A Case to Support the

INNOVATION FUND

TURNING **BOLD IDEAS** INTO REALITY

UNIVERSITY *of* MARYLAND
SCHOOL OF MEDICINE

WE ARE A CATALYST FOR INNOVATION.

Through entrepreneurship we cultivate a community of bold innovators — those who envision and venture beyond the norm to bring about change.

Every day, scientists at the University of Maryland School of Medicine (UMSOM) are finding new ways to transfer the research they are doing in their laboratories into innovative pharmaceuticals, therapeutics, vaccines, and biomedical devices that are helping to further the well-being of patients both in Maryland and around the world.

The UMSOM **Innovation Fund** will help move this cutting-edge research from the laboratory into groundbreaking medical interventions by investing in promising Maryland-based start-up companies to commercialize intellectual property developed by UMSOM faculty, staff, students, and graduates. Pooled gifts to this philanthropic fund, administered by the University of Maryland Baltimore Foundation, Inc. (UMBF) on behalf of UMSOM, are dedicated to advance these technologies. The returns generated from these investments will be applied to investing in exciting new ventures while also supporting UMSOM's most critical educational and public health goals.

REALIZING COMMERCIAL POTENTIAL

UM Ventures and the Maryland Momentum Fund (MMF) invest in the University of Maryland, Baltimore's (UMB) most promising technologies, helping faculty and researchers move their discoveries out of the laboratory and into the marketplace. Early-stage and seed-round investment can provide UMSOM entrepreneurs essential resources when seeking their initial round of funding, which is usually the most difficult to get. These investments can also provide critical support to help start-ups survive the 'valley of death' period between laboratory discoveries and company formation.

Staffed by highly qualified UMB personnel and guided by an external Advisory Board of entrepreneurs and venture capitalists with significant investment experience, these teams conduct extensive due diligence on investment candidates. Additionally, ongoing assistance is provided to portfolio companies to help them overcome initial roadblocks, such as advice on capital raising, strategic direction, industry and professional collaborations, obtaining grant support, and facilitating connections to other angel and investor groups.

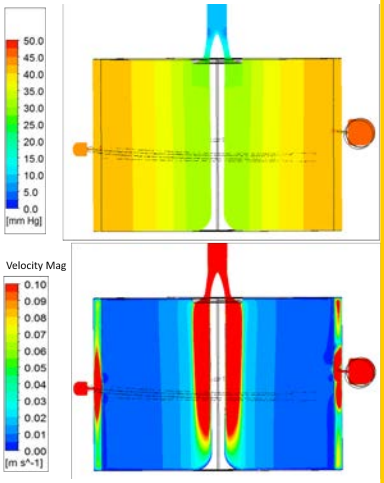
Decisions on investments will be made collaboratively with UMSOM's Dean Reece and UM Ventures or MMF. Distributions of investment returns will provide:

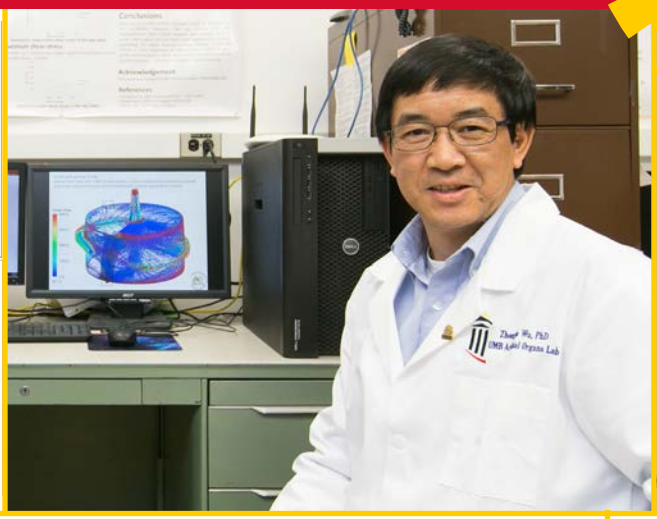
- 50% for reinvestment in future entrepreneurial opportunities; and
- 50% to remain with UMSOM to be applied at the discretion of Dean Reece to support our strategic mission areas of clinical care, research, education, and community impact.

