Rising global temperatures may threaten diabetics

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The World Health Organization estimates that of the 500 million people worldwide thought to have diabetes, 90 percent have type 2 diabetes and the number diagnosed with diabetes by 2020 will increase dramatically. As the review by Dr. Glen Kenny and colleagues titled "Body temperature regulation in diabetes" highlights, diabetes can impair the body's ability to thermoregulate leading to a relative inability to adequately regulate core temperature. As they discuss in their review, this can have a profound impact on the ability of individuals with diabetes to work and play in adverse environments which includes workers in many vital industries who may be regularly exposed to harsh environmental conditions.

Over the past 20 years, Dr. Glen P. Kenny of the University of Ottawa has directed his research activities at understanding how vulnerable populations such as older adults and individuals with chronic health conditions respond and adapt to harsh environments and extreme temperatures. In collaboration with Mr. Ryan McGinn of the University of Ottawa (medical trainee) and Dr. Ronal Sigal of the University of Calgary (endocrinologist, world expert in physical activity and diabetes), their review published in the journal *Temperature* discusses how their research assessing the effects of diabetes on the body's ability to dissipate heat, along with the previous work in this field, is playing an important role in advancing our understanding of the physiological factors that contribute to increased vulnerability to thermal stress in individuals with diabetes. This information is particularly timely considering that rising ambient temperature has been identified as a

major threat to global health especially in the most vulnerable populations groups such as those with diabetes.

As discussed in this review, individuals with diabetes are at a significantly greater risk for heat-related morbidity and mortality compared with the general population. They note that compared to young adults, even relatively healthy active adults aged ≥40 years have a reduced ability to dissipate heat during exposure to warm environments at rest and physical activity. However, this problem is worsened in those with even well-controlled Type 2 diabetes. The work conducted by Dr. Kenny employs a unique approach to assess thermoregulatory function in individuals with diabetes. Concomitant with the traditional measures of thermoregulatory function (skin blood flow, sweat rate, body temperatures), their studies integrate the use of one-of-a-kind whole-body calorimeter to accurately measure the rates of whole-body heat loss and the resultant changes in body heat storage. This novel approach has allowed his research team to achieve an unprecedented insight in the extent to which diabetes may impair thermoregulatory function.

As the authors discuss in their review, it cannot be ignored that type 2 diabetes is often accompanied by one or more other health conditions (obesity, hypertension, cardiovascular disease) which can further affect an individual's ability to dissipate heat during a heat stress. While research on this topic remains relatively limited, the authors note that there is an important need to develop a robust understanding of the cause-and-effect relationships between the thermal environment and health outcomes at the population level, including evidence-based identification of 'high risk' ambient conditions to activate appropriate short-term (health warning system, emergency response plan) and long-term (adaptation strategies for vulnerable individuals) response management activities that will enhance our ability to plan and respond to temperature extremes and therefore protect our vulnerable populations. For vital industries, this will include the development of new management

strategies tailored to protect their aging vulnerable workforce, which includes those individuals with diabetes, who represent an increasing proportion of the world's labour force.

More information: Glen P. Kenny et al. Body temperature regulation in diabetes, *Temperature* (2016). DOI: 10.1080/23328940.2015.1131506

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