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Active Voice: Sedentary Behavior and Regional Fat Distribution: Are You Sitting Too Comfortably?

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Viewpoints presented in SMB commentaries reflect opinions of the authors and do not necessarily reflect positions or policies of ACSM.

Joseph Henson, Ph.D., is a research associate in sedentary behavior, physical activity and health at the Leicester Diabetes Centre, University of Leicester, UK. The Leicester Diabetes Centre is an international center of excellence in research, education and innovation, which is a partnership between the University Hospitals of Leicester NHS Trust and the University of Leicester and is led by Professors Kamlesh Khunti and Melanie Davies. His research, which is funded by the National Institute for Health Research (NIHR) Leicester-Loughborough Diet, Lifestyle and Physical Activity Biomedical Research Unit, focuses on the independent association of sedentary behavior and the impact of interruptions upon chronic disease markers, particularly those affiliated with Type 2 diabetes (T2DM).



*This commentary presents Dr. Henson's views on the topic of a research article that he and his colleagues had published in the August 2015 issue of *Medicine & Science in Sports & Exercise* (MSSE).*

Our modern day society now encompasses an ecological niche in which sedentary behavior (best conceptualized as sitting during waking hours with low energy expenditure) and labor-saving devices have become the new reference of living. Despite this shift being considered by many as an improvement in living conditions, the insidious nature of sedentary behavior has undoubtedly created a mismatch between our evolutionary history and the environment for which humans adapted. Within modern society, many adults now spend the majority of their waking hours sedentary (up to 70 percent), a figure that far surpasses the hunting, gathering and migratory patterns of our ancestors.

Recently, multiple observational studies have demonstrated a positive association between objectively measured sedentary time and markers of diabetes risk, independent of the amount of moderate-to-vigorous physical activity (MVPA) undertaken. These findings, alongside its ubiquitous nature, suggest that sedentary behavior is likely to be a distinct risk factor for type 2 diabetes mellitus (T2DM) and, thus, a potential target for lifestyle intervention.

In this observational study, [published in the August issue of MSSE](#), we examined the association between objectively measured sedentary time and heart, liver, visceral and total body fat, independent of MVPA and whole body fat in a population at high risk of T2DM. These are important markers of health, particularly as regional fat deposits have been postulated to be of greater importance than overall adiposity in provoking metabolic disturbance.

We examined magnetic resonance images (MRI) and accelerometer data from 66 participants, who were recruited from diabetes prevention programs. Each 30 minutes of sedentary time was associated with a 15.7cm³ increase in heart fat (p=0.008), 1.2 percent increase in liver fat (p=0.026) and a 183.7cm³ increase in visceral fat (p=0.039) after adjustment for several covariates, including glycemia, whole body fat and MVPA.

The findings from this study suggest that objectively measured sedentary behavior has a deleterious impact upon heart, liver and visceral fat in individuals at a high risk of T2DM. Interestingly, since the associations remained after adjustment for whole body fat and MVPA, it may suggest that sedentary behavior is linked to selective depositions of fat which cannot be fully explained by an increase in overall adiposity and may act via an independent mechanism. These observations need further examination in carefully controlled experimental research studies.

The results from this study, coupled with the mounting evidence promulgating the importance of reducing sedentary behavior as a therapeutic target (particularly in the promotion of metabolic health), mean there is an

ongoing need to establish causation while also considering how this evidence can be incorporated into diabetes prevention and treatment pathways. In particular, care is needed regarding how interventions aimed at reducing sedentary behavior are integrated alongside the well-recognized benefits of participation in regular MVPA. It is plausible that highly sedentary and inactive individuals may benefit from a stepped interventional approach whereby the first step is aimed at reducing sitting time through increasing standing or light ambulation before more purposeful MVPA is introduced.