

How sugar and fat affect our brain leading to a high blood pressure?

Obesity is a serious, chronic and pandemic disease that can have a negative effect on many systems in our body. People who are overweight or obese have a much greater risk of developing serious diseases including hypertension. The cause of obesity and hypertension still puzzles the medical and scientific fields, since there are many complex interrelated factors involved, such as genetics, lifestyle and how your body uses energy. For this reason, the available therapeutic treatments usually fail.

High fat diet and high sucrose diet causes obesity and metabolic disorders like diabetes and hypertriglyceridemia. Recently, we discovered that eight weeks of high fat diet exposure causes hypertension in some mice, like in humans. Otherwise, a high sucrose diet associated with high fat diet did not cause hypertension in any mice.

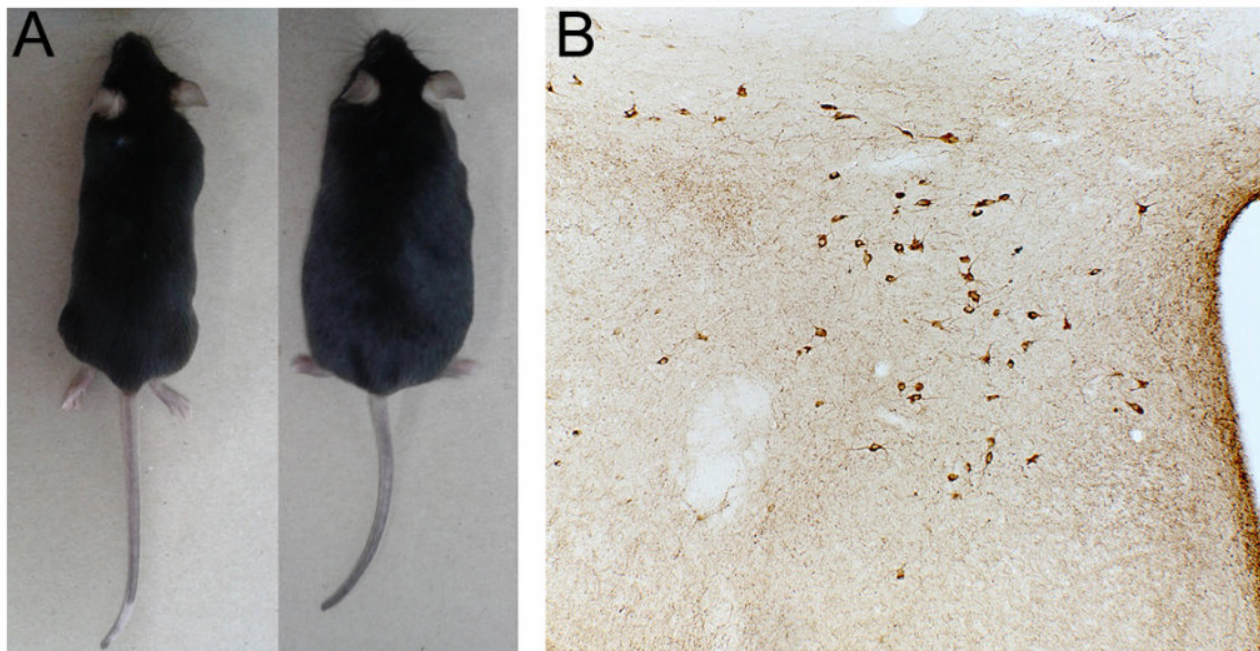


Fig. 1. A. Lean mice (left) and obese mice after eight weeks eating high fat diet (right). B. Neuron cell bodies and axons that have CART as neurotransmitter. Chaar et al., 2016.

The autonomic nervous system is a set of neurons that controls body functions. One branch of the autonomic nervous system is the sympathetic neurons that plays an important role on the cardiovascular system. Depending on the body needs, for instance, during exercise training, a high sympathetic activity can lead to tachycardia and increase blood pressure. However, a prolonged

overactivity of the sympathetic nervous system causes hypertension and organ damage. Seeking the causes of the distinct effects of high fat and high sucrose intake in blood pressure, we found that high fat diet increases the sympathetic activity only in hypertensive mice, but not in high sucrose fed mice. It does not mean that eat a lot of sugar is safe for health, because high sucrose diet can cause diabetes, also a serious complication of obesity.

So, how is possible high fat affect blood pressure and high sucrose not?

By looking at the brain level, we have found that a neurotransmitter called CART (cocaine-amphetamine related transcript), a cocaine and amphetamine very similar molecule, is increased in the hypothalamus of hypertensive mice fed with high fat diet. This happens precisely in the dorsomedial nucleus, a brain region involved in feeding and drinking behavior, as well as body-weight control, circadian activity and stress responses. Thus, CART seems to be the cause of hypertension on obesity that can lead to sympathetic overactivity, stroke, heart attack and renal failure. Perhaps, these discoveries may help to develop new strategic therapies for the treatment of hypertension secondary to obesity. But, still healthy eating habits and exercise training are excellent adjuvants to control blood pressure levels.

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[High-fat diet-induced hypertension and autonomic imbalance are associated with an upregulation of CART in the dorsomedial hypothalamus of mice.](#)

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