Study finds increase in healthy Omega-3s in the brain as we age

Researchers at the Illawarra Health and Medical Research Institute (IHMRI), based at the University of Wollongong campus, have found surprising evidence that the amount of health-giving omega-3 polyunsaturated fatty acids in the human brain don’t decrease with age. They increase.

The finding, published recently in Neurobiology of Aging, is the first to emerge from an IHMRI research program looking at the role that phospholipids play in ageing and Alzheimer’s disease (AD).

Despite the fact that advanced age is the highest risk factor for developing AD, almost nothing is known about changes in phospholipid composition within the brain over the adult lifespan. Previous work has shown that several genetic markers of AD have a role to play in lipid metabolism and lipid trafficking within the brain. Significant changes in phospholipid levels have also been identified in post mortem Alzheimer’s brain tissue.

IHMRI PhD candidate, Sarah Hancock (nee Norris), capitalised on recent advances in mass spectrometry to produce the most detailed study ever conducted on phospholipids of human brains during healthy ageing. By capturing this data the team, which included Postdoctoral Research Fellow, Michael Friedrich, and leading Australian lipids researchers Associate Professor Todd Mitchell and Professors Roger Truscott and Paul Else, would then be able to compare the changes in healthy brains to those with AD.

The team set out to examine the amount of phospholipids in different regions of the brain, starting with the prefrontal cortex; an area known to be affected by AD. Using tissue samples donated to the University of Sydney’s NSW Tissue Resource Centre, they examined age-related changes in the major phospholipids normal human prefrontal cortex over the adult lifespan.

“A diverse range of molecular phospholipids were found to undergo changes with normal adult ageing,” explained Sarah.

“To our knowledge, this is the first time that these changes have been reported. The main finding was that phospholipids containing a type of an omega-3 called docosahexaenoic acid, or DHA, increase slowly but steadily over the adult lifespan within the human prefrontal cortex.

“This surprised us initially as it seems counter-intuitive. However, we know that DHA has a number of roles within the brain and is considered a neuro-protective molecule. We also know that DHA increases considerably in the brain in the early years of life, but it was previously thought that the levels of DHA declined in the brain over the adult lifespan. Past studies have shown that the level of DHA within the brain is considerably decreased in AD.”

The specific age-related changes observed in the study also suggest that individuals with higher amount of phospholipids containing DHA in their cellular membranes may have a longer lifespan.

“Ours was not a dietary study and we are not making any claims in this area, but the findings certainly seems to add to the body of knowledge about the health benefits of consuming DHA from natural sources like fish,” said Sarah.

“While we were unable to determine what is driving the increase, the findings emphasise how little we know about the human brain, and what happens with age.”

The study provides several phospholipids to target for future research into cellular aging within the human brain.

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