Abstract

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Lipid alterations in lipid rafts from Alzheimer's disease human brain cortex.

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OBJECTIVE: Lipid rafts are membrane microdomains intimately associated with cell signaling. These biochemical microstructures are characterized by their high contents of sphingolipids, cholesterol and saturated fatty acids and a reduced content of polyunsaturated fatty acids (PUFA).

METHODS: Here, we have purified lipid rafts of human frontal brain cortex from normal and Alzheimer's disease (AD) and characterized their biochemical lipid composition.

RESULTS: The results revealed that lipid rafts from AD brains exhibit aberrant lipid profiles compared to healthy brains. In particular, lipid rafts from AD brains displayed abnormally low levels of n-3 long chain polyunsaturated fatty acids (LCPUFA, mainly 22:6n-3, docosahexaenoic acid) and monoenes (mainly 18:1n-9, oleic acid), as well as reduced unsaturation and peroxidability indexes. Also, multiple relationships between phospholipids and fatty acids were altered in AD lipid rafts. Importantly, no changes were observed in the mole percentage of lipid classes and fatty acids in rafts from normal brains throughout the lifespan (24-85 years).

CONCLUSIONS: These indications point to the existence of homeostatic mechanisms preserving lipid raft status in normal frontal cortex. The disruption of such mechanisms in AD brains leads to a considerable increase in lipid raft order and viscosity, which may explain the alterations in lipid raft signaling observed in AD.

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