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Journal

Cell Reports Medicine, 2(7)

ISSN

2666-3791

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Publication Date

2021-07-01

DOI

10.1016/j.xcrm.2021.100356

Peer reviewed

Cell Reports Medicine

CellPress
OPEN ACCESS

Preview

Human brown fat, adiposity, and cardiometabolic health: New pieces to the puzzle

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https://doi.org/10.1016/j.xcrm.2021.100356

Brown adipose tissue (BAT) is an emerging target against obesity and its related metabolic diseases. Wibmer et al.[1] recently reported that human BAT is associated with a healthier fat distribution and improved cardiometabolic health independent of adiposity and fat distribution.

Since the confirmation of functional brown adipose tissue (BAT) in human adults approximately a decade ago,[2–4] there has been intense scientific interest on understanding the metabolic significance of BAT in the context of obesity and its related cardiometabolic complications (e.g., type 2 diabetes [T2D], atherosclerotic dyslipidemia, hepatic steatosis, and cardiovascular disease). Convincing evidence from studies in animal models and clinical investigations support the notion that BAT functions as a "metabolic sink" for nutrients because of its high capacity for substrate oxidation and heat production.[5] More recent studies suggest that BAT may affect metabolism in other tissues by secreting signaling molecules with endocrine function.[6] Twelve years after the re-discovery of BAT in humans, there is still ongoing scientific debate with regard to the clinical and physiological significance of human BAT in metabolic health. One of the current gaps in knowledge is understanding the interrelationship between BAT, adiposity, fat distribution, and cardiometabolic health.

To address this gap in knowledge, Wibmer and colleagues[1] performed a retrospective observational study involving review of medical and imaging records of patients admitted for cancer diagnosis, treatment, or monitoring in a major cancer center in the United States. ^{18}F-fluorodeoxy-glucose positron emission tomography computed tomography (PET/CT) scans were analyzed to assess the presence of BAT and its peak metabolic activity. To determine the relation between BAT, body fat distribution, and cardiometabolic health, the authors compared individuals with and without detectable BAT (BAT+ and BAT−, respectively). The two groups were matched for a number of factors that may affect the prevalence of detectable BAT including age, gender, body mass index, and outdoor temperature in the month of the PET/CT scan. The BAT+ group had improved indices of cardiometabolic health (lower blood glucose, triglycerides, and white blood cells [WBC], and higher liver density and high-density lipoprotein [HDL] cholesterol), lower prevalance of T2D, and healthier fat distribution (lower visceral adipose tissue [VAT] area, higher subcutaneous adipose tissue [SAT] area, and SAT/VAT ratio) compared with the BAT− group. To further evaluate the relationship between BAT and metabolic health independent of fat distribution, the authors performed multivariate regression analyses adjusting for VAT and SAT area and/or the ratio of the two. BAT was independently associated with lower blood glucose, WBC count, triglycerides prevalence of T2D, and higher HDL cholesterol and liver density even after adjusting for adiposity and body fat distribution. Interestingly, the reported protective relationship between BAT and cardiometabolic health was even more pronounced for individuals with central adiposity (i.e., SAT/VAT area).

This study adds new pieces to the puzzle of understanding the role of BAT in metabolic health. The reported findings support the notion of an interrelationship between BAT, body fat distribution, and cardiometabolic health. The reported link between BAT and body fat distribution and the association between BAT and metabolic health, independent of body fat distribution, are the major novel findings of the study. These findings support and expand the knowledge produced by previous investigations on the link between BAT and metabolic health (reviewed elsewhere[7–9]). Limitations of this study include its retrospective study design and lack of mechanistic insights. Future studies are needed to prospectively and mechanistically investigate the clinical and physiological significance of BAT in the context of obesity and its related cardiometabolic diseases.

ACKNOWLEDGMENTS

M.C. is supported by the National Institutes of Health UL1-TR001860 and the USDA National Institute of Food and Agriculture, Hatch project number CA-D-NTR-2618-H. L.S.S. is supported by a grant from American Diabetes Association (14-TS-35) and Rutgers University start-up funds.

DECLARATION OF INTERESTS

The authors declare no competing interests.

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