

## JACKSON HEART STUDY – BUILDING A 21<sup>ST</sup> CENTURY PLATFORM FOR DISCOVERY, SERVICE AND TRAINING TO ADDRESS AN AMERICAN HEALTH PRIORITY

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### INTRODUCTION

Health equity is an elusive goal. Statistics dating back to the early years of the nation testify to disparities in health among Americans along the lines of social and economic strata, as well as geography and race.<sup>1</sup> During the last 40 years, cardiovascular disease (CVD) disparities have become particularly burdensome, due, in part, to the significant death toll related to this cluster of diseases in Americans overall, and the markedly worse mortality experienced by African Americans and other subpopulations.

It is widely appreciated that African Americans (AAs) have borne a tragically excess burden of CVD. African Americans in the South, (where the majority still live despite huge waves of out-migration in the middle of the 20<sup>th</sup> century), seem to be particularly vulnerable (though many Northern cities, populated by AAs two or three generations removed from Southern roots, are often reported to have similarly distressing CVD statistics). While some analysts have found it tempting to ascribe the disparities to a disproportionate burden of poverty, a large and growing body of

literature clearly establishes that the explanations for discrepant health status among Americans are far more complex than what mere income differentials can explain.

### SOCIETAL AND HEALTH CARE PROGRESS AND THE AMERICAN HEALTH MOSAIC

The persistence of the health deficits for the AA population into the 21<sup>st</sup> century is as bedeviling as it is tragic and intolerable. There have been major gains in civil society for African Americans—a burgeoning middle class, higher educational attainment, and other marks of group advancement are well documented. Further, there have been dramatic advances in the understanding of what causes CVD, how to prevent it and what to do if it develops.<sup>2</sup> An explosion of new technologies, pharmaceuticals and systems approaches to cardiovascular health has spurred a dramatic improvement among Whites in America, but has had far less impact on their AA compatriots, producing ever-widening differences. The resulting mosaic of morbidity and mortality has inspired a number of authors to see multiple “America’s” within our borders, delimited principally by race and geography.<sup>3</sup>

These facts are especially stark in Mississippi. In 1999, a group of scientists, statisticians, educators and administrators who were engaged in the planning of the Jackson Heart Study, collaborated on an article that painted a picture of the rising levels of cardiovascular mortality in Mississippi

from 1979–1995. This analysis revealed the following picture of the CVD epidemic in Mississippi in the years just before the start of recruitment for the JHS:<sup>4</sup>

1. The 1995 age-adjusted cardiovascular disease mortality rate in Mississippi was the highest in the country; it was approximately 37% higher than the rate for the United States as a whole.<sup>5</sup>
2. In both the United States and Mississippi, African American men had the highest age-adjusted cardiovascular disease mortality rates.<sup>5</sup>
3. The age-adjusted mortality rates in Mississippi for African American women were 70% percent higher than for White women.<sup>5</sup>
4. The age-adjusted cardiovascular mortality rate for African American men was 46% higher than for White men.<sup>5</sup>
5. The three leading causes of cardiovascular disease mortality were heart disease, stroke and hypertension.<sup>5</sup>
6. In 1995, Mississippians had the highest heart disease mortality rate in the country, the fourth highest stroke rate and the third highest hypertension rate.<sup>5</sup>
7. The African American/White differentials in Mississippi for heart disease were even higher for women, whereas similar differentials were found for stroke and hypertension. Heart disease mortality rates were 62% higher in African American women than in White women. Differences between races were most pronounced in young adults.<sup>5</sup>
8. Between 1979 and 1995, cardiovascular disease mortality rates in

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Mississippi were slowly diverging from those in the United States, and rates for African Americans in Mississippi were increasing significantly as rates in the nation as a whole were decreasing.<sup>5</sup>

9. During the years 1979–1995, the divergence in mortality rates resulted in an estimated 19,400 excess deaths from cardiovascular disease in Mississippi.<sup>5</sup>
10. African American men in Mississippi in the 45–54 age groups had a 3.5 times greater chance of dying from cardiovascular disease than their White US counterparts. For African American women the relative risk was 4.2 times greater than for White women.<sup>5</sup>

