

# Cardiovascular Research Institute Strategic Plan



## Table of Contents

<b>Morehouse School of Medicine Mission, Vision, Core Values, Vision Imperatives</b>	<b>1</b>
<b>Cardiovascular Research Institute .....</b>	<b>2-3</b>
<b>CVRI Mission, Strategic Direction, Vision and Goals.....</b>	<b>4-6</b>
<b>CVRI Strategic Action Plan Framework.....</b>	<b>7-10</b>
<b>Conclusion.....</b>	<b>11</b>

# Morehouse School of Medicine

## MSM MISSION

The mission of the Morehouse School of Medicine (MSM) reflects its core purpose and the reason for its existence:

- Improve the health and well-being of individuals and communities.
- Increase the diversity of the health professional and scientific workforce.
- Address primary health care needs through programs in education, research and service.

With emphasis on people of color and the underserved urban and rural populations in Georgia, the nation, and the world.

## MSM VISION

Leading the creation and advancement of health equity.

## MSM CORE VALUES

MSM core values are aligned to six major themes, each characterized by a single word, that are reflected throughout MSM academic history (Figure 1).

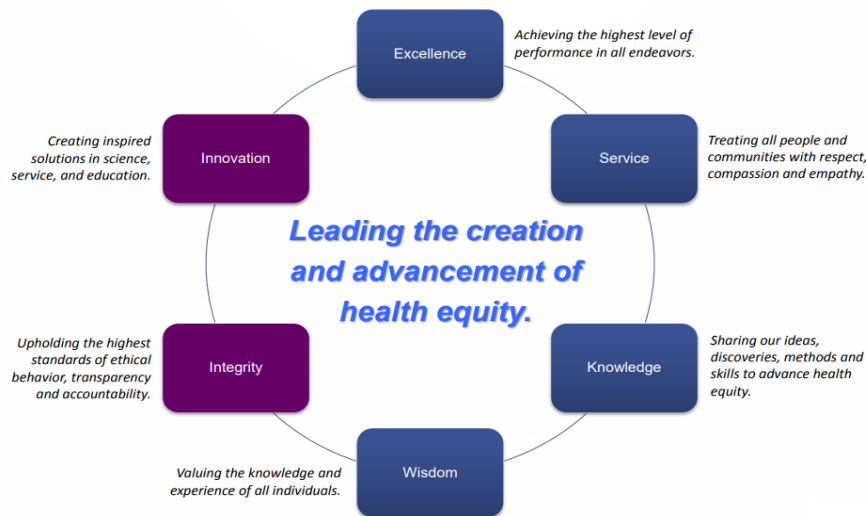


Figure 1: MSM Core Values

## MSM VISION IMPERATIVES AND GOALS

These six themes and their corresponding strategic goals are outlined in the [MSM 2015 Strategic Plan](#). MSM “audacious” vision corresponds to three Vision Imperatives:



# Cardiovascular Research Institute

## BRIEF HISTORY

The Cardiovascular Research Institute (CVRI) at Morehouse School of Medicine (MSM) was launched in July 1999 and one of the first Centers of Research Excellence at a historically minority institution. CVRI major initial funding was awarded by the National Institute of Health's (NIH) National Center for Minority Health and Health Disparities (NCMHD) and the National Heart, Lung, and Blood Institute (NHLBI).

CVRI encourages critical thinking that promotes excellence in translational cardiovascular research and education. Also, CVRI enhances cardiovascular research by bringing investigators together from multiple disciplines. Our institute consists of more than 10 faculty members from basic science, epidemiology, community health and clinical departments.

