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ASPC President's Message

The role of the preventive cardiologist in addressing climate change



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As I begin my term as the President of the American Society for Preventive Cardiology, I wished to reflect on the important impact that climate change is having on cardiovascular health calling for greater awareness of this issue in the preventive cardiology community. Climate change has altered our Earth and its impact on human health has become increasing concerning, particularly for cardiovascular health. As the American Society for Preventive Cardiology (ASPC) is recognized as leading the charge in cardiovascular disease prevention, we can no longer discuss this without addressing the effect climate change and pollution is having on cardiovascular health. In the past decade, we observed a 1.5 °Celsius elevation in the global mean surface temperature, which is significantly higher than any prior time period when compared with the pre-industrial period [1]. Rising temperatures, extreme weather, increases in greenhouse gasses (GHG) and rising sea levels are threatening human lives and dramatically impacting cardiovascular health.

Historically, physicians have quickly mobilized and addressed global threats to human health. Inexplicably, there has not been the same response to climate change, despite its unprecedented global impact on health. The United Nations Intergovernmental Panel on Climate Change (IPCC) report from 2021 noted unprecedented changes in the Earth's climate in every region, and stated that there was "discernable human influence on the global climate" and noted that how we respond in the next few years will determine how hot the earth gets, and how much it will stress all forms of life [2]. Unfortunately, some changes that have occurred because of climate change -such as rising sea levels- have found to already be irreversible [2].

Within the United States (US), the persons affected disproportionately by climate change and pollution are those already at the highest risk for cardiovascular disease [3]. Maps that demonstrate areas of higher risk of cardiovascular mortality in the US can be easily superimposed on maps of high concentrations of particulate matter, which are also superimposable on maps of the highest social deprivation index [3]. This is relatively unsurprising, given that neighborhood zoning in the US dates back to dates the Home Owners' Loan Corporation (HOLC) in the

1930s, which created maps of US cities based on racial composition, housing and neighborhood environments as a rating metric [4]. This resulted in discriminatory practices and racial segregation, and although it was outlawed in the 1960s, it created structures that have resulted in further widening health inequities, including harmful environmental exposures based on neighborhood [4]. The lowest HOLC grade given was a "D" and D neighborhoods were labelled as "red (hazardous) zones" based on investment risk for banks, but came to be known as historical redlining [4]. Results from the Multi-Ethnic Study of Atherosclerosis found an association of poorer cardiovascular health for Black adults who lived in historically redlined areas in the six enrolling cities, when compared with those living in the best neighborhoods [5]. Similarly, the Center for Disease Control and Prevention PLACES database has demonstrated the persistent association of redlined neighborhoods and cardiometabolic disease and cardiovascular risk factors [6].

Climate change is evident by both rising temperatures on Earth, extreme weather events, increased GHG and rising sea levels. The effect of climate change on human cardiovascular health is exerted both directly and indirectly [7]. Some of the direct effects are seen as a result of change in temperature and precipitation. The continued temperature rise, along with heat waves that are occurring in greater frequency, intensity and duration, are resulting in heat-related premature mortality or morbidity and quite frequently present as ischemic heart disease or stroke [7]. Extreme temperatures- heat or cold- are associated with cardiovascular mortality, with a U-shaped association of temperature and mortality from coronary artery disease [8]. Rising air pollution, worsened by an increase in wildfires, increased the risk for cardiovascular disease. Indirectly, heat and extreme weather will affect food and water availability, vector ecology, home stability, and will disproportionately affects those with the poorest social determinants of health [9]. Globally, nine million deaths annually are attributed just to GHG alone, with 62% of them due to cardiovascular disease, and although the World Health Organization recommends a mean annual air pollution level of 10 µg per cubic meter or less, 91% of the world's population currently lives in places that exceeds this threshold [10]. This makes air pollution

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the fourth leading cause of death, with ambient air pollution continuing to rise [10]. In high income countries, air pollution plays less of a role in cardiovascular disease than in the past, due to laws, regulations, and new technology that has reduced pollution significantly. For example, in the US, the passage of The Clean Air Act in 1970 resulted in a dramatic fall in air pollution [11]. Nonetheless, in much of the developing world, air pollution is worsening and even short term variations in particulate matter increase the risk of myocardial infarction, stroke and cardiovascular deaths [12].