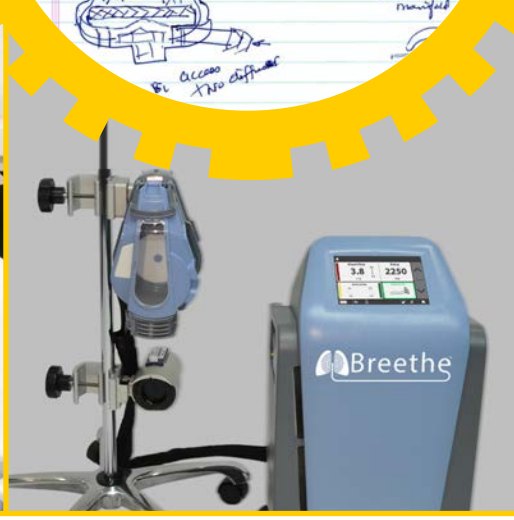
In recent years, many researchers at UMSOM have had success with technology transfer. UM Ventures and MMF have invested more than $4.3 million in UMSOM start-ups since 2014, with investments ranging from $50,000 to $500,000. Led by strong management teams, these companies have raised an additional $100 million from angel investors, venture capitalists, and strategic investors, and produced strong returns.

The UM Ventures investment program has been incredibly successful with 16 investments in 11 companies, four of which have had successful exits via acquisition. UMB has seen an estimated five to six times return on these investments to date. On average, these companies were acquired four years after investment.

These are two success stories of technology transfer that resulted from the innovative research of UMSOM faculty.







AN IDEA TO REVOLUTIONIZE PATIENT CARE WITH THE FIRST PORTABLE ARTIFICIAL LUNG

*Breethe, f*ounded by Dr. Griffith, has developed a first-of-its-kind portable artificial lung that has the potential to revolutionize care for patients needing an artificial lung. Dr. Griffith and **Zhongjun Jon Wu, PhD**, the Peter G. Angelos Distinguished Professor in Entrepreneurial Surgical Sciences, designed the core of the innovative extracorporeal membrane oxygenation (ECMO) system in their laboratory at UMSOM. The vision was to help treat patients suffering from respiratory failure that may result from infections caused by viruses such as H1N1, SARS, and COVID-19, along with many other noninfectious causes of pulmonary failure.

Hundreds of thousands of patients die each year from respiratory disease and lung failure, and most must live out their days in a hospital bed tethered to a bulky oxygen machine for critical care situations or as a bridge option while waiting for an organ. Each year, more than 20,000 patients receive ECMO therapy in the United States.

As a transplant surgeon, Dr. Griffith saw a need and has dedicated much of his career to finding a better solution for these patients.

This easy-to-use compact ECMO system has an integrated oxygen concentrator that eliminates the need for bulky oxygen tanks promoting easier patient ambulation. The wearable, portable artificial lung system took decades to develop, but it is now one step closer to being available to those who need it most.

The company was founded in 2014, and UM Ventures invested in Breethe in 2015. Breethe obtained exclusive licensing rights to the intellectual property from UMB in 2015. In April 2020, Massachusetts-based Abiomed acquired Breethe and its novel oxygenation device to expand its product portfolio.

The FDA issued a 510(k) clearance of the device during the COVID-19 public health emergency, and the first patient in the world to use the Abiomed Breethe OXY-1 System™ was treated in December 2020 at the University of Maryland Medical Center. It is currently being used for other patients with acute respiratory distress syndrome, including patients with COVID-19 and trauma-related conditions.

