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# Understanding the rise in cardiovascular diseases in Africa: harmonising H3Africa genomic epidemiological teams and tools

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## Abstract

Cardiovascular diseases, principally ischaemic heart disease and stroke, are the leading causes of global mortality and morbidity. Together with other non-communicable diseases, they account for more than 60% of global deaths and pose major social, economic and developmental challenges worldwide. In Africa, there is now compelling evidence that the major cardiovascular disease (CVD) risk factors are on the rise, and so are the related fatal and non-fatal sequelae, which occur at significantly younger ages than seen in high-income countries. In order to tackle this rising burden of CVD, the H3Africa Cardiovascular Working Group will hold an inaugural workshop on 30 May 2014 in Cape Town, South Africa. The primary workshop objectives are to enhance our understanding of the genetic underpinnings of the common major CVDs in Africa and strengthen collaborations among the H3Africa teams and other researchers using novel genomic and epidemiological tools to contribute to reducing the burden of CVD on the continent.

**Keywords:** cardiovascular diseases, H3Africa, Africa, genomics, epidemiology

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Non-communicable diseases (NCDs) are currently responsible for over 60% of global deaths. NCDs, which threaten the economic and social development of nations across the globe, are predicted to increase in the coming decades.<sup>1</sup> Globally, non-communicable cardiovascular diseases (CVDs) are the leading cause of mortality, morbidity and rising healthcare costs.<sup>1–5</sup>

Although there are huge data gaps<sup>6,7</sup> and time lags between original data gathering and publication on the current burden of CVD in Africa, recent evidence suggests that the burden of stroke and other CVDs is rising on the continent.<sup>3,8–12</sup> Stroke is the second leading cause of death globally, with 70.9% of deaths due to stroke, and 77.7% of the disability-adjusted life years lost occurring in low- and middle-income countries, many of which are in Africa.<sup>8</sup>

Whereas ischaemic heart disease tops the list of CVDs in high-income countries, stroke predominates in African countries.<sup>3,10–13</sup> This is possibly because most African countries are in stage two or three of their epidemiological transition.<sup>14</sup> This epidemiological transition is due to a combination of lifestyle and dietary changes, urbanisation, and demographic transition (increasing life expectancy and population growth),<sup>7,14,15</sup> against a background of unique patterns of genomic variation.

Whereas from 1990 to 2010, the age-standardised incidence of stroke significantly decreased by 12% in high-income countries due to the successful deployment of public health tools and interventions,<sup>8</sup> it has increased in Africa.<sup>8,9</sup> There is an urgent need to identify knowledge gaps and propose a synergistic

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research agenda to accurately determine the current burden and fully characterise and quantify the factors underlying this epidemic in Africa.

The Cardiovascular Working Group of H3Africa therefore aims to explore this rising burden of CVDs using novel genomic and epidemiological tools to inform appropriate interventions for the continent. We seek to comprehensively characterise the genomic, sociocultural, economic and behavioural risk factors leading to the development of clinical risk factors (e.g. hypertension and diabetes) and sub-clinical disease (e.g. cardiac and cerebral vascular structural changes), which in turn result in multiple organ damage<sup>7,16</sup> (e.g. stroke, and kidney and heart failure).

To begin this work, the H3Africa Cardiovascular Working Group will hold an inaugural workshop on 30 May 2014 in Cape Town, South Africa, in conjunction with the fourth H3Africa consortium meeting ([www.h3africa.org/9-news/125-fourth-h3africa-consortium-meeting](http://www.h3africa.org/9-news/125-fourth-h3africa-consortium-meeting)). The specific working group objectives are (1) to review the current burden of CVDs and their risk factors in Africa, identifying knowledge gaps; (2) to provide the research and surveillance pillar of the integrated CVDs quadrangle (the remaining three pillars are prevention, acute care and rehabilitation) aimed at reducing the rising burden of CVDs; (3) to develop, nurture and strengthen synergistic symbiotic collaboration among H3Africa teams exploring CVDs and their risk factors using novel genomic and epidemiological tools; (4) to enhance our understanding of the genetic underpinnings of the common major CVDs in Africa and across the globe; and (5) to facilitate an appreciation of the pathophysiological interrelationships between cardiometabolic diseases and certain infectious/inflammatory diseases (e.g. rheumatic heart disease, HIV), the heart, brain and kidneys.<sup>7,16-21</sup> It is anticipated that refinement and harmonisation of phenotypic characteristics, consideration of environmental factors, and the recruitment of large numbers of well-characterised patients with diverse CVDs across the continent will result in a better understanding of the links between phenotype and genotype in this extremely important group of diseases.

In understanding these complex interrelationships throughout the course of life, we will study important pathways, including endothelial dysfunction, indices of microvascular damage (e.g. albuminuria), oxidative stress, inflammatory processes, as well as endocrine and paracrine influences.<sup>22-24</sup> Furthermore, we will explore how these indices inform the development of risk-prediction models and integrated surveillance systems, as well as tailored (responsive) systems and individual-level preventive and therapeutic interventions within and beyond the continent. The H3Africa Cardiovascular Working Group welcomes the active participation of all interested scientists in the inaugural workshop on 30 May 2014 in Cape Town.

We thank the members of the H3Africa consortium and its international expert panel of advisors for building this remarkable resource. The H3Africa consortium is funded by the National Institutes of Health and the Wellcome Trust. The workshop is supported by the National Institute of Diabetes and Digestive and Kidney Diseases, the National Heart, Lung and Blood Institute, the National Institute of Neurological Disorders and Stroke, the National Human Genome Research Institute, and the National Institutes of Health office of AIDS Research.

The Wellcome Trust <<http://www.wellcome.ac.uk/>> is a global charitable foundation dedicated to achieving extraordinary improvements in human and animal health. It supports the brightest minds in biomedical research and the medical humanities. The Trust's breadth of support includes public engagement, education and the application of research to improve health. It is independent of both political and commercial interests. See <http://www.h3africa.org/consortium/projects> for a complete list of grants.

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4 June 2014

Dear Catheter Laboratory Unit Manager

Re: Complementary ISCAP cardiac catheterisation manual to cath labs in Africa!

The Pan-African Society of Cardiology (PASCAR) is privileged to announce that the Interventional Society of Catheter Laboratory Allied Professionals (ISCAP), a working group of the South African Society of Cardiovascular Intervention (SASCI) has offered to donate a cardiac catheterisation training manual to each cath lab unit in Africa. ISCAP wishes to support educational partnerships with cath labs across Africa. This partnership will ultimately benefit the interventional cardiology patient in Africa and is a first step towards achieving this goal.

This manual was compiled by experienced South African catheter laboratory professionals over a two-year period and is issued under the auspices of SASCI and ISCAP. It was launched at the recent AfricaPCR course in Cape Town, South Africa, and was well received by cardiologists and allied professionals alike. The printing of the manual was primarily supported by B Braun South African, and Medtronic Africa offered to hand-deliver each manual. PASCAR wishes to thank these partners for their unconditional contribution to interventional cardiology education in Africa.

ISCAP would appreciate your feedback/opinion. Please forward comments and your contact details to George Nel ([george@medsoc.co.za](mailto:george@medsoc.co.za)), who will forward it to the respective societies.

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With appreciation,  
 Professor Bongani M Mayosi, DPhil, FCP (SA)  
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