Brain mechanisms of food reward

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Studying what makes us want to eat, could help devise approaches to prevent obesity, which is becoming widespread in Europe

Suzanne Dickson is a Professor of physiology and neuroendocrinology at the Institute of Neuroscience and Physiology, based at the Sahlgrenska Academy at the University of Gothenburg, Sweden. She tells youris.com about her involvement in the EU funded NeuroFAST project. Her focus is on the impact of appetite-regulating gut hormones on parts of the brain that influence food preference and food reward.

This research is also driven by the huge unmet need of treating the

growing group of obese patients.

What is the focus of your work relating to food and the brain?

We work on food reward, which involves neurobiological circuits linked to the addiction process. We decided to work on this because increasing evidence linked excessive over-eating to brain pathways involved in reward, including pathways known to be targets for addictive drugs. Over-eating can be influenced by genetic predisposition traits, psychiatric diseases, cues from the environment that trigger expectation of a food reward. Other factors include socio-economic pressures, stressful lifestyle including stress in the workplace or home.

What is the nature of food reward?

Our specific focus is on the property of the reward value. If animals find food rewarding, they will display altered behaviours that indicate that the reward value of the food is changed. Members of our team are working with sugars, fats and combinations of the above. We have also been working in clinical projects with foods of similar taste but with altered caloric value. By targeting brain mechanisms involved in food reward, we hope to reveal new mechanisms that will help develop new treatment strategies for obesity.

We have studied an area of the brain called ventral tegmental area (VTA) is a key node in the brain's reward pathway. It is the home of the dopamine cells that are activated by rewards, including food rewards. Its role is very complex. Many believe that these cells are involved in food searching behaviours or food motivation, for example. However, they also can be activated simply by cues associated with foods akin to deciding to consume a chocolate bar by the sight of one at the cashier in

a supermarket and novelty of the reward stimulus appears to play a role.

Did you identify the difference between the brain's pleasure center and hunger center?

The pleasure centres are involved in food intake that is linked to its reward value. Whether we are hungry or fed, by raising the reward value of food the reward system encourages us to eat more, especially rewarding food. This system has been critical during the evolution process to ensure survival from famine. In our modern environment that generates obesity, food reward is no longer our friend as it encourages us to over-indulge in sweet and fatty food, even when we are not hungry.

By contrast, the hunger pathways can be considered more primitive. They detect and respond to nutrient deficit. If we enter negative energy balance, homeostatic pathways become activated informing higher feeding networks to initiate feeding behaviours.

What strategies have studied to try and find ways to limit over-eating?

We have recently learned from the field of bariatric—weight loss—surgery that it is possible to change reward behaviour towards food. This involves unknown mechanisms that are likely linked to the brain's food reward system. We focus particularly on a hormone called ghrelin whose secretion is altered after bariatric surgery. We hope to reveal new information that is of clinical and therapeutic relevance for future drug strategies for this disease area.

So far, in the laboratory, we have learned a lot about the basic brain mechanisms controlling food reward and the role played by gut hormones in regulating these. We therefore know a lot more about

mechanisms—namely about the brain systems and circuits underpinning over-eating—especially for calorie dense foods.

More information: www.neurofast.eu/

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