

The use of high dose Omega-3 fatty acids in patients with macular oedema due to Wet Age Related Macular Degeneration and Diabetic Retinopathy

Tassos Georgiou*, Panagiotis Kolovos, Despina Nicolaou, Ekatherine Prokopiou, Soulla Michael, Cristina Ikonomu

Ophthalmos Research and Educational Institute, Nicosia, Cyprus

Introduction

Aim

To evaluate the potential therapeutic effects of Omega-3 polyunsaturated fatty acids (PUFAs) on macular oedema in patients with wet age-related-macular-degeneration (AMD) and diabetic retinopathy (DR).

Background

Omega-3 PUFAs have a wide range of protective properties, such as anti-inflammatory, antiangiogenic, and antioxidant. They decrease the formation of free radicals and they remarkably prevent the initiation of retinal angiogenesis by downregulating the expressions of various angiogenic agents such as VEGF, MMPs and COX-2.¹ When combined with anti-VEGF intravitreal injections they appear to be associated with decreased vitreal VEGF-A levels compared to anti-VEGF injections alone in neovascular AMD patients.² Serum levels of EPA also appear to be associated with significant lower risk of choroidal neovascular AMD.³ The levels of VEGF and leukocytes infiltration is reduced in the retina and choroid in the Omega-3 fed mice model of neovascular AMD.⁴

Three thousand four hundred and eighty two participants with type 2 diabetes, taking at least 2 weekly servings of oily fish at baseline showed a 48% relatively reduced risk of incident sight-threatening diabetic retinopathy compared with those not meeting this target.⁵ Mice with oxygen-induced retinopathy also show that increasing Omega-3 tissue levels reduce pathological angiogenesis in the disease. These results indicate that enriching the sources of Omega-3 may be an effective therapeutic approach to help prevent proliferative retinopathy.⁶

Materials and Methods

Retrospective review to evaluate the effect of high dose oral supplementation of Omega-3 fatty acids in macular oedema in patients with wet age-related macular degeneration (AMD) and diabetic retinopathy (DR). Patients who were previously treated with Avastin injections without any response were referred to the ophthalmology clinic for continuing their treatment with Eylea injections according to protocols.

A 2 year review of all patient clinical notes was manually performed. During that period patients were offered the option to take 3.6g Omega-3 fatty acids orally (Eicosapentaenoic acid (EPA)/Docosahexaenoic acid (DHA); ratio 5:1) or continue with the injection treatment without any Omega-3 supplementation. Patients were routinely examined every month for the first 3 visits and then every 2 months. Best corrected visual acuity was tested with a linear LogMAR acuity chart at each visit.

Results

Sixty-two eyes (48 patients) were identified and analyzed. The Eylea with Omega-3 group of all patients had a mean of 10.86 ± 1.46 previous Avastin injections and the Eylea without Omega-3 group had a mean of 12.58 ± 1.45 injections. For Wet AMD the mean gain of letters was 14.9 ± 2.47 at 3 months and 21.9 ± 3.1 at 6 months for the Omega-3 with Eylea group and there was loss of letters of 2.3 ± 1.58 at 3 months and loss of 4 ± 1.88 letters at 6 months in the Eylea without Omega-3 group ($p < 0.01$).

For the diabetic retinopathy, in the Eylea with Omega-3 group there was 11.6 ± 2.82 letter gain at 3 months and 17.1 ± 2.71 letters gained at 6 months and in the Eylea without Omega-3 group there was 1.1 ± 0.27 letter gain at 3 months and 2.8 ± 0.71 letter gain at 6 months ($p < 0.01$).