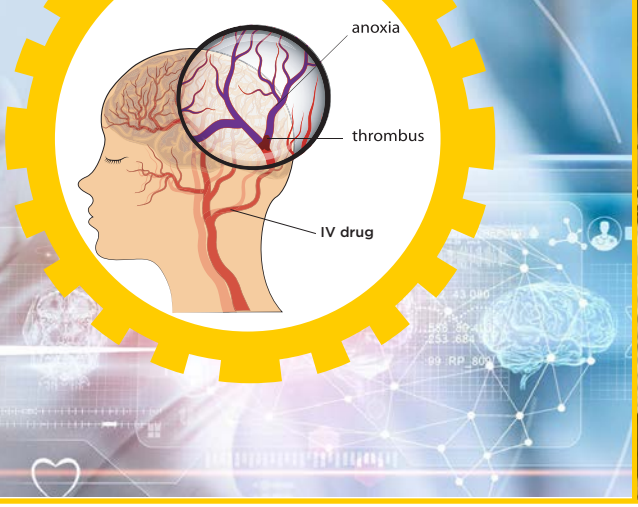
UM Ventures investing in *Breethe* early on shows that the University supports its entrepreneurs not just through words, but through action. Commercializing a device such as *Breethe's* wearable, artificial lung system requires much more than just monetary investment — it requires people backing you every step of the way and believing in your vision. To receive that support from the University has been invaluable."

Bartley Griffith, MD

Thomas E. and Alice Marie Hales Distinguished Professor in Transplant Surgery

Director, Cardiac and Lung Transplant Programs

2017 UMB Entrepreneur of the Year



DISCOVERED A NOVEL THERAPY TO REDUCE BRAIN SWELLING IN STROKE AND TRAUMATIC BRAIN INJURY

Dr. Simard is on the brink of a medical breakthrough for providing advanced treatments for the most devastating forms of stroke and traumatic brain injury (TBI). When the brain is deprived of its blood supply and swells, it can have devastating consequences. Brain surgery has been the only life-saving technique, but the results can often leave patients debilitated. Now, a promising alternative, discovered by Dr. Simard could advance the first-ever pharmacological intervention for stroke and TBI.

The pivotal discovery by Dr. Simard of an ion channel in the brain (SUR1-TRPM4) which is a key regulator of cerebral edema, has led to promising clinical trials using a repurposed diabetes drug, glyburide. Dr. Simard and his colleagues found that this new patented formulation, CIRARA™ (intravenous glyburide), significantly reduces dangerous swelling in the brain of patients with large hemispheric infarction (LHI), a severe form of ischemic stroke which normally carries a high mortality rate. Acute ischemic stroke is the leading cause of disability and the 5th leading cause of death in the United States.

After over a decade of development, Biogen completed an asset purchase of CIRARA™ in 2017 from Remedy Pharmaceuticals, which licenses the intellectual property exclusively from the University of Maryland. Biogen has continued investment in the development and commercialization of CIRARA™ now known as BIIB093 which has the potential to be the first major innovation in stroke in over 20 years. BIIB093 is currently in global Phase III clinical trial for stroke and a Phase II clinical trial for traumatic brain injury, bringing a new drug therapeutic one step closer to helping stroke and trauma patients.

"Translational science can take many years. Investment is critical to support the commercialization of innovative therapeutic interventions like CIRARA.™ Early seed support gives companies the momentum to advance novel clinical research while attracting investors and industry partners to obtain the resources necessary to bring these new treatments to patients."

J. Marc Simard, MD, PhD

Dr. Bizhan Aarabi Professor of Neurotrauma

Chief, Neurosurgical Service, Baltimore VA Medical Center

2008 UMB Entrepreneur of the Year

BOLDLY INVEST IN THE FUTURE OF MEDICINE

These examples are just the tip of the iceberg. We have wonderful opportunities at UMSOM for biomedical breakthroughs, and many scientists are doing work that has the potential to provide millions of patients with better health and better health care, not only in Maryland but around the world.

You can be a catalyst to fuel the spirit of entrepreneurship. Someone is dreaming up a new invention right now with the power to transform medicine. You can be part of the excitement as your philanthropic investment helps to turn these bold ideas into reality. Your gift to the UMSOM **Innovation Fund** will help drive breakthroughs by commercializing University discoveries through private-sector partnerships that grow the state's economy. In addition, you will support UMSOM's critical mission areas that will improve human health and well-being locally and globally.

medschool.umaryland.edu/InnovationFund

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