

Study reveals a biological link between stress and obesity

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Laurel and Hardy and the microRNA connection – it's not coincidental that the heavier character is also the most anxious of the duo. Credit: Petra Pollins

Metabolic and anxiety-related disorders both pose a significant healthcare burden, and are in the spotlight of contemporary research and therapeutic efforts. Although intuitively we assume that these two phenomena overlap, the link has not been proven scientifically.

Now, a team of researchers from the Hebrew University of Jerusalem, headed by Prof. Hermona Soreq from the Edmond and Lily Safra Center for Brain Sciences, revealed the molecular elements that bridge anxiety and metabolism – a type of microRNA that influences shared biological mechanisms.

"We already know that there is a connection between body and mind, between the physical and the emotional, and studies show that psychological trauma affects the activity of many genes. Our previous research found a link between microRNA and [stressful situations](#) - stress and anxiety generate an inflammatory response and dramatically increase the expression levels of microRNA regulators of inflammation in both the brain and the gut, for example the situation of patients with Crohn's disease may get worse under psychological stress," says Prof. Soreq.

"In the present study, we added obesity to the equation. We revealed that some anxiety-induced microRNA are not only capable of suppressing inflammation but can also potentiate metabolic syndrome-related processes. We also found that their expression level is different in diverse tissues and cells, depending on heredity and exposure to stressful situations," explains Prof. Soreq.

The family of microRNA genes is part of the human genome, which was considered until not too long ago as "junk-DNA". However, microRNAs are now known to fulfill an important role in regulating the production process of proteins by other genes. These tiny RNA molecules, which are one percent of the average size of a protein-coding gene, act as suppressors of inflammation and are able to halt the production of proteins.

The research paper, published in the journal *Trends in Molecular Medicine*, details the evidence linking microRNA pathways, which share regulatory networks in metabolic and anxiety-related conditions. In

particular, microRNAs involved in these disorders include regulators of acetylcholine signaling in the nervous system and their accompanying molecular machinery.

Metabolic disorders, such as abdominal obesity and diabetes, have become a global epidemic. In the USA, the prevalence of metabolic syndrome is as high as 35 percent. In other countries, such as Austria, Denmark and Ireland it affects 20-25 percent of the population.

Anxiety disorders are harder to quantify than metabolic ones. They include obsessive-compulsive disorder (OCD), [post-traumatic stress disorder](#) (PTSD) and phobia. The full burden of the anxiety spectrum is difficult to assess, due to under-diagnosis and poorly defined pathophysiological processes.

This newly revealed link offers novel opportunities for innovative diagnoses and treatment of both metabolic and anxiety-related phenomena.

"The discovery has a diagnostic value and practical implications, because the activity of microRNAs can be manipulated by DNA-based drugs," explains Prof. Soreq. "It also offers an opportunity to reclassify 'healthy' and 'unhealthy' anxiety and metabolic-prone states, and inform putative strategies to treat these disorders."

More information: Chanan Meydan et al, MicroRNA Regulators of Anxiety and Metabolic Disorders, *Trends in Molecular Medicine* (2016). [DOI: 10.1016/j.molmed.2016.07.001](https://doi.org/10.1016/j.molmed.2016.07.001)

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