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Inflammation: Mindful ingredient applications

A rundown of promising dietary ingredient investigations

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Inflammation can give rise to a variety of diseases and harmful health conditions, and many natural ingredients have been put to the test to determine their relative effects on inflammation. Following is a compilation overviewing some of the most noteworthy natural ingredient research findings published over the last 10 to 20 years.

Ahiflower Seed Oil (*Buglossoides arvensis*) is a plant-based omega fatty acid oil with a balance of omega-3 (ALA and EPA), -6 (GLA) and -9 fatty acids.

In a randomized, placebo-controlled trial, researchers investigated the effects of three ahiflower oil dosages on omega-3 polyunsaturated fatty acid (PUFA) content of plasma and mononuclear cells (MCs) on simulated cytokine production in blood.[1] The 88 male and female subjects consumed either 100% high oleic (omega-9) sunflower oil (HOSO) which served as the placebo, 30% ahiflower oil + 70% HOSO, 60% ahiflower oil + 40% HOSO or 100% ahiflower oil at a dose of 9.7 ml/day. All samples that contained ahiflower oil produced increases in plasma and MC EPA levels. In addition, the 100% ahiflower oil group exhibited increases in the production of the anti-inflammatory cytokine, interleukin-10 (IL-10).

Astaxanthin is a red-orange carotenoid found in marine animals, algae and vegetables. As a dietary ingredient it is commonly derived from *Haematococcus pluvialis* algae.

Serbian researchers examined the effect of astaxanthin on the oxidative stress, muscle injury and inflammation of 40 male soccer players.[2] The group supplemented with 4 mg of astaxanthin for 90 days demonstrated a rise of salivary immunoglobulin-A (IgA) antibody levels, which was accompanied with a decrease in prooxidant-antioxidant balance. Plasma muscle enzymes levels were reduced significantly by astaxanthin supplementation and by regular training. The increase in neutrophil count and high sensitivity C-reactive protein (hs-CRP) level was found only in placebo group, indicating a significant blunting of the systemic inflammatory response in the subjects taking astaxanthin.

This study indicated that astaxanthin supplementation improves salivary IgA response and attenuates muscle damage, thus preventing inflammation induced by rigorous physical training. The findings also pointed to astaxanthin's demonstrating significant physiologic modulation in individuals with mucosal immunity impairment or under conditions of increased oxidative stress and inflammation.

An animal study concluded astaxanthin suppressed endotoxin-induced uveitis (EIU), a type of inflammation of the eye, and concluded that a 100 mg/kg dose of astaxanthin had the same anti-inflammatory strength as a 10 mg/kg dose of prednisolone.[3] Researchers determined astaxanthin decreased the production of nitric oxide (NO), activity of inducible nitric oxide synthase (iNOS) and production of prostaglandin E2 and tumor necrosis factor-α (TNFa) in mouse macrophage cell line studied in vitro in EIU-induced rats.

Another study focused on the action of dietary astaxanthin in modulating immune response, oxidative status and inflammation in young healthy adult female humans and found astaxanthin decreased a DNA damage biomarker (lowered CRP levels).[4] Participants received 0, 2 or 8 mg astaxanthin (Zanthin natural astaxanthin, from Valensa International) daily for eight weeks in a randomized double-blind, placebo-controlled study. Immune response was assessed on weeks zero, four and eight, with the tuberculin test performed at week eight.

Dietary astaxanthin stimulated mitogen-induced lymphoproliferation, increased natural killer cell cytotoxic activity, and increased total T and B cell subpopulations, but did not influence populations of T-helper, T-cytotoxic or natural killer (NK) cells. A higher percentage of leukocytes expressed the lymphocyte function-associated antigen-1 (LFA-1) marker in subjects given 2 mg astaxanthin at week eight. Subjects who received 2 mg astaxanthin had a higher tuberculin response than non-supplemented subjects. There was no difference in TNFa and IL-2 concentrations, but plasma interferon-gamma (IFNg) and IL-6 increased at week eight in subjects given 8 mg astaxanthin.

Bioflavonoids and flavonoids are beneficial polyphenolic plant compounds and colorful pigments found in citrus plants as wells as in dark colored berries, tea, red wine and dark chocolate (respectively).

A study on a standardized, proprietary blend of lemon flavonoid (as Eriomin, from Ingredients by Nature) investigated three interrelated functions of prediabetes management, including inflammation.[5] On the premise that an increased production of proinflammatory cytokines negatively affects the body's ability to maintain proper blood glucose levels and weakens the antioxidant defense, which in turn exacerbates the inflammatory cytokine imbalance in a debilitating cycle, the study found that lemon flavonoid supplementation yielded significant drops in IL-6, TNFa, and CRP by activating the expression of inflammation-influencing transcription factor peroxisome proliferator activated receptor gamma (PPARg) and inhibiting signaling molecule family nuclear factor kappa-B (NFkB). These proinflammatory cytokines have the potential to influence the dysfunction of B-pancreatic cells, which would then cause an imbalance in glycemia and insulin resistance.

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