### A RESPONSE FROM THE NIH

The JHS was conceived in the context of this CVD epidemic 12 years ago. Ambitious in scope, audacious in aims, it originally had the following objectives as enumerated in the Jackson Heart Study Protocol of April 27, 2000:

1. Identification of factors that influence the development and worsening of CVD in African Americans, with an emphasis on manifestations related to high blood pressure (such as enlargement of the left ventricle of the heart, coronary artery disease, heart failure, stroke and disorders affecting the blood vessels of the kidney).
2. Building research capabilities in minority institutions at the undergraduate and graduate level by developing partnerships between minority and majority institutions and enhancing participation of minority investigators in large-scale epidemiologic studies.
3. Attracting minority students to and preparing them for careers in public health and epidemiology.

The JHS Renewal Goals for June 2004 through May 2013 are to:

1. Continue a longitudinal epidemiological study of African American men and women by examination and follow-up of 5302 JHS participants.
2. Identify genetic, biological and environmental risk factors for development and progression on CVD in African American men and women.
3. Maintain cohort and community participation and continue community outreach for health education and risk reduction.
4. Enhance scientific productivity of the JHS and develop methods for enhancing cohort retention and participation.
5. Expand minority participation in CVD epidemiology research by building research capacities at minority institutions and attracting minority students to careers in epidemiology and public health.
6. Enhance genetic expertise of the JHS through collaboration with other universities and the National Heart Lung and Blood Institute to (or make this last part a new objective?) increase scientific productivity and training in the area of genetic epidemiology.<sup>6</sup>

### FUNDING AGENCIES AND PARTNERING INSTITUTIONS

Funding for the JHS is a collaborative endeavor among 3 of the 22 institutes of the National Institutes of Health (NIH). The JHS is funded through May 2013 by the National Heart, Lung and Blood Institute (NHLBI), and the National Institute on Minority Health and Health Disparities (NIMHD). Imaging studies, specifically CT scans of the carotid arteries and abdomen in Exam 2 and magnetic resonance imaging for structure and function of the heart for part of Exam 2 and all of Exam 3 is funded by the National Institute on Biomedical Imaging and Bioengineering (NIBIB). In addition, The JHS is a unique, collaborative sponsorship endeavor among two universities and one college,

all located in Jackson, Mississippi: Jackson State University, Tougaloo College, and the University of Mississippi Medical Center.

### BREADTH OF THE DATABASE: AN OVERVIEW

The JHS is a large, community-based, observational study whose participants were recruited from urban and rural areas of the three counties (Hinds, Madison and Rankin) that make up the Jackson, Miss., metropolitan statistical area (MSA). Participants were enrolled from each of 4 recruitment pools: random, 17%; volunteer, 22%; currently enrolled in the Atherosclerosis Risk in Communities (ARIC) Study, 30%; and secondary family members, 31%. Recruitment was limited to non-institutionalized adult African Americans, aged 35–84 years, except in the family cohort where those aged 21 to 34 years were eligible. The final cohort of 5,301 participants included 6.59% of all African American Jackson MSA residents aged 35–84 ( $N=76,426$ , US Census 2000). Major components of each exam included medical history, physical examination, blood/urine analytes, and interview questions on areas such as: physical activity; stress, coping and spirituality; racism and discrimination; socioeconomic position; and access to health care. At 12-month intervals after the baseline clinic visit (Exam 1), participants were contacted by telephone to update information; confirm vital status document interim medical events, hospitalizations, and functional status. Questions about medical events, symptoms of cardiovascular disease and functional status are repeated annually. Ongoing cohort surveillance includes abstraction of medical records and death certificates for relevant International Classification of Diseases (ICD) codes and adjudication of nonfatal events and deaths.

