

## EXECUTIVE SUMMARY

1. Cardiovascular disease (CVD) is the global leading cause of death. It has no geographic, gender or socio-economic boundaries. By 2030, it is projected that 23.6 million people will die from CVD, mainly from heart disease and stroke. In Singapore, CVD accounted for nearly 30% of all deaths in 2015, which equates to 16 CVD deaths per day. CVD was the top disease burden in Singapore, responsible for 20% of the total disease and injury burden in 2010. Of this, ischaemic heart disease (53% of CV burden) and stroke (34% of CV burden) were the main contributors. Much of this morbidity and mortality occurs earlier than observed in western countries.

2. The CVD Taskforce has identified multi-system macro-vascular disease as a common factor that underpins CVD in the nation. This underlies the common occurrence of adverse end organ events (myocardial infarction and heart failure; stroke) at a relatively young age. Cardiovascular risk factors (hypertension, metabolic syndrome, dyslipidaemia and diabetes) are prevalent and these are associated with more severe end organ disease for given risk factor burden than in the West. There are also ethnic differences in the disease burden. Lifestyle factors including nutrition (diet), exercise, smoking and psychosocial stress as well as cultural attitudes to treatment adherence could all play important contributory roles.

3. In developing the strategy for the HBMS initiative for CVD research funding, the Taskforce considered factors such as local disease burden, unmet medical needs, current research capabilities and competitiveness, and industry interest. Based on this approach, the Taskforce identified three priority themes for the HBMS Open Fund-Large Collaborative Grant (OF-LCG) for CVD:

**a. Macrovascular disease: myocardial infarction and chronic coronary heart disease**

Challenge Statement:

To support the of long-term goals of (i) delaying the average age of onset of acute coronary syndromes and acute heart failure events by 5 years within the next 5-10 years; (ii) reducing 30-days post-MI mortality by 30% over the next 5 years and (iii) doubling survival from Out-of-Hospital Cardiac Arrest over the next 5 years from 11% to 22%.

**b. Stroke**

Challenge Statement:

To support the long-term goals of (i) reducing the incidence of stroke by 20% in 10 years; (ii) reducing mortality and morbidity from stroke by 20%.

**c. Macrovascular disease: aortic and peripheral arterial disease**

Challenge Statement:

To support the long-term goals of (i) delaying the average age of onset of aortic and peripheral artery disease by 5 years within the next 5-10 years; (ii) reducing the number of surgical arterial interventions required for macrovascular disease

by 20% within the next 10 years, and (iii) establishing accurate documentation of the disease burden.

The goals of all three themes go hand-in-hand with efforts from MOH and healthcare institutions to promote screening of CVD risk factors (e.g. hypertension, diabetes, BMI, sex, age, obesity, diet, lipids) from age 40 in Singapore.

4. For the 5-year CVD research roadmap, the Taskforce has proposed a seamless set of national research priority areas covering the biology and sociology of CVD from risk to established disease and health services research. The key research priority areas are:

- a. Risk stratification of CVD by ethnicity, genetics, epigenetics, circulating biomarkers, advanced imaging, advanced wearable vital signs monitoring and data analytics.
- b. Biology of multi-system macro-vascular disease (coronary, cerebral, aortic, peripheral).
- c. Behavioural modification strategies and interventions, including monitoring of outcomes.
- d. Developing platforms that transects multi-system macrovascular cardiovascular and neurovascular diseases.
- e. Development of platforms to develop new therapeutic candidates or device prototypes to a state of “Readiness” for clinical testing.
- f. Establishing a national priority health resource: national population cohort study to definitively characterize the Asian disease phenotype.

5. In addition, the Taskforce has provided a series of recommendations on governance and structure, research capabilities and funding, and talent building, as well as addressing current impediments to CVD research. These address the following areas:

- a. Establishing leadership and mechanisms to address CVD research needs, translate research into health and economic outcomes, and improve coordination.
- b. Ensuring good balance in distribution of research funds.
- c. Building research capabilities in social science for CVD.
- d. Addressing issues around PDPA- and HIPAA HL7-compliance in CVD research.
- e. Building regional research networks in CVD.
- f. Building and retaining internationally competitive talent in CVD research.