LONG-TERM EFFECT OF OMEGA-3 FATTY ACID SUPPLEMENTATION IN A MODEL OF AGE-RELATED HEARING LOSS

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Omega-3 polyunsaturated fatty acids (PUFAs) are dietary nutrients well-known for their beneficial effects on cognitive development and maintenance, inflammation, oxidative stress and insulin sensitivity, among others (1). Insufficient levels of docosahexaenoic acid are associated to age-related neurological and vascular disorders, and with human age-related hearing loss (ARHL) (2). There is an inverse relationship between high plasma levels of PUFAs and ARHL (3), whereas high levels of plasma homocysteine (Hcy) are associated with hearing loss (4). Here we used C57Bl/6 mice and long-term Omega-3 supplementation to evaluate the impact on hearing, Hey cochlear, oxidative stress and inflammation.

Two-month old mice were fed either control or omega-3 supplemented diets for 10 months. Hearing capacity was assessed monthly by ABR and DPOAE threshold analyses. Blood samples were taken to measure Hcy and folate concentrations by HPLC. Cochlear morphology was evaluated with cresyl violet and immunohistochemistry. Biomarkers of inflammation and oxidative stress were analyzed by Western blotting and RT-qPCR.

The control group showed significantly higher ABR hearing thresholds (25 dB SPL in average) and lower 2f1-f2 amplitude (nV) in mid-high frequencies, when compared to the Omega-3 group. No evident histological differences were found. Higher Hcy levels (p<0.03), together with decreased serum folate concentrations (p<0.05), were detected in control vs. Omega-3 supplemented mice. The results obtained suggest that omega-3 supplementation may have a long-term protective role on ARHL.


REFERENCES


CONCLUSIONS

Omega-3 supplemented mice showed functional and molecular signs compatible with a slow-down of cochlear aging:

• Lower ABR thresholds and higher 2f1-f2 amplitudes at low and high frequencies when compared to the matched age group of mice fed on normal diet.
• Increased expression levels of anti-inflammatory interleukins, IGF-1 and genes involved in the protection against oxidative stress. G2 fed mice also showed decreased levels of pro-inflammatory interleukins when compared with the Control group.
• Lower homocysteine incorporation into proteins and higher Hcy levels with respect to the Control group indicate a better basal methionine/homocysteine metabolism.