## CVRI'S ROLE IN THE QUEST FOR PRECISION IN HEALTH AND MEDICINE

### *The Opportunity*

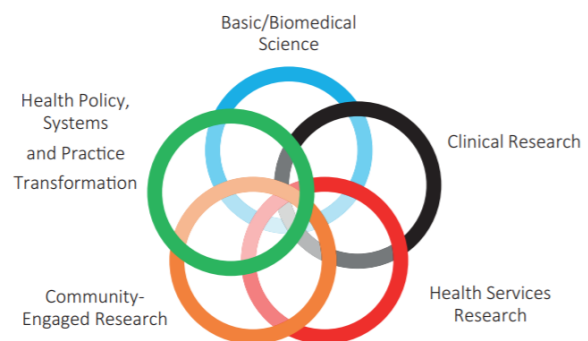
Precision in our approaches to promoting health and treating disease demands a robust basic biomedical science capability, and an intimate knowledge of social, psychosocial, demographics and genotypic data of potentially vulnerable and affected individuals. Accessing, discovering and analyzing expanding streams of data—including phenotype and molecular “omic” data from animal and human biological specimens, traditional medical data (e.g. electronic health records), and even potentially crowd-sourced data streams (e.g., mHealth and applications) capable of capturing details of individual exposomes (e.g. social, health behavior environmental data); all of which offers a promise for ushering a new age of precision in medicine.

### *The Challenge*

The required expertise resides in a multiplicity of disciplines that often speak very different languages. Institutions on the leading edge of innovation and experience are often competitors, and may reside in different sectors (e.g. academic, private-for profit). Full access to important data is in tension with the goals of data security and individual privacy.

### *CVRI and MSM T<sup>x</sup>™*

CVRI's new vision aligns with the MSM vision by building on a basic science foundation and embracing population science, emerging health technology and the impact of social determinants on physiology to enhance or impair cardiovascular health. CVRI will embrace MSM's T<sup>x</sup>™ model (Figure 2) which promotes and supports the convergence of interdisciplinary approaches and scientists to stimulate exponential advances in the health of diverse communities<sup>1</sup>. This research engages diverse disciplines and perspectives early in the process of identifying public health problems and framing opportunities, revealing



**Figure 2.** T<sup>x</sup> MSM Translational and Transformative Research Approach

<sup>1</sup> Henry Akintobi, T., Hopkins, J., Holden, K. B., Hefner, D., & Taylor, H. A., Jr (2019). Tx™: An Approach and Philosophy to Advance Translation to Transformation. *Ethnicity & disease*, 29(Suppl 2), p. 349.

different repositories of knowledge and lived experience<sup>2</sup>. The P50 Center of Excellence Award supported early research career development and inspired team science collaboratives and Blue-Sky projects investigating complex cardiovascular problems. Furthermore, the launching of CVRI's program of Affiliate and Associate faculty has brought scientific expertise from other disciplines and institutions. New creative partnerships with academic institutions, community stakeholders and private sector entities have given rise to increasing the breadth of the CVRI's research portfolio. For example, CVRI has recently engaged in research efforts that investigates individual and community resilience special populations (e.g. former NFL players), cardiovascular genomics (e.g. epigenetics of angiogenesis) and fresh paradigms (e.g. resilience in the face of risk). In addition, CVRI has established a closer affiliation with the landmark Jackson Heart Study, the largest community-based epidemiological study of cardiovascular disease among African Americans.

#### *CVRI and the New Genomics Medicine Institute at MSM*

The CVRI Director in association with an internal Genomics Interest Group and an External Advisory Council are developing a roadmap for the Morehouse School of Medicine Genomics Medicine Institute. This autonomous new institute will work closely with the CVRI (and other divisions of MSM and the AUC) as the latter pursues special collaborative investigations into the phenomenon of cardiovascular resilience and other topics of relevance to the African Diaspora and other populations.

#### *Data Science Integration – Present and Future*

In planning its future, CVRI is tasked to redefine its identity amidst MSM's institutional and the research climate's growing emphasis on data science integration. As noted above, CVRI has been tapped to lead MSM's goal of developing a genomics medicine institute. The MOYO mobile health application will set the stage for a multitude of new research opportunities in "big data" and digital epidemiology, machine learning, telehealth, STEM pipeline, community-based participatory research, training in computer coding, entrepreneurship ventures and data infrastructure development. Promising CVRI advances in computational genomics may lead to the creation of an African American genome. Data science will also be the engine that drives the predictive modeling and synthesis of environmental demographics and biological markers to build upon the MECA study.

