Brain system serves as 'remote control' for fat metabolism

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A system in the brain already known to regulate food intake also serves as a direct “remote control” for the way fat is stored and metabolized in the body, say University of Cincinnati (UC) researchers.

What is known as the melanocortin system, the researchers say, controls fat metabolism and the way it accumulates in the body completely independently of food intake.

The finding, the researchers report, could lead to the development of new and urgently needed medications to treat the growing, worldwide obesity epidemic.

Led by Matthias Tschöp, MD, UC associate professor of psychiatry, and coauthored by scientists at the German Institute of Human Nutrition, the study appears in the Sept. 20, 2007, online edition of the *Journal of Clinical Investigation*.

The melanocortin system was previously identified as a “control loop” in the central nervous system (CNS) that receives hormonal signals from the gut—like those given off by “hunger” and “satiety” hormones such as ghrelin and leptin—and responds to these sensations of hunger or fullness by causing the body to either ingest or burn calories.

Tschöp and colleagues say that beyond responding to signals of hunger or satiety, the melanocortin system also controls whether extra energy (glucose) will be converted to fat and whether it will be stored or

metabolized.

“Understanding how specific CNS circuits directly control fat storage and metabolism is essential in order to achieve a breakthrough in this important area of research,” the authors write.

The group studied the melanocortin system at the molecular level in rodents. They found that when the system is stimulated to increase activity, fat is metabolized. When activity in the system is reduced—either pharmacologically or genetically—fat accumulation increases.

“We were able, in essence, to change traffic signals in so-called nutrient highways in the body so that calories were metabolized, and not dumped into fat cells,” says Tschöp. “And we did this without changing the rate of food intake.

“These findings are relevant for human obesity, since mutations in the system we studied here are the most common known reason for genetically caused obesity in humans,” Tschöp added.

The study authors also reported clinical data from coauthors I. Sadaf Farooqi and Stephen O’Rahilly. Their studies in humans with activity-reducing genetic variations in the melanocortin system indicate that fat metabolism may be “remote controlled” by the human brain similar to the way it is in rodents.

The Centers for Disease Control (CDC) and Prevention estimates that more than 30 percent of adults aged 20 to 74 are obese. Obesity increases chances for developing diabetes, heart disease and some cancers.

Source: University of Cincinnati