

Study: Eating less keeps the brain young

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Overeating may cause brain aging while eating less turns on a molecule that helps the brain stay young.

A team of Italian researchers at the Catholic University of Sacred Heart in Rome have discovered that this molecule, called CREB1, is triggered by "[caloric restriction](#)" (low caloric diet) in the [brain](#) of mice. They found that CREB1 activates many genes linked to longevity and to the proper functioning of the brain.

This work was led by Giovambattista Pani, researcher at the Institute of General Pathology, Faculty of Medicine at the Catholic University of Sacred Heart in Rome, directed by Professor Achille Cittadini, in collaboration with Professor Claudio Grassi of the Institute of [Human Physiology](#). The research appears this week in the [Proceedings of the National Academy of Sciences \(PNAS\)](#).

"Our hope is to find a way to activate CREB1, for example through [new drugs](#), so to keep the brain young without the need of a [strict diet](#)," Dr Pani said.

Caloric restriction means the animals can only eat up to 70 percent of the food they consume normally, and is a known experimental way to extend life, as seen in many experimental models. Typically, caloric-restricted mice do not become obese and don't develop diabetes; moreover they show greater [cognitive performance](#) and memory, are less aggressive. Furthermore they do not develop, if not much later, Alzheimer's disease and with less severe symptoms than in overfed animals.

Many studies suggest that obesity is bad for our brain, slows it down, causes early brain aging, making it susceptible to diseases typical of older people as the Alzheimer's and Parkinson's. In contrast, caloric restriction keeps the brain young. Nevertheless, the precise [molecular mechanism](#) behind the positive effects of an hypocaloric diet

on the brain remained unknown till now.

The Italian team discovered that CREB1 is the molecule activated by caloric restriction and that it mediates the beneficial effects of the diet on the brain by turning on another group of molecules linked to longevity, the "sirtuins". This finding is consistent with the fact that CREB1 is known to regulate important brain functions as memory, learning and anxiety control, and its activity is reduced or physiologically compromised by aging.

Moreover, Italian researchers have discovered that the action of CREB1 can be dramatically increased by simply reducing caloric intake, and have shown that CREB is absolutely essential to make caloric restriction work on the brain. In fact, if mice lack CREB1 the benefits of caloric restriction on the brain (improving memory, etc.) disappear. So the animals without CREB1 show the same brain disabilities typical of overfed and/or old animals.

"Thus, our findings identify for the first time an important mediator of the effects of diet on the brain," Dr. Pani said. "This discovery has important implications to develop future therapies to keep our brain young and prevent brain degeneration and the aging process. In addition, our study shed light on the correlation among metabolic diseases as diabetes and obesity and the decline in cognitive activities."

Provided by Catholic University of Rome

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