#### *Current Research*

CVRI is a multidisciplinary institute that transcends traditional academic departmental structures to focus on advancing cardiovascular research and tion. CVRI's promising successor research projects in social epigenomics (MECA), mobile health and digital epidemiology (MOYO) and advanced genomic technology (i.e. genotyping, bioinformatics, computational and high throughput sequencing) led by Drs. Qing Song and Li Ma, are in sync with current research trends which increasingly stress the implementation of technology. Also, the MH-GRID project co-led by Drs. Rakale Quarells and Gary Gibbons (NHLBI) holds untapped potential for scientific productivity of genomic research of hypertension in African Americans. Additionally, CVRI basic scientists are conducting research on vascular biology and atherothrombosis (Dr. Dong Liu) and metabolism, obesity and metabolic diseases (Drs. Kameswara Badri and Sharon Francis), all have novel research that has both strong clinical translational relevance and correlation to resilience.

---

<sup>2</sup> Henry Akintobi et al., p. 351.

# CVRI Mission, Strategic Direction, Vision and Goals

## MISSION

To advance innovative multidisciplinary research to promote and preserve cardiovascular health.

## STRATEGIC DIRECTION

Conduct leading-edge cardiovascular research pertaining to human resilience (protection, promotion and preservation of healthy function) and exposomics (the exposures and stressors that perturb healthy CV function) by fostering unique collaborations disparate disciplines including basic, translational, clinical and population science approaches.

## VISION

The reconceptualized vision for CVRI is **to become a research leader in cardiovascular disease by fully embracing T<sup>x</sup> approaches from discovery to implementation**. This is an audacious vision that will require harnessing extant resources and the procurement of expanded capabilities, including expansion of collaborations internal and external; recruitment/partnering with scientists expert in bioinformatics and artificial intelligence/machine learning, digital epidemiology and human-computer interaction, along with stakeholder engagement—an MSM strength.

CVRI will lead MSM efforts in achieving *Translating Discovery into Health Equity* via three strategic themes shown in Figure 3:

1. Understanding and modifying the exposome (e.g. social and digital epidemiology) to improve cardiovascular health.
2. Multiomic<sup>3</sup> approaches (i.e. genomics, transcriptomics, epigenomics) to understand cardiovascular resilience and longevity.
3. Physiology of vascular biology and associated obesity related metabolic diseases.



Figure 3. CVRI Multidisciplinary Strategic Themes

We will: a) strategically expand CVRI research capacity b) cultivate existing and prospective partnerships; c) utilize existing datasets and biorepositories; and d) solidify MSM intra-departmental sharing of faculty, resources and collaboration (e.g., Neuroscience, Satcher Health Leadership Institute, Prevention Research Center, MSM Innovation Center).

MSM efforts in achieving *Translating Discovery into Health Equity* will guide the Cardiovascular Research Institute (CVRI) research efforts over the next five years:

**Goal 1: Build on discoveries rooted in CVRI's traditional focus on vascular biology and**

---

<sup>3</sup> Multiomics is a new approach where the data sets of different -omic groups are combined during analysis. The different -omic strategies employed during multiomics are genome, proteome, transcriptome, epigenome, and microbiome.

*metabolism by exploring methods to address the multiple levels of CV risk, and moving innovative insights along the pathway from “Inspiration to Implementation”*

Emphasis on the pursuit of basic scientific discoveries will continue to be a part of the CVRI mission. Examples like the ongoing research into molecular regulatory mechanisms governing the vascular biology of obesity and hypertension-related diseases; unraveling the mechanistic aspects of the proangiogenic effect of ASCs-released microvesicles; dissecting the molecular mechanisms of adipogenesis, smooth muscle myogenesis and other lines of investigation are illustrations of active bench science work.