The Jackson Heart Study (JHS) provides a rare and valuable research resource maintained under the joint

**Table 1. Time, topic, presenters and moderators for day one – Thursday, September 23, 2010**

Time	Topic	Presenters/Moderators
8:45 AM Plenary	Major Cardiovascular Disease Outcomes: Priorities Today, Priorities Tomorrow for Research and Public Health	<b>Plenary Speaker:</b> Clyde Yancy, MD <b>Panel Moderator:</b> Ralph Sacco, MD <b>Panelists:</b> Errol Crook MD, Ervin Fox, MD, Veronique Roger MD, David Herrington MD <b>Working Group Co-Moderators:</b> Errol Crook, MD, George Howard, PhD
10:30 AM Plenary	Social, Cultural and Psychological Determinants of Cardiovascular Disease/Health: Current Insights, Future Focus	<b>Plenary Speaker:</b> David Williams, PhD <b>Panel Moderator:</b> Sherman James, PhD <b>Panelists:</b> Tene’ Lewis PhD, Cheryl Clark, MD, Marino Bruce, PhD, Mario Sims, PhD <b>Working Group Co-Moderators:</b> Ana Diez Roux, PhD, Mario Sims, PhD
12:15 PM Keynote	Advances in Biomedical Imaging: Today and Tomorrow	<b>Keynote Speaker:</b> Roderic Pettigrew, MD, PhD
1:30 PM	The Revolution in Risk Assessment and Disease Detection: Implications for Population Science	<b>Plenary Speaker:</b> Jeff Carr, MD <b>Panel Moderator:</b> William Heetderks, MD, PhD <b>Panelists:</b> Michelle Albert, MD, Greg Hundley, MD, Aurelian Bidulescu, MD, Jiankang Liu, MD <b>Working Group Co-Moderators:</b> Robert Garrison, PhD, William Heetderks, MD, PhD
4:30 PM	Synthesis of Working Group Recommendations	<b>Speaker:</b> Russell Tracy, PhD

stewardship of the JHS institutions and the NHLBI, NIHMD and NIBIB. These NIH institutes and the researchers it supports have a responsibility to the public and to the scientific community to encourage rapid scientific progress.<sup>7</sup> Detailed information is available on the JHS website [www.jhs.jsums.edu/jhsinfo](http://www.jhs.jsums.edu/jhsinfo)

## CONFERENCE HISTORY AND PLANNING

The JHS 2010 Scientific Conference was in the planning process for more than a year. Essentially, the Conference was a part of a larger process of self-review initiated by the JHS Director’s Office. We began with the solicitation of white papers on key CV health topics of relevance to the JHS from international thought leaders (early 2009); then a review of these submissions by a subgroup of the JHS Scientific Directions Committee, led by Dr Phil Greenland (fall 2009). The most compelling topics were chosen and formed the core of the agenda for the Anniversary Scientific Conference. After securing funding support from NHLBI,

NIMHD, NIBIB and local Jackson institutions, conference planning began in earnest. The subsequent review and synthesis of proceedings from the 2-day meeting reported in this supplement to *Ethnicity & Disease* have helped outline areas of emphasis for the future of a study, which is now maturing into an important platform for epidemiologic discovery.

On September 23, 2010, the two-day conference opened with 207 participants, from 21 states, the District of Columbia and Kingston, Jamaica, to an historic Jackson Heart Study Scientific Conference. The scientific conference, held at the Jackson Convention Center in downtown Jackson, Mississippi, was one of several activities over a 4-day period (September 23–25, 2010) to celebrate the 10th Anniversary of the enrollment of the first participant in the JHS, which occurred on September 26, 2000.

The theme, “Toward the Resolution of Cardiovascular Health Disparities” set the tone of the sessions. The conference format was also designed to allow conference participants the opportunity to make recommendations for future research priorities of the JHS and

the resolution of cardiovascular health disparities beyond 2020. Conference participants earned continuing education credit in accordance with the requirements of their discipline-specific accrediting agencies for physicians, nurses, pharmacists, social workers and dietitians.

