

# Obesity may be impacted by stress, study says

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This is an image of a weight scale. Credit: CDC/Debora Cartagena

Using experimental models, researchers at Boston University School of Medicine (BUSM) showed that adenosine, a metabolite released when the body is under stress or during an inflammatory response, stops the process of adipogenesis, when adipose (fat) stem cells differentiate into adult fat cells.

Previous studies have indicated adipogenesis plays a central role in maintaining healthy fat homeostasis by properly storing fat within cells so that it does not accumulate at high levels in the bloodstream. The current findings indicate that the body's response to stress, potentially stopping the production of fat cell development, might be doing more harm than good under conditions of obesity and/or high levels of circulating [blood fat](#).

The process is halted due to a newly identified signaling from an adenosine receptor, the A2b adenosine receptor (A2bAR) to a stem cell factor, known as KLF4, which regulates stem cell maintenance. When A2bAR is expressed, KLF4 level is augmented, leading to inhibition of differentiation of [fat stem cells](#). The correlation between these two factors leads to an interruption of fat cell development, which could result in issues with [fat storage](#) within the cells and it getting into the bloodstream.

While the majority of the study was carried out in [experimental models](#), the group also showed that A2bAR activation inhibits adipogenesis in a human primary preadipocyte culture system. Finally, analysis of [adipose tissue](#) of obese subjects showed a strong association between A2bAR and KLF4 expression in both subcutaneous (under the skin) and visceral (internal organ) human fat.

"It may seem counterintuitive, but our body needs fat tissue in order to function properly, and certain biochemical cellular processes are necessary for this to happen," said Katya Ravid, DSc/PhD, professor of medicine and biochemistry at BUSM and director of the Evans Center for Interdisciplinary Biomedical Research who led the study. "Our study indicates that a dysfunction resulting from stress or inflammation can disrupt the process of fat tissue development, which could have a negative impact on processes dependent on proper fat cell homeostasis."

This study is part of ongoing research interest and investigations by researchers in Ravid's lab examining the differentiation of bone marrow and tissue [stem cells](#) and the role of adenosine receptors in this process.

Provided by Boston University Medical Center

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