

REVIEW OF CLINICAL PHARMACOLOGY AND
PHARMACOKINETICS INTERNATIONAL
EDITION 24: 84 (2010)
©PHARMAKON-Press

Omega 3 Fatty Acids Suppress Retinopathy

Lois E.H. Smith

Harvard Medical School, Children's Hospital Boston, USA

SUMMARY

Many sight-threatening diseases have two critical phases, vessel loss followed by hypoxia-driven destructive neovascularization. These diseases include retinopathy of prematurity and diabetic retinopathy, leading causes of blindness in childhood and middle age. We studied the influence of omega-3- and omega-6-polyunsaturated fatty acids (PUFAs) on vascular loss, vascular regrowth after injury, and hypoxia-induced pathological neovascularization in a mouse model of oxygen-induced retinopathy. We show that increasing omega-3-PUFA tissue levels by dietary or genetic means decreases the avascular area of the retina by increasing vessel regrowth after injury, thereby reducing the hypoxic stimulus for neovascularization. The bioactive omega-3-PUFA-derived mediators neuroprotectinD1, re-

solvinD1 and resolvinE1 also potentially protected against neovascularization. The protective effect of omega-3-PUFAs and their bioactive metabolites is mediated, in part, through suppression of tumor necrosis factor- α . This inflammatory cytokine is found in a subset of microglia that is closely associated with retinal vessels. These findings indicate that increasing the sources of omega-3-PUFA or their bioactive products reduces pathological angiogenesis. Western diets are often deficient in omega-3-PUFA, and premature infants lack the important transfer from the mother to the infant of omega-3-PUFA that normally occurs in the third trimester of pregnancy. Supplementing omega-3-PUFA intake may be of benefit in preventing retinopathy.