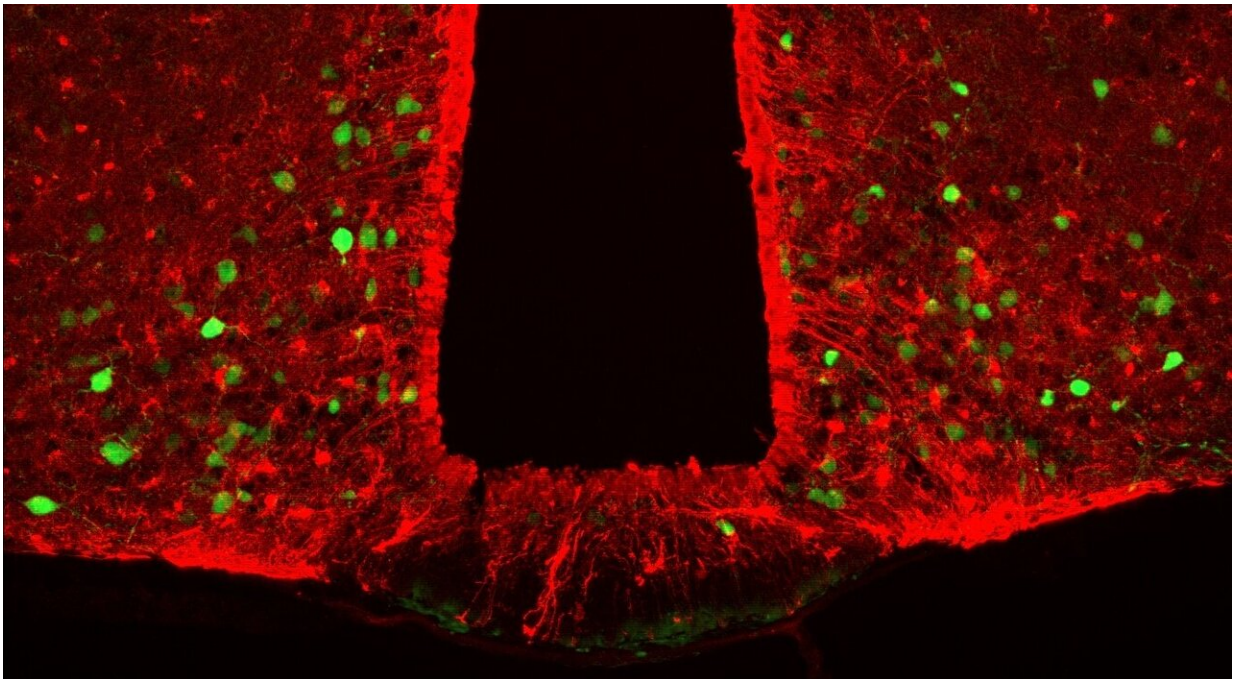


# Obesity: The key role of a brain protein revealed

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POMC neurons labeled with green fluorescent protein (GFP) and red astrocytes expressing ACBP protein in the arcuate nucleus of the hypothalamus. Credit: Khalil Bouyakdan / CHUM 2019

Regardless of how much you exercise or how balanced your diet is, controlling your weight is more brain-related than you might have thought. In a study published in the *Journal of Clinical Investigation*, researchers from the University of Montreal Hospital Research Centre

(CRCHUM) show for the first time in mice that the acyl-CoA-binding protein, or ACBP, has a direct influence on the neurons that allow rodents and humans to maintain a healthy weight.

In April 2015, Thierry Alquier, a CRCHUM researcher and the lead author of this study, had already revealed, with his team, that this same protein allowed astrocytes, cells that support neuronal functions, to communicate variations in fatty acids and lipids in the blood to [neurons](#). Thanks to this essential piece of information, the brain can adjust [food intake](#) and energy expenditure—and, ultimately, control its owner's weight.

"With colleagues from the Université de Bordeaux's NutriNeuro laboratory, we now show that neurons that reduce [food](#) intake, known as proopiomelanocortin neurons or POMC neurons, are in 'close communication' with astrocytes that produce the protein ACBP in a specific area of the brain: the arcuate nucleus of the hypothalamus," said Thierry Alquier, associate professor at Université de Montréal.

Essential for the control of feeding and metabolism, this area of the hypothalamus contains two populations of neurons with opposing functions when activated: the first results in an increase in food intake; the second—POMC neurons common to animals and humans—promotes a reduction of food intake and an increase in [energy expenditure](#).

## A species issue?

"Genetic mutations explain five to 10 per cent of obesity cases," said Alquier. "Among these cases, a large proportion is related to a disruption of this neuronal pathway commonly known as the melanocortin pathway. We observed that the deletion of the ACBP gene in astrocytes of the arcuate nucleus promotes obesity. In mice that were genetically modified

to be obese, we observed in the laboratory that injecting them daily with ACBP led to a reduction of food intake and weight loss in the order of 5 per cent over five days, a mechanism that relies on the activation of POMC neurons."

However, the researcher urged caution in translating this discovery to humans. This study is at the basic research stage and was carried out in the laboratory on mice.

Recognized by the World Health Organization as a global public health problem, obesity is a major risk factor for certain chronic illnesses, such as type 2 diabetes, cardiovascular diseases and certain cancers, and for musculoskeletal disorders and premature death.

**More information:** Khalil Bouyakdan et al, The gliotransmitter ACBP controls feeding and energy homeostasis via the melanocortin system, *Journal of Clinical Investigation* (2019). [DOI: 10.1172/JCI123454](https://doi.org/10.1172/JCI123454)

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