A double-blind, randomized, placebo-controlled trial of n-3 versus n-6 fatty acid-based lipid infusion in atopic dermatitis

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BACKGROUND: In the involved epidermis of patients with atopic dermatitis, changes in the metabolism of eicosanoids with increased quantities of the arachidonic acid (AA)-derived lipoxygenase products have been observed. Free eicosapentaenoic acid (EPA), a fish oil-derived alternative (n-3) fatty acid, may compete with AA, resulting in an anti-inflammatory effect. METHODS: In a 10-day double-blind, randomized, placebo-controlled trial, 22 patients hospitalized for moderate-to-severe atopic dermatitis were randomly assigned to receive daily infusions of either a n-3 fatty acid-based lipid emulsion (fish oil, 10%; 200 mL/d) or a conventional n-6-lipid emulsion (soybean oil, 10%; 200 mL/d). Topical treatment was restricted to emollients. The severity of disease was evaluated daily with scoring of erythema, infiltration, and desquamation and by subjective patient scoring of clinical manifestations. In addition, plasma-free and total-bound fatty acids and the composition of membrane fatty acids in blood cells (thrombocytes, granulocytes, and erythrocytes), lipid mediators from isolated neutrophils and platelets, and lymphocyte-activation parameters were determined. RESULTS: Twenty patients completed the trial. Marked improvement from baseline was seen in both groups. On days 6, 7, 8, and 10, disease severity score-defined as the sum of all scores-was more pronounced ($p < .05$) in the n-3 group compared with the n-6 group. Free arachidonic acid in plasma did not change substantially in both groups, whereas plasma-free EPA, total-bound EPA, and the membrane EPA/AA ratio markedly increased in response to n-3-lipid infusion. In parallel, EPA-derived lipid mediators appeared, whereas lymphocyte functions were unaffected. In the post-treatment period (2/4 weeks), relapse was observed in some patients after n-3 psoralene-ultraviolet A (PUVA) infusion, whereas there was a marked long-term improvement in the n-6 group. CONCLUSIONS: IV n-3-fatty acid administration is effective in acutely improving the severity of atopic dermatitis, paralleled by changes in plasma and membrane fatty acid composition and lipid mediator synthesis. The long-term beneficial effects of IV n-6 fatty acids should be evaluated further.