Clinical Summary

Big Bold Health® Professional

Satoh-Asahara N, Shimatsu A, Sasaki Y, et al. Highly Purified Eicosapentaenoic Acid Increases Interleukin-10 Levels of Peripheral Blood Monocytes in Obese Patients With Dyslipidemia. Diabetes Care 2012;35:2631-2639.

EPA Supplementation Improves IL-10 Levels and Immune Genetic Expression

This study was the first to demonstrate that the omega-3 fatty acid eicosapentaenoic acid (EPA) heightens the genetic expression of anti-inflammatory interleukin-10 (IL-10) in circulating immune cells as well as beneficially influencing arterial function in humans.

In blood, the ratio between EPA and pro-inflammatory arachidonic acid (or EPA/AA) and the Omega-3 Index are proportional to dietary intakes of omega-3 fats. However, many American diets are recognized as providing generous amounts of AA relative to omega-3 fats, and lower blood levels of EPA and DHA (docosahexaenoic acid) constitutes a risk factor for cardiovascular disease.

Nutrition research is discovering mechanisms by which dietary EPA and DHA benefit body function, ranging from cognition and skin and eye health to musculoskeletal comfort and immune balance. A number of studies have converged upon ways EPA and DHA influence immune-related messaging among cells, and suggest that this immune-mediated signaling may underlie many of the observed advantages of omega-3 fat supplementation.

In this clinical trial, researchers provided 1.8 g EPA or placebo daily to 82 obese individuals, who also showed elevated triglyceride levels and/or reduced HDL-cholesterol levels, for a period of three months. Study subjects were tested for nutritional, metabolic, immune, and cardiovascular parameters before and after intervention. In a separate lab study, monocytes immune-triggered by exposure to toxic lipopolysaccharides (LPS) were subsequently exposed to EPA to observe effects on levels and genetic expression of IL-10.

Excess Adiposity is Marked by Immune Imbalance

In obesity, adipose tissues contain reduced levels of omega-3 fatty acid metabolites. This metabolic imbalance is reflected by a predominance of pro-inflammatory M1 macrophages over anti-inflammatory M2 macrophages, accompanied by reduced genetic expression of the pivotal immunomodulator IL-10. EPA supplementation may represent a meaningful way of improving IL-10 expression.

Study Parameters and Findings

Before and after three months of supplementation with EPA or placebo, researchers tested study participants' EAP levels, EPA/AA ratio, HbA1c levels, triglyceride levels, circulating adiponectin levels, and monocyte expression of IL-10. In addition, subjects were evaluated for pulse wave velocity (PWV), a measure of arterial stiffness.

Clinical trial results:

- Researchers noted that, prior to treatment, monocytes in dyslipidemic individuals showed significantly reduced genetic expression of IL-10 (a marker for anti-inflammatory M2 macrophage recruitment and differentiation) compared to those in non-dyslipidemic persons
- In subjects receiving EPA, monocyte IL-10 expression very significantly increased
- EPA supplementation also very significantly increased subjects' EPA/AA ratios
- Receiving EPA significantly reduced participants' triglyceride and HbA1c levels while significantly raising levels of IL-10 and adiponectin (an anti-inflammatory cytokine from fat cells); this combination of effects indicates overall improvement in immune balance as well as in fat and carbohydrate metabolism
- EPA supplementation very significantly reduced PWV, reflecting improved arterial elasticity
- The reduction in PWV after receiving EPA was independently linked to the beneficial increases in IL-10 and adiponectin in study subjects
- In the separate lab study of immune-stimulated monocytes, EPA exposure increased IL-10 expression, confirming the immunomodulating influence of EPA on activated immune cells

CONCLUSION

Nutrient-poor diets, lack of regular physical activity, and environmental change poses a conundrum to the immune systems of many. This innovative clinical-plus-laboratory investigation presents solid evidence that improving individuals' omega-3 fat nutritional status is a powerful means of modulating balance between pro- and anti-inflammatory immune cells and cytokines. EPA supplementation showed benefits for immune, metabolic, and cardiovascular signaling and function.