The increasing prioritization of Tx approaches reflects a belief that solving complex health can be achieved by cross-disciplinary teams. CVRI will serve as a catalyst for such activity by expanding on its traditional focus on vascular biology. Everything that we will do to distinguish CVRI in interdisciplinary research will require a level of collaboration and teamwork that will allow our faculty and students to conceptualize their identity and commitment to CVRI in broader ways than signaled by their primary disciplines or departments. Partnering across institutes and departments in thoughtful ways will drive innovation.

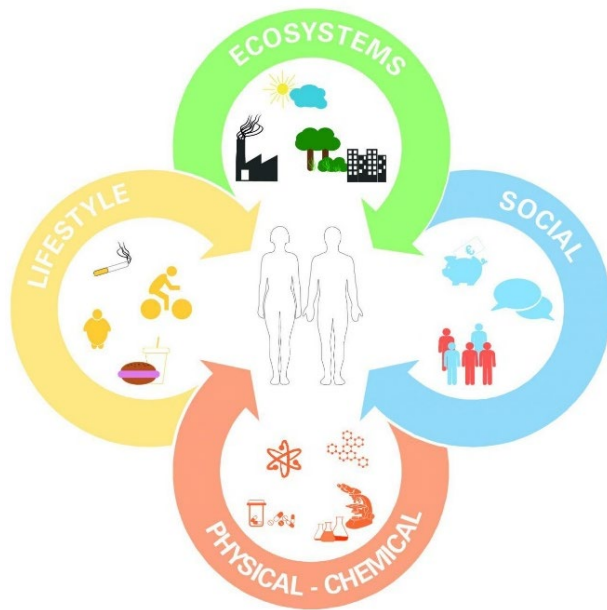
The merging of team science with translational research is in concert with MSM’s institutional strategic plan and will accelerate the emergence of new knowledge, products and approaches to implementation to transform cardiovascular health, particularly among the historically underserved<sup>3</sup>.

*Goal 2: Capitalize on the Research Advances that Integrate Data Science and Information Technology to Introduce and Build Infrastructure for a CVRI Digital Epidemiology Mobile Health Platform*

---

<sup>3</sup>Dankwa-Mullan I, Rhee KB, Stoff DM, Reineke-Pohlhaus J, Sy FS, Stinson Jr N, and Ruffin J. (2010). Moving Toward Paradigm-Shifting Research in Health Disparities Through Translational, Transformational, and Transdisciplinary Approaches. *Am J Public Health*, 100:S19–S24. doi:10.2105/AJPH.2009.189167.

CVRI collaborates with academia and the private sector to utilize advanced technologies related to social and digital epidemiology. CVRI continues to play a critical role in the development and testing of new digital health strategies, including MECA, MOYO and MOYO Mom Health Network. MOYO was developed to empower young adults and moms-to-be to embrace behaviors that can improve and monitor heart health through creative, digital health strategies (mHealth) technologies.



To continue our efforts, CVRI will have to recruit computational scientists and programmers to stay competitive in the ever-expanding data science landscape. Additionally, CVRI will need to acquire and deploy new faculty talent, comprised of epidemiologists, biostatisticians, bioinformaticians, clinicians and behavioral scientists.

Investment in data science infrastructure must be done in parallel to maximize the acquired faculty talent. Infrastructure will range from dedicated programmers, cloud technology, computer hardware and servers to build the necessary backend to support the expansion of the MOYO mobile health

app and data storage for the collection of granular data from research participants

*Goal 3: Cultivate research in human resilience and factors associated with high levels of cardiovascular health and longevity, despite adverse environmental and individual circumstances*

The concept of resilience is receiving increasing attention in cardiovascular disease and disparities. The CVRI is investigating contextual, individual and molecular factors contributing to cardiovascular resilience in the face of acute and chronic stressors. Resilience is also a research theme of the planned MSM Genomics Medicine Institute. Additionally, MSM is the major partner in a new Data Science Center at the AUC. The collaboration among the new AUCC Data Science Center, the CVRI, and the planned Genomics Medicine Institute (GMI) will be catalytic for research into resilience (and numerous other topics). This convergence of scientists, ideas and resources at MSM--an institution the has health equity as its DNA--sets the stage for an era of MSM leadership in innovative, transformative cardiovascular research.



