

Olive oil to counter cognitive decline

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Regular consumption of extra virgin olive oil decreases the formation of protein aggregates inside neurons, a condition associated with the onset of several types of dementia in humans, recent research shows.

Several neurodegenerative diseases, including Alzheimer's disease and frontotemporal dementias (Pick disease, in particular), have the characteristic of presenting aggregates called neurofibrillary degenerations inside neurons. These dementias are grouped under the name of tauopathies, because the formation of these aggregates is caused by a modification in the structure of a protein called tau which leads to the appearance of filamentous structures within nerve cells.

These filamentary tangles are very toxic to neurons because they prevent the transport of substances inside cells, thus blocking all communication with other neurons. This isolation eventually leads to the death of neurons and the appearance of various cognitive problems, particularly in memory.

PREVENT TAUOPATHIES

The mechanisms responsible for the accumulation of neurofibrillary aggregates remain poorly understood and there is still no therapy capable of curing these pathologies. On the other hand, a preventive approach to prevent or slow the development of these lesions is clearly possible, because many studies have shown that certain lifestyle factors (smoking, hypertension, obesity, diabetes, sedentary lifestyle) increase the risk of dementia, so conversely, smoking cessation, regular physical exercise and healthy eating can all reduce this risk, even at older ages.

With regard to eating habits, a study has shown that a "MIND" type diet (Mediterranean-DASH Intervention for Neurodegenerative Delay), which uses olive oil as the main fatty substance and favors a high intake of plants (fruits, vegetables, nuts, whole grains), could reduce the deterioration of cognitive functions often observed in victims of stroke (1).

This suggests that the inclusion of foods rich in biologically active phytochemicals (polyphenols, for example) could help reduce the risk of dementia. This concept is supported by the results of a French study showing that the elderly who regularly consumed foods that are good sources of polyphenols (nuts, berries, green vegetables, soy, olive oil, green tea and red wine) had a 50% reduced risk of developing dementia compared to those who ate these foods infrequently (2).



CONTRIBUTION OF OLIVE OIL

Extra virgin olive oil could play a very important role in reducing the risk of dementia seen in these studies. We have known for a few years that certain polyphenols present in extra virgin olive oil, in particular oleocanthal (the molecule responsible for the peppery taste of these oils), had the property of blocking the formation of aggregates by the protein tau *in vitro*. A recent study goes further by showing that this phenomenon is also observed in animals genetically predisposed to develop tauopathies (3). When extra virgin olive oil is added to the diet of these adult mice, equivalent to a human age of 30-40 years, it is observed that the formation of tau aggregates inside their brains is reduced by 60% during their aging compared to animals that did not receive olive oil.

Further analysis shows that the protection offered by olive oil is associated with better cognitive function in memory and learning tests, possibly due to the maintenance of high levels of a protein called complexin-1, known to play an important role in the transmission of information at the synapses.

These positive effects of olive oil therefore add to the already well-documented health benefits of this oil, in particular its role in the prevention of cardiovascular disease. It should be noted that the antioxidant and anti-inflammatory compounds present in olive oil play an important role in the benefits of this oil and it is for this reason that it is preferable to choose virgin olive oils or extra virgin, obtained by mechanical cold pressing of the olives which preserves the integrity of these molecules.

- (1) Cherian LJ et coll. Mediterranean-Dash Intervention for Neurodegenerative Delay (MIND) diet slows cognitive decline after stroke. *J. Prev. Alzheimers Dis.* 2019; 6: 267-273.
- (2) Lefèvre-Arbogast S et coll. Pattern of polyphenol intake and the long-term risk of dementia in older persons. *Neurology* 2018; 90: e1979-e1988.
- (3) Lauretti E et coll. Extra virgin olive oil improves synaptic activity, short-term plasticity, memory, and neuropathology in a tauopathy model. *Aging Cell* 2020; 19(1): e13076.