THE EFFECTS OF CHOLESTEROL AND FISH OIL DIETS ON APOE4 MICE FOLLOWING ENVIRONMENTAL ENRICHMENT

Z. Kariv-Inbal¹, S. Yacobson¹, L. Broersen², T. Hartmann³, D.M. Michaelson¹

¹Neurobiology, Tel Aviv University, Tel Aviv, Israel, ²Danone Research, Center for Specialized Nutrition, Wageningen, Netherlands Antilles, ³Neurodegeneration and Neurobiology, Deutsches Institute für DemenzPrävention (DIDP) Saarland University, Homburg/Saar, Germany

Introduction: ApoE4, the most prevalent genetic risk factor for AD, is an important brain lipoprotein. We have previously demonstrated that the neuronal and cognitive impairments of ApoE4 following environmental stimulation are associated with an accumulation of Ab in the affected neurons.

Aims: To examine the effects of the ApoE4 genotype and cholesterol or fish oil diets on brain Ab levels in mice subjected to enriched environment.

Methods: 4 weeks old ApoE4 and ApoE3 transgenic mice were maintained on cholesterol, fish oil or control diets for 4 months period in either regular or enriched environment. The mice were subjected to object recognition test and immunohistochemical analysis.

Results: Ab levels of mice maintained on cholesterol and control diets were higher in ApoE4 mice in comparison to ApoE3 mice under regular conditions. Enriched environment had complex effects on brain Ab; under these conditions, the levels of Ab increased in the ApoE3 mice while decreased in the ApoE4.

In contrast, in mice maintained on fish oil diet, neither the ApoE genotype nor environmental stimulation had an effect on brain Ab. Object recognition test revealed improved performance of ApoE3 mice that were maintained on control diet following environmental enrichment. In contrast, no such effects were achieved in ApoE4 mice. Further examination revealed that the cholesterol diet impaired the performance of both mice groups whereas the fish oil diet improved the performance of the ApoE4 mice.

Conclusions: The results illustrate that the effects of ApoE4 on Ab levels and cognition are ameliorated by fish oil diet.