# CVRI Strategic Action Plan Framework

**GOAL 1: BUILD ON DISCOVERIES ROOTED IN CVRI'S TRADITIONAL LONG-TERM FOCUS ON VASCULAR BIOLOGY AND METABOLISM BY EXPLORING METHODS TO ADDRESS THE MULTIPLE LEVELS OF CV RISK, "FROM MOLECULES TO MAIN STREET."**

## **TACTICS:**

- 1.1 Elucidate innovative methods for addressing social, cultural, and environmental determinants of health
- 1.2 Devise intervention-behavioral change strategies
- 1.3 Employ internal and cross-institutional collaborations to explore novel multidisciplinary approaches as a catalyst for scientific discovery, implementation and dissemination.
- 1.4 Train and mentor early career researchers and students in translational research and implementation science.
- 1.5 Recruit faculty in areas that build upon cardiovascular research, target persons that will complement our research strengths and advance our vision via molecular biology, genetics, physiology, clinical investigation, epidemiology, computational science, behavioral science and community-based interventions.

## **KEY METRICS:**

- ❖ New team collaborations formed
- ❖ Number of training programs administered or attended by CVRI faculty and students
- ❖ Increased number of grant proposals submitted and awarded, collaborations across departments and external research institutions.
- ❖ Interdisciplinary research manuscripts published
- ❖ Number of collaborations started with investigators and/or scientists from diverse disciplines
- ❖ Invited plenary talks at local, national, and international conferences.
- ❖ Number of graduate and postgraduate students with interdisciplinary programs or components to their disciplinary programs.
- ❖ Hiring of new faculty
- ❖ Increased membership of CVRI Associate and Affiliate program

## **ESTABLISHED AND EMERGING EXTERNAL COLLABORATIONS:**

- ❖ University of Michigan
- ❖ University of Washington
- ❖ Emory University
- ❖ Louisiana State University
- ❖ Harvard Medical School
- ❖ Medical University of South Carolina
- ❖ Jackson Heart Study
- ❖ Yale University School of Medicine
- ❖ University of Virginia
- ❖ OptumHealth

- ❖ 23andMe
- ❖ CDC Million Hearts Program

**STRATEGIC EXPANSION:**

- ❖ Resubmission of GaMATCHIS proposal in collaboration with Emory Global Diabetes Center
- ❖ Finalize metabolomics collaborative study with Dr. Charles Serhan of Brigham & Women's

**INTERNAL COLLABORATIONS/PARTNERSHIPS:**

- ❖ National Center for Primary Care
- ❖ Morehouse Healthcare Family Medicine
- ❖ Grady Hospital

## **GOAL 2: CAPITALIZE ON THE RESEARCH ADVANCES THAT INTEGRATE DATA SCIENCE AND INFORMATION TECHNOLOGY TO INTRODUCE AND BUILD INFRASTRUCTURE FOR A CVRI DIGITAL EPIDEMIOLOGY MOBILE HEALTH PLATFORM**

### **TACTICS:**

2.1 Combine technology interventions with classic epidemiologic and community-based participatory approaches to address issues of health disparities and social determinants.

2.2 Explore novel electronic approaches to granular, near-real time, “in the wild” health data collection, and mobile health interface with electronic health records

2.3 Expand the MOYO application in disciplines outside of cardiovascular (e.g. MOYO Mom) and align with Telehealth.

### **KEY METRICS:**

- ❖ Number of papers accepted and/or published
- ❖ Number of grant proposals/awards
- ❖ Amount of infrastructure monies secured
- ❖ Increase in the number of external and non-academic partnerships for research particularly in private sector partnerships, their sponsorship of projects and donated services/equipment.
- ❖ Data science faculty and programmers hired