There have been extensive reviews explaining the mechanisms by which climate change, pollution, extreme weather, and toxin pollutants affect cardiovascular risk factors and cardiovascular health [9,12]. Although reviewing their mechanisms is beyond the scope of this brief commentary, pollutants may cause inflammation and are associated with oxidative stress, resulting in altered vascular tone, autonomic tone, and endocrine dysfunction [13,14]. There is a noted elevated risk of hypertension, insulin resistance, and diabetes, resulting in an increased risk of cardiovascular disease [9,13,14].

For the preventive cardiology community, we must raise the alarm regarding climate change immediately and demand actionable solutions to this crisis. We must take on this risk factor with an urgency that must exceed our prior response to any other global epidemic if we are going to be able to offset the impact of climate change on cardiovascular disease

(Fig. 1) First, we must understand climate change and its impact on cardiovascular health. Second, assessment of climate change must become a core component of any cardiovascular prevention program. Individual assessment and providing recommendations for modifying exposure must be part of patient care. Helping our patients understand the effect of what we eat- not just on the cardiovascular system but also the environment- is an important part of patient education. Lastly, climate change is a modifiable risk factor, but it can only be modified on a population level if we can affect public policy, hence the need for a public health and policy intervention. Given the threat to global health, the cardiovascular prevention community must be the voice for action and change.

Additionally, we must look for solutions to climate change within our hospital systems, the places we are most likely to have the greatest influence. The healthcare sector is responsible for one-tenth of the GHG emissions in the US, which is much greater than the global estimate of 4.6% [15]. Our hospitals directly contribute through direct emissions from our healthcare facilities (including anesthetic gasses and combustion), in addition to indirect emissions from our high energy consumption in forms of gas and fossil fuels. Nonetheless, the greatest contribution of healthcare emissions come from the products and pharmaceuticals used in our hospital systems, each with their own carbon footprint. What we purchase and how we deal with waste



Fig. 1. Actionable item for the preventive cardiology community on climate change.

produced within a hospital, must be recognized for their role in climate change. The healthcare system must work to achieve carbon neutrality and implement plans for greener models of care [15] (Fig. 1).

The importance of the climate on health has been recognized in the US, with President Biden having directed the Secretary of the Department of Health and Human Services (HHS) in his first week in office in 2021 to establish an Office of Climate Change and Health Equity (OCCHE) to address the impact of climate change on the health of American people (Executive Order 14,008, Section 222(d)). Nonetheless, the office has yet to receive funding [16]. Under HHS, Million Hearts®, in collaboration with OCCHE and the Environmental Protection Agency, has initiated the Climate Change and Cardiovascular Disease Collaborative (CCC) with the goal of creating a national forum for healthcare organizations to expand their knowledge about cardiovascular threats that climate change and air pollution present, and develop interventions to address these threats, especially for vulnerable populations [17]. Cardiovascular organizations like the American College of Cardiology, the American Heart Association, the European Society of Cardiology and the World Heart Federation have issued a joint statement addressing the urgency to address air pollution, and have insisted that structural actions to mitigate pollution be undertaken [18]. There is no time to wait. We cannot simply ignore the problem and address cardiovascular disease prevention by addressing only the traditional cardiovascular risk factors that we have done in the past. As stated by President Barack Obama Bar,

“We are the first generation to feel the impact of climate change and the last generation that can do something about it.” [19].

Our time is now. Let's be the leaders in cardiovascular disease prevention and lead the way.

Declaration of Competing Interest

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