WET AMD

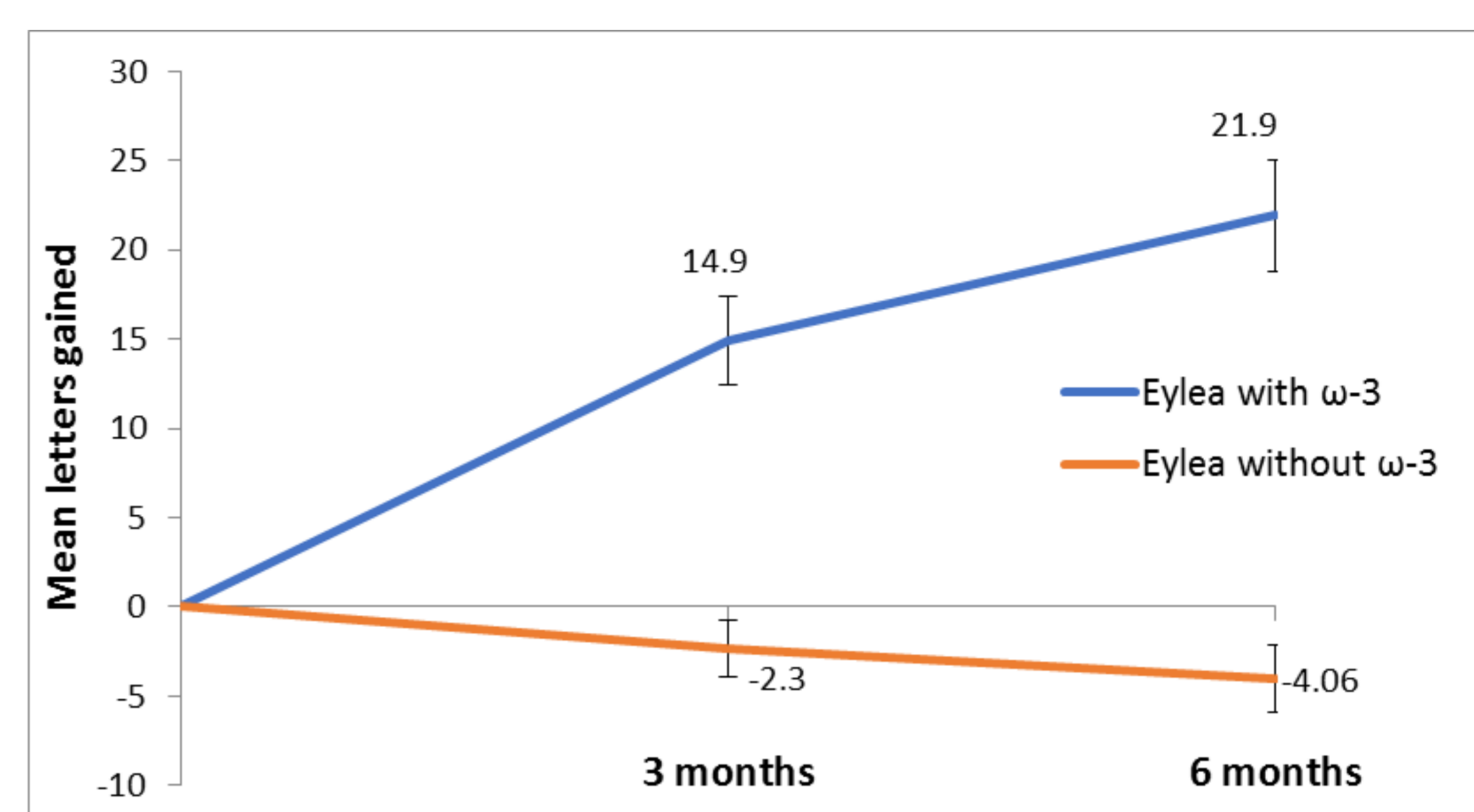


Figure 1. Visual acuity gain in letters. Patients gained 14.9 letters at 3 months and 21.9 letters at 6 months for the Omega-3 with Eylea group and there was a loss of 2.3 and 4.06 letters at 3 and 6 months respectively in the Eylea group without Omega-3 ($p < 0.01$).

