A single protein controls our metabolism

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A certain type of cell in our body controls our metabolism and helps decide whether we are hungry or not. This could lead to a drug for controlling obesity.

Not everybody feels sated after a meal. Some people have a continuing appetite, which means they can become overweight or obese, with complications such as diabetes and cardio-vascular disease.

A better understanding of how the body feels sated will help us fight obesity. The discovery of the molecule GPRC6A, by Hans Bräuner-Osborne, a professor of molecular pharmacology, and his colleagues at the University of Copenhagen, has brought that understanding closer.

Drug to make you feel sated

This molecule, which is an interface between the outer and inner functions of a cell, appears to have a central role in controlling both our metabolism and the amount of food we consume.

Since Bräuner-Osborne and his colleagues discovered GPRC6A in 2004 they have been studying its functions. They believe the molecule is activated when we eat, and tells the brain to tell us to feel sated when we have eaten sufficiently, switching off our desire to eat.

The food we eat contains carbohydrates, fats and proteins, which are absorbed by the body; at the same time, data about the quantitative content of carbohydrates, fats and proteins in our food is sent by the GPRC6A molecules in our organs to our brains.

Keeping slim thus means our food must activate these molecules.

“We depend on GPRC6A molecules to control our food uptake,” says the researcher. “If this process doesn’t work properly, we get fat.”

Research shows that GPRC6A molecules are involved in measuring the body’s uptake of proteins, which fuel our metabolism.

Proteins are also good at making us feel sated – but researchers do not know how this function works.

Testing a theory

“GPRC6A and similar molecules are probably activated by amino acids, derived from proteins, in the intestines,” he says. “We’re testing that theory.”

Bräuner-Osborne’s team investigated human GPRC6A molecules to discover which food ingredients activate them – and the answer was proteins’ amino acids.

They also compared two sets of mice – one set without the gene that creates the GPRC6A molecules – and

discovered that mice without GPRC6A molecules had a much poorer metabolism.

“The mice without the GPRC6A molecules ate more, were fatter and had a greater tendency to develop diabetes,” he says.

“This is an interesting discovery. We still don’t know why they got fatter, but we are studying that question. Although we must work more on it, our theory seems to be correct, which means it is an interesting possibility for new drugs.”

A drug that builds on an amino acid called arginine, which is found in nuts, can perhaps achieve a slimming effect.

“Our vision is to make a drug that, by activating GPRC6A, can strengthen our metabolism and create an artificial feeling of being sated,” he says. “This can make it easier for overweight people to keep to a weight-loss diet, so they can avoid complicating diseases. The idea is to develop an artificial substance with the same effect as arginine, but much more powerful.”

The Danish Ministry of Science, Innovation and Higher Education recently presented Hans Bräuner-Osborne with the Elite Researcher Award, stating that his research shows great potential.

Read this article in Danish at videnskab.dk [9]

Fat people often have problems of not feeling properly sated by their food. This could be due to a poorly functioning GPRC6A molecule. (Photo: Colourbox) [10]
Hans Bräuner-Osborne was one of five young researchers recently given the prestigious Danish Elite Researcher Award for his studies of signalling molecules and how potential drugs work on their molecular neurotransmitters. (Photo: University of Copenhagen). [11]
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Fact box

The GPRC6A molecule is a receptor – a protein in a cell’s membrane, working as an interface between the cell and the human body.

GPRC6A belongs to the family of G protein-coupled receptors.

Signalling substances such as neurotransmitters and hormones bind to the outside of the receptor, activating it; the receptor then activates proteins in the cell. This starts a cellular response, which could result in changes in muscle activity or the release of hormones in e.g. the intestines or the brain.

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