### **ESTABLISHED AND EMERGING EXTERNAL PARTNERSHIPS:**

- ❖ Emory Biomedical Informatics
- ❖ Georgia Tech
- ❖ University of Virginia
- ❖ University of Texas-Dallas
- ❖ West Virginia University

### **STRATEGIC EXPANSION:**

- ❖ Pending proposal to establish an MSM Digital Epidemiology Unit for programming
- ❖ Mobile App Development
- ❖ Community Co-Creation/Modification of Novel Research Tools

### **INTERNAL COLLABORATIONS/PARTNERSHIPS:**

- ❖ Neuroscience Institute
- ❖ Satcher Leadership Institute
- ❖ National Center for Primary Care
- ❖ Prevention Research Center
- ❖ Morehouse Healthcare Family Medicine and Telehealth
- ❖ Atlanta University Center Consortium Data Science Center

### **PRIVATE SECTOR PARTNERSHIPS:**

- ❖ American Heart Association Precision Medicine
- ❖ United Health Group
- ❖ Sharecare

### **GOAL 3: CULTIVATE RESEARCH IN HUMAN RESILIENCE AND FACTORS ASSOCIATED WITH HIGH LEVELS OF CARDIOVASCULAR HEALTH AND LONGEVITY, DESPITE ADVERSE ENVIRONMENTAL AND INDIVIDUAL CIRCUMSTANCES**

#### **TACTICS:**

- 3.1 Conduct MECA successor studies to explore social genomics and epigenetic/metabolomic modeling of CV resilience.
- 3.2 Investigate biospecimen data to identify COVID-19 risk among patients with Sickle Cell Trait.
- 3.3 Apply “omics” research methods to existing MSM databases and biospecimens (MetaHealth, MH-GRID) to elicit new research pathways and publications.
- 3.4 Encourage secondary analysis of the wealth of data housed within CVRI
- 3.5 Develop algorithms for improved accuracy of multiomic analyses.

#### **KEY METRICS:**

- ❖ # of grant proposals/awards
- ❖ Completion of Genomics White Paper
- ❖ Recruitment of the Genomics Medicine Institute Director and team
- ❖ Number of faculty, postdoctoral fellows, and graduate students trained while conducting secondary analyses.
- ❖ Recruitment of participants
- ❖ Scientific publications reporting the progress and results of the research

#### **ESTABLISHED AND EMERGING EXTERNAL COLLABORATIONS:**

- ❖ Emory Clinical Cardiovascular Research Institute
- ❖ Harvard Catalyst
- ❖ Boston Children’s
- ❖ Grady Hospital
- ❖ Medical University of South Carolina
- ❖ Clinical and Translational Science Awards

#### **STRATEGIC EXPANSION:**

- ❖ Roadmap for the Development of the MSM Genomic Medicine Institute

#### **PRIVATE SECTOR PARTNERSHIPS**

- ❖ United Health Group
- ❖ Sharecare

# Conclusion

This plan outlines steps forward for the CVRI. CVRI's plan for 21st century science strives to be both evolutionary and revolutionary. Drawing on the core strengths of the unit, we will apply T<sup>x</sup> principles to both the structure and the programmatic pursuits of CVRI 2.0. The groundwork has been partially laid. Further development will require creativity, energy, commitment and long-term investment. Based on our proposed strategic goals, CVRI has formulated tactics and initiatives categorized by MSM Vision Imperatives to bring our department vision to fruition.

This new direction will require an organizational strategy to recruit an infusion of new research talent, coupled with the grooming and cultivation of current research faculty. Significant development needs exist, particularly at the interface of digital and social epidemiology, data science and computer technologies, and computational multiomics. Collaboration with research units with similar needs and/or resources must be an integral tactical approach. In some instances, trans-institutional partnerships that supplement MSM current capacities will continue to be necessary in the near term.

The blueprint outlined for the future of the CVRI will not only reaffirm MSM as the nation's pre-eminent academic medical institution for health equity, but also establish CVRI as a pioneer in technology-driven cardiovascular research that leverages methodologies and expertise of broad-based teams addressing complex problems in human cardiovascular health.