Circulating omega-3 fatty acids and neovascular age-related macular degeneration

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PURPOSE

The exclusive form of age-related macular degeneration (AMD) accounts for almost 80% of cases of severe vision loss related to AMD.

High dietary intake of omega-3 polyunsaturated fatty acids (n-3 PUFAs) and fish have been consistently associated with a decreased risk for AMD.

Because of the multiple difficulties of dietary assessment, circulating biomarkers may represent a more objective alternative for the assessment of nutritional status.

We report the associations of neovascular AMD with serum and red blood cell membranes (RBCM) omega-3 PUFAs, which represent a more objective assessment of omega-3 PUFAs status.

METHODS

Case-control Study

Cases
- 290 patients
- 65 to 85 years old
- neovascular AMD in one eye and early AMD lesions in the other eye
- patients from the Nutritional AMD Treatment 2 Study (NAT2)!
- Eye examination included:
  - best-corrected visual acuity
  - slit lamp examination
  - fundus photography
  - from the same geographical area as the AMD cases

Controls
- 144 subjects
- < 55 years old
- normal visual acuity
- no history of ocular diseases
- normal fundus examination
- normal fundus photography
- from the same geographical area as the AMD cases

All participants were recruited and examined at the Department of Ophthalmology of Créteil between 2002 and 2008.

Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) composition in serum and RBCM were determined by gas chromatography from 120 fasting blood samples and was expressed as percentages of total fatty acids profile.

Associations of neovascular AMD with dietary intake of seafood and circulating omega-3 PUFAs were estimated by logistic regressions adjusted for age, gender, QFN V402H, ARMS2 A69S, and ABC4 polymorphisms, plasma triglycerides, hypertension, hypercholesterolemia and family history of AMD.

RESULTS

Figure 1. Association of the risk of neovascular AMD with serum EPA
Figure 2. Association of the risk of neovascular AMD with serum DHA
Figure 3. Association of the risk of neovascular AMD with serum EPA+DHA

After adjustment for potential confounders, serum EPA was significantly associated with a lower risk for neovascular AMD (Tertile 3 OR=0.50, 95% CI 0.37;0.61, Tertile 3 OR=0.41, 95% CI 0.29;0.60), while serum DHA and EPA+DHA were not significantly associated with neovascular AMD.

Figure 4. Association of the risk of neovascular AMD with RBCM EPA
Figure 5. Association of the risk of neovascular AMD with RBCM DHA
Figure 6. Association of the risk of neovascular AMD with RBCM EPA+DHA

After adjustment for potential confounders, EPA and EPA+DHA were strongly associated with a lower risk for neovascular AMD (Tertile 3 OR=0.25, 95% CI 0.13;0.47 and OR=0.52, 95% CI 0.28;0.94, respectively). As in serum, DHA in RBCM was not significantly associated with neovascular AMD.

CONCLUSION

RBCM EPA and EPA+DHA, as long-term biomarkers of omega-3 dietary PUFA status, were strongly associated with neovascular AMD and thus represent an objective biomarker identifying subjects at high risk for neovascular AMD, whom may most benefit from nutritional interventions.

REFERENCES


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