The conference agenda featured keynote presenters, progressing to plenary speakers who were followed by panel presenters and culminating with participant engagement in concurrent discussion groups. The panels and discussion groups were moderated by carefully selected junior and senior investigators. Speakers were experienced and well known experts in six selected content areas: (1) Social Determinants of Cardiovascular Disease/Health; (2) Genetics; (3) Imaging and Biomarkers; (4) CVD Risk Factors: Obesity/ Physical Activity/ Nutrition; (5) CVD Risk Factors: Hypertension/Lipids/Diabetes; and (6) Major CVD Outcomes. Abstracts were invited for posters in these content areas as well as in the area of Community Engagement and Capacity Building. A total of 45 posters were

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**Table 2. Time, topic, presenters and moderators for day two – Friday, September 24, 2010**

Time	Topic	Presenters/Moderators
8:00 AM 8:30 AM	Cardiovascular Risk Factors, Population Genomics and Health CVD Health Factors and CVD Risk Factors: State of the Science, Emerging Priorities Part 1: Hypertension/Lipids/Diabetes	<b>Keynote Speaker:</b> Teri Manolio, MD, PhD <b>Plenary Speaker:</b> Donald Lloyd-Jones, MD, PhD <b>Panel Moderator:</b> Dan Jones, MD <b>Panelists:</b> Anne Sumner, MD, Keith Ferdinand, MD, Michael Steffes, MD, PhD, Malcolm Taylor, MD, John Flack, MD <b>Working Group Co-Moderators:</b> Caroline Fox, MD, Marjuyua Rowser, PhD
10:15 AM	CVD Health Factors and CVD Risk Factors: State of the Science, Emerging Priorities Part 2: Obesity/Physical Activity/Nutrition	<b>Plenary Speaker:</b> Robert Eckel, MD <b>Panel Moderator:</b> Katherine Tucker, PhD <b>Panelists:</b> Sameera Talegawkar PhD, Kristen Hairston, MD, Caroline Fox, MD, Patricia Dubbert, PhD <b>Working Group Co-Moderators:</b> O.T. Randall, MD, Sharon Wyatt, RN, PhD
Noon	The NHLBI Strategic Initiative and the Resolution of Cardiovascular Health Disparities	<b>Keynote Speaker:</b> Susan Shurin, MD
1:15 PM	What's Now and What's New in Genomics/Epigenomics and Cardiovascular Disease	<b>Plenary Speaker:</b> Rick Kittles, PhD <b>Panel Moderator:</b> James Wilson, MD <b>Panelists:</b> Linda Kao, PhD, David Reich, PhD, Joel Hirschhorn, MD, PhD <b>Working Group Co-Moderators:</b> Joel Hirschhorn, MD, PhD, James Wilson, MD
4:15 PM	Synthesis of Working Group Recommendations	<b>Speaker:</b> Keith Norris, MD

presented. Topic, presenters and moderators for the conference program are presented in Tables 1 and 2.

### ACKNOWLEDGMENTS

The JHS appreciates all who contributed to the success of the 2010 Scientific Conference and extends a very special thanks to our 5,301 participants, JHS investigators, non-JHS investigators and collaborators, support staff, speakers, moderators, Institute directors, college/university presidents, funding agencies, planning and coordinating committee, partnering institutions, the Jackson

Convention Center, and the Jackson community at-large. It has truly taken teamwork, commitment and dedication by the JHS village to reach this milestone. Surely, the JHS will achieve even more as it seeks to transform a history of heart disease among African Americans into a legacy of heart health.

### REFERENCES

1. Byrd W, Clayton L. *An American Health Dilemma A Medical History of African Americans and the Problem of Race, Beginnings to 1900*. New York: Routledge; 2000.
2. Nabel EG, Braunwald E. A tale of coronary artery disease and myocardial infarction. *N Engl J Med*. 2012;366(1):54–63.
3. Murray CJL, Kulkarni SC, Michaud C, et al. Eight Americas: investigating mortality disparities across races, countries, and race-counties in the United States. *PLoS Med*. 2006;3(9):e260.
4. Jones D, Sempos C, Thom T, et al. Rising levels of cardiovascular mortality in Mississippi, 1979–1995. *Am J Med Sci*. 2000;319(3):131–137.
5. Centers for Disease Control and Prevention, National Center for Health Statistics. Compressed Mortality File on CDC WONDER Online Database. <http://wonder.cdc.gov/cmfi-icd9.html>
6. *Technical Proposal in Response to RFP-NIH-NHLBI-HC-04-26*. Jackson Heart Study Exam Center. August 2004.
7. Jackson Heart Study website. <http://jhs.jsums.edu/jhsinfo/>. Last accessed June 15, 2012.