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Editorial

Prolonged Sitting: the New Public Health Priority

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There has been a global rise in sedentary behaviour (sitting) at work and during leisure time due to technological advancements for workplace productivity, personal transportation, communication, and domestic entertainment. Sedentary behaviour, separate from physical inactivity, is defined as any waking behaviour characterised by an energy expenditure ≤ 1.5 Metabolic Equivalents while in a sitting or reclining posture [15]. Desk-based office work, driving in automobiles, and television viewing are all common examples of behaviours that encourage engagement in prolonged bouts of sitting and it is not surprising that this low energy expending behaviour is associated with increased levels of obesity [12]. However, the harmful consequences of prolonged sitting go beyond a simple issue of low energy metabolism. There is also a prolonged absence of muscular contractions, particularly in the lower limbs, which may induce negative effects on relatively fast-acting cellular processes important in the regulation of cardiometabolic risk factors such as glucose and lipids [8]. This hypothesis has received strong support over the past five years with a wealth of evidence published identifying prolonged sitting as an independent risk factor for morbidity and mortality from cardiovascular diseases, type 2 diabetes, and some cancers. Therefore, the potential health benefits of reducing prolonged sitting time need to be considered in order to identify public health priorities.

Recent meta-analyses of cross-sectional observation studies have demonstrated consistent findings that increased

daily hours of sitting is associated with increased risk of major chronic disease and premature mortality, independent of exercise or moderate-to-vigorous physical activity [2,14,16,17]. The meta-analysis by Biswas et al. [2] included forty-seven articles and reported significant hazard ratio associations between increased sedentary time (sitting) and all-cause mortality, cardiovascular disease mortality, cardiovascular disease incidence, cancer mortality, cancer incidence, and type 2 diabetes incidence. Wilmot et al. [17] conducted a meta-analysis of eighteen studies including 794,577 participants that revealed compelling evidence of sedentary time being a distinct chronic disease risk factor. Compared to participants who engaged in the lowest amount of sedentary time, those who engaged in the highest amounts had a 112%, 147%, 90% and 49% increased risk of diabetes, cardiovascular disease, cardiovascular mortality, and all-cause mortality, respectively. There has also been a wealth of cross-sectional data demonstrating that increased total daily sedentary time measured using accelerometry is associated with adverse cardiometabolic risk factor levels, independent of moderate-to-vigorous physical activity (see Brocklebank et al. [3] for a review of these studies). There is consistent evidence of an unfavourable association between total sedentary time and insulin sensitivity and some evidence of unfavourable associations with fasting insulin, insulin resistance, and triglycerides [3].

In addition to the detrimental health effects of total sedentary time, the manner in which sedentary time is accumu-

lated is emerging as a significant health risk factor. Several cross-sectional studies have reported beneficial associations between increased breaks in sedentary time and cardiometabolic risk factor levels including waist circumference, body mass index, triglycerides, and 2-h glucose [5,9,10]. These associations persisted after adjustment for moderate-to-vigorous physical activity and total sedentary time. This evidence informed the pioneering experimental study by Dunstan et al. [7] who observed significant reductions in glucose and insulin concentrations over a 7 h period when prolonged sitting was interrupted with 2 min bouts of light- or moderate-intensity walking every 20 min during a 5 h postprandial period. A number of studies have since been published demonstrating significant improvements in cardiometabolic risk marker levels when prolonged sitting is frequently broken up with short bouts of activity (see Benatti et al. [1] for a review of these studies). Remarkably, there is evidence that greater improvements in postprandial glucose occur when engaging in short regular activity breaks compared to a single energy-matched continuous bout of activity [11,13].

There is now sufficient evidence to consider a shift in public health policy to a greater focus on reducing prolonged bouts of uninterrupted sitting. Government and professional bodies around the globe have begun to update physical activity guidelines to reflect this increased understanding. The Australian government released guidelines in 2014 that included reference to sedentary behaviour, but these were broad and nonspecific (“Minimise the amount of time spent in prolonged sitting”, and “Break up long periods of sitting as often as possible”) [6]. The first global guidelines on reducing sedentary behaviour in the workplace were published in early 2015, which included specific recommendations on accumulating standing and light activity (initially 2 h/day) and regularly breaking up seated-based work [4]. Although this is a good starting point, these recommendations are based on limited data and further efforts are needed to inform effective and sustainable changes in policy and guidelines that are based on strong scientific evidence. Further substantial investment in research to further our understanding and help tackle the global epidemic of prolonged sitting is warranted.

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