team's multidisciplinary expertise in nanotechnology, biophotonics, and wound care, aiming to significantly improve clinical outcomes for patients with chronic wounds. By enabling early detection and efficient treatment of biofilm-associated infections, the project promises to reduce treatment costs, lower the risk of severe complications, and enhance the overall quality of life for affected individuals. The project's success

will testify to the collaboration between advanced bio-nanotechnology and healthcare, marking a significant stride in personalized medical care. Supported by the College of Engineering and Virginia-Maryland College of Veterinary Medicine at Virginia Tech, this endeavor stands at the forefront of innovative healthcare solutions, aligning with the CHRB's commitment to advancing medical research and patient care.



Commonwealth Health Research CHRB [CHRB]
FY 2024/2025 Annual Report

Commonwealth Health Research Funds available for FY 2024/2025 Grant Awards

Pursuant to ***Virginia Code* §32.1-162.28(E)**, (CHRF) 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**.

Commonwealth Health Research Board [CHRB]
Financials

Supporting documentation for CHRB Annual Report and ACFR Reporting

Funds available for 2024 Grant Awards

Calendar Year		Market Value as of 12/31/xx	
January 1 - December 31, 2018	Year 1	$36,998,370.93	Source: VRS Finance Division Activity Report through December 31, 2018
January 1 - December 31, 2019	Year 2	$40,977,689.88	Source: VRS Finance Division Activity Report through December 31, 2019
January 1 - December 31, 2020	Year 3	$43,250,731.05	Source: VRS Finance Division Activity Report through December 31, 2020
January 1 - December 31, 2021	Year 4	$49,523,068.01	Source: VRS Finance Division Activity Report through December 31, 2021
January 1 - December 31, 2022	Year 5	$45,217,004.36	Source: VRS Finance Division Activity Report through December 31, 2022
	Total	$215,966,864.23	
	Average Market Value	$43,193,372.85	
Funds available for 2024 grants based on 5% of the average market value	5.00%	$2,159,669	

Commonwealth Health Research CHRB [CHRB]
FY 2024/2025 Annual Report

Commonwealth Health Research Board (CHRB) Members

Francis X. Farrell, Ph.D., Chair
Thomas W. Eppes, Jr., M.D., Vice Chair
Neelam Azad, Ph.D.
Robert W. Downs, Jr., M.D.
Andrew F. Kohler, M.D.
Ethlyn McQueen-Gibson, DNP
Rawle Seupaul, M.D.

CHRB Administrator

Erin E. Sprouse, CPA
Commonwealth Health Research Board
Post Office Box 1971 (Mailing)
101 N. 14th Street, 2nd Floor (Delivery)
Richmond, Virginia 23218-1971
804.371.7799 Telephone Direct
erin.sprouse.chrb@doa.virginia.gov

Commonwealth Health Research Board (CHRB) Scientific Consultants

Raya Mandler, Ph.D.
Arnold Revzin, Ph.D.
Chuck Selden, Ph.D.