DIABETIC RETINOPATHY

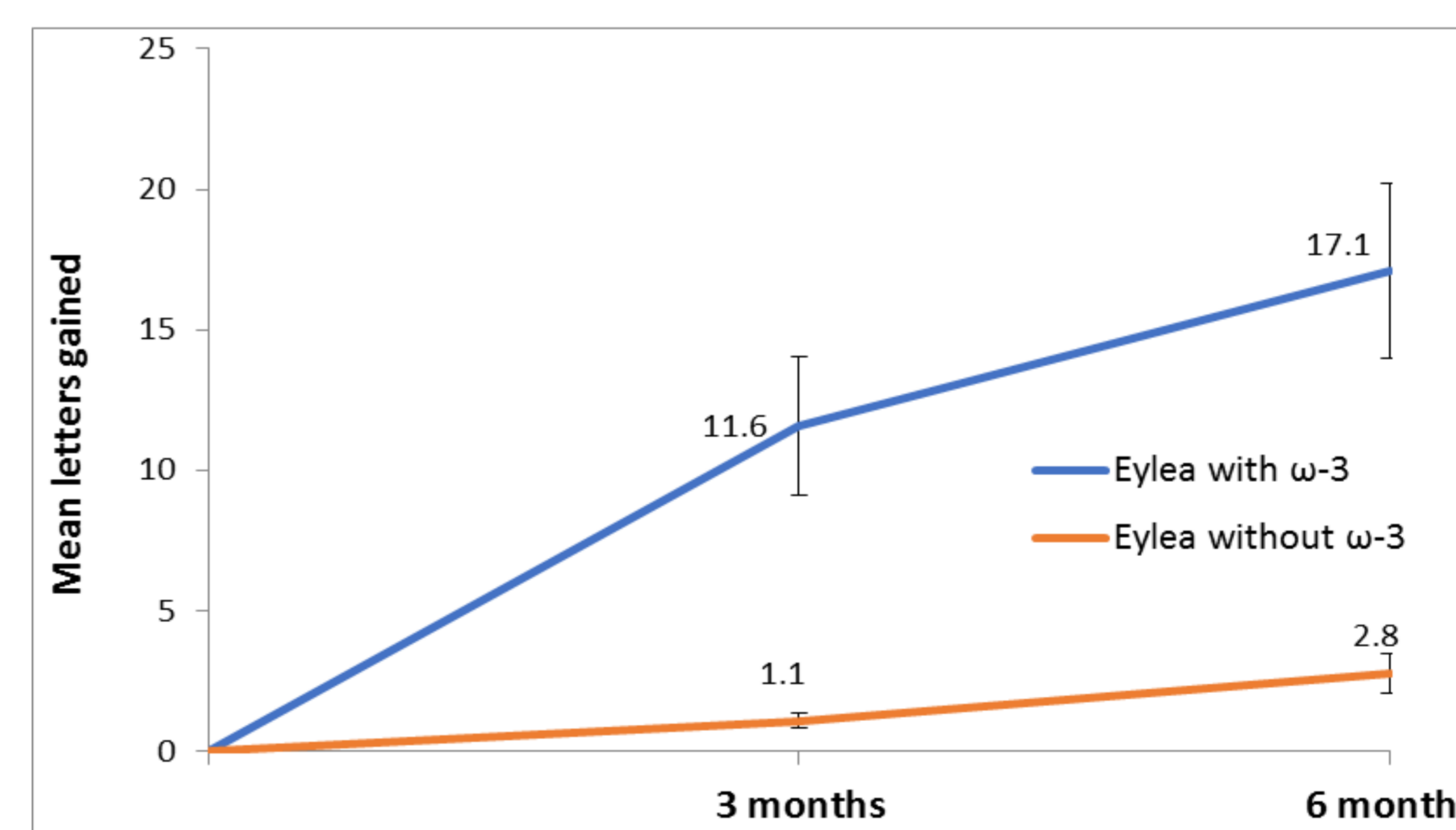


Figure 2. Visual acuity gain in letters. In the Eylea with Omega-3 group patients gained 11.6 letters at 3 months and 17.1 letters at 6 months and in the Eylea without Omega-3 group patients gained 1.1 letters at 3 months and 2.8 letters at 6 months ($p < 0.01$).

Discussion

Omega-3 supplementation may play a therapeutic role for improving vision in patients with neovascular AMD and DR with macular oedema.

A significant improvement of visual acuity in patients with macular oedema due to neovascular AMD and DR when treated with Eylea injections and Omega-3 fatty acid supplementation for 6 months was seen in our patients compared to Eylea injections alone.

References

- Behl T, Kotwani A. Omega-3 fatty acids in prevention of diabetic retinopathy. *J. of Pharm and Pharmacol.* 2017 Aug;69(8):946-954.
- Rezende FA, et al. Omega-3 Supplementation Combined With Anti-Vascular Endothelial Growth Factor Lowers Vitreal Levels of Vascular Endothelial Growth Factor in Wet Age-Related Macular Degeneration. *Am. J. of Ophthalmol.* 2014 Nov 1;158(5): 1071-1078.
- Merle BM, et al. Circulating omega-3 fatty acids and neovascular age-related macular degeneration. *IOVS.* 2014 Mar 1;55(3):2010-2019.
- Yanai R, et al. Cytochrome P450-generated metabolites derived from Omega-3 fatty acids attenuate neovascularization. *Proc. of the National Acad. of Sci.* 2014 Jun 12;111(26):9603-8.
- Sala-Vila A, et al. Dietary Marine ω-3 Fatty Acids and Incident Sight-Threatening Retinopathy in Middle-Aged and Older Individuals With Type 2 Diabetes: Prospective Investigation From the PREDIMED Trial. *JAMA Ophthalmol.* 2016 Oct 1;134(10):1142-1149.
- Connor MK, et al. Increased dietary intake of Omega-3-polyunsaturated fatty acids reduces pathological retinal angiogenesis. *Nature Med.* 2007 Jul;13(7):868-873.

