

Ultra processed foods manipulate our brain

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The combination of sugar and fat, frequently present in ultra-processed industrial foods, synergistically increases the release of dopamine in the brain and creates a reward circuit that encourages overconsumption of calories, shows a recent study.

Throughout the day, our brain is constantly listening for signals from our hormones, our digestive tract and our external environment to integrate this information and determine when it is time to eat and the amount of food required to meet our metabolic needs.

Under normal conditions, this control exercised by the brain allows our feelings of hunger and satiety to be in balance, so that caloric intake corresponds exactly to the body's energy needs and our weight remains constant.

BRAIN DYSFUNCTION

Overweight, and especially obesity, is fundamentally the result of an excess calorie balance, that is to say that energy intake exceeds the body's needs and leads to an accumulation of excess energy in the form of fat.

The mechanisms responsible for this imbalance are extremely complex, but research in recent years suggests that it is disruptions in the brain circuits involved in the control of hunger and satiety that play a leading role in the development of obesity.

This importance of the brain is also supported by a study carried out at Laval University that showed that around sixty proteins present exclusively in the brain had a central role in the control of body weight (1).

UNREGULATED APPETITE

The global obesity epidemic coincides with the massive arrival on the market of ultra-processed industrial foods (junk food, for example) and it seems increasingly clear that these foods, overloaded with sugar and fat, are one of the main factors that contribute to being overweight.

This was particularly well highlighted by a very important study by the group of Kevin Hall at the NIH, a leader in obesity research (2). In this study, the scientists housed 20 volunteers for a month, which allowed them to very closely control everything they ate and to precisely establish the impact of this diet on body weight.

The first group was served meals where 80% of the calories came from ultra-processed foods, while the other group's diet contained the same amount of calories, but from unprocessed foods. The portions served were deliberately large, so that the amount of food consumed was determined by the appetite of the volunteers, without restriction.

The difference between the two groups is striking: compared to those who ate unprocessed foods, people who had access to the ultra-processed diet ate about 500 calories more each day and gained weight.



Ultra processed foods therefore seem to disrupt the brain's control of appetite, promoting overconsumption of food that leads to excess weight.

BRAIN OVERSTIMULATION

A recent study suggests that it is the simultaneous presence of sugar and fat in ultra-processed foods that is particularly disruptive for the brain (3).

In this study, researchers were interested in the communication between the intestine and the brain in response to the ingestion of sugar and/or fat.

It is in fact well established that the neurons present in the digestive system are activated by these substances and, in return, send signals to the brain (via the vagus nerve) to activate the production of dopamine and thus create a reward circuit which encourages the consumption of foods containing these energy sources.

The originality of the study is to show that sugar and fat activate parallel neuronal circuits, each of which allows the production of dopamine in the brain.

On the other hand, when the two substances are combined, the production of dopamine is much greater than that coming from the sum of the two circuits taken separately. The consequence of this synergy is to disproportionately increase the appetite for foods rich in sugar and fat and therefore to encourage their overconsumption.

It is important to note that these mechanisms are autonomous physiological phenomena, completely independent of people's will, which makes it extremely difficult to curb the overconsumption of these high-calorie foods once the reward circuit has been established.

The presence of fat and sugar in the same food being very rare in nature, the best way to escape this manipulation of brain chemistry is to encourage an intake of fresh, unprocessed foods.

- (1) Gagnon E et al. Genetic control of body weight by the human brain proteome. *iScience* 2023; 26: 106376.
- (2) Hall KD et al. Ultra-processed diets cause excess calorie intake and weight gain: an inpatient randomized controlled trial of ad libitum food intake. *Cell Metab* 2019; 30: 67-77.e3.
- (3) McDougale M et al. Separate gut-brain circuits for fat and sugar reinforcement combine to promote overeating. *Cell Metab* 2024; S1550-4131(23)00466-7.