MedicalXpress

Researchers shed light on fat burning

February 5 2009

Researchers at Georgia State University have found that fat cells give feedback to the brain in order to regulate fat burning much the same way a thermostat regulates temperature inside a house.

With as increase in obesity threatening the health and life expectancies of people across the world, the research may help scientists better understand how weight is shed.

C. Kay Song and Tim Bartness of Georgia State, along with Gary J. Schwartz of the Albert Einstein College of Medicine, found that during the process of burning fat — called lipolysis — fat cells use sensory nerves to feed information to the brain.

Using viruses to trace communications in the nerves of Siberian hamsters, they found that the brain uses part of the nervous system used to regulate body functions, called the sympathetic nervous system, to in turn communicate back to the cells to initiate, continue or stop the fat burning depending upon the information the brain receives from the fat.

"The brain can trigger lipid burning by fat cells and through these sensory nerves, the fat cell can give the brain feedback," Bartness explained. "This is a really important concept in biology, as it can regulate the process of lipolysis much like how a thermostat regulates temperature in your house, using input from the air and output to a furnace or heating unit.

"The presence and function of the sensory nerves has been completely

ignored and the areas in the brain that receive this sensory information were unknown until we did these studies," he said.

When the body has a low amount of a type of readily available fuel, a carbohydrate called glycogen, the body starts lipolysis to release energy stored in fats. At the end nerves which are part of the sympathetic nervous system, a chemical called norepinephrine is released to trigger the breakdown of fat.

Sensory nerves then appear to report back to the brain to inform it of the status of the lipolysis, communicating whether too much or too little energy has been released — and the activity of the sympathetic nerves can be adjusted accordingly.

"If you're doing a moderate amount of exercise or even if it has been a fairly long interval since you last ate, you will use up all or most of the available glycogen, necessitating the break down fat to yield sufficient energy," he said. "But you don't want to break down more than you need. So, this would be a way to stop the sympathetic nervous system from triggering the release of too much lipid energy from fat."

Bartness said that though this communication process is known to play a role in the short-term burning of fat, researchers are not sure whether this process is involved with the long-term issues of burning fat — important in understanding obesity and why some people burn fat more readily than others.

"It could be that sensory nerves have a dual function," he explained. "In addition to the moment-to-moment lipolysis process, they might also have a longer term function. It's complicated, and it might be a different subset of the sensory nerves performing the long-term monitoring of fat reserves."

The research appears in the March edition of the *American Journal of Physiology: Regulatory, Integrative and Comparative Physiology*.

Source: Georgia State University