

Brain circuit that makes it hard for obese people to lose weight

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(Medical Xpress)—Imagine you are driving a car, and the harder you press on the accelerator, the harder an invisible foot presses on the brake. That's what happens when obese people diet – the less food they eat, the less energy they burn, and the less weight they lose.

While this phenomenon is known, scientists at Sydney's Garvan Institute of Medical Research and the University of NSW have pinpointed the exact [brain circuitry](#) behind it and have published their findings in the prestigious international journal [Cell Metabolism](#), now online.

Dr Shu Lin, Dr Yanchuan Shi and Professor Herbert Herzog and his team have been studying the complex processes behind energy balance using various mouse models. They have shown that the neurotransmitter Neuropeptide Y (NPY), known for stimulating appetite, also plays a major role in controlling whether the body burns or conserves energy.

The researchers found that NPY produced in a particular region of the brain – the arcuate nucleus (Arc) of the hypothalamus – inhibits the activation of 'brown fat', one of the primary tissues where the body generates heat.

"This study is the first to identify the neurotransmitters and [neural pathways](#) that carry signals generated by NPY in the brain to brown [fat cells](#) in the body. It is also the first to show a direct connection between Arc NPY, the [sympathetic nervous system](#) and the control of energy expenditure." said Professor Herzog.

"We know that NPY also influences other aspects of the sympathetic nervous system – such as heart rate and gut function – but its control of [heat generation](#) through brown fat seems to be the most critical factor in the control of [energy expenditure](#)."

"When you don't eat, or dramatically curtail your calorie intake, levels of NPY rise sharply. High levels of NPY signal to the body that it is in 'starvation mode' and should try to replenish and conserve as much energy as possible. As a result, the body reduces processes that are not absolutely necessary for survival."

"Evolution has provided us with these mechanisms to help us survive famine, and they are strictly controlled. When people had to survive by finding food or hunting game, they could not afford to run out of energy and die of exhaustion, so their bodies evolved to cope."

"Until the twentieth century, there were no fast food chains and people did not have ready access to high fat, high sugar, foods. So in evolutionary terms, it was unlikely that people were going to get very fat and mechanisms were only put in place to prevent you losing weight."

"Obesity is a modern epidemic, and the challenge will be to find ways of tricking the body into losing weight – and that will mean somehow circumventing or manipulating this NPY circuit, probably with drugs."

Provided by Garvan Institute

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