

Abstract

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Omega-3 fatty acids in cardiac biopsies from heart transplantation patients: correlation with erythrocytes and response to supplementation.

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BACKGROUND: Omega-3 fatty acids (FAs) appear to reduce the risk of sudden death from myocardial infarction. This reduction is believed to occur via the incorporation of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) into the myocardium itself, altering the dynamics of sodium and calcium channel function. The extent of incorporation has not been determined in humans.

METHODS AND RESULTS: We first determined the correlation between red blood cell (RBC) and cardiac omega-3 FA levels in 20 heart transplant recipients. We then examined the effects of 6 months of omega-3 FA supplementation (1 g/d) on the FA composition of human cardiac and buccal tissue, RBCs, and plasma lipids in 25 other patients. Cardiac and RBC EPA+DHA levels were highly correlated ($r=0.82$, $P<0.001$). Supplementation increased EPA+DHA levels in cardiac tissue by 110%, in RBCs by 101%, in plasma by 139%, and in cheek cells by 73% ($P<0.005$ versus baseline for all; responses among tissues were not significantly different).

CONCLUSIONS: Although any of the tissues examined could serve as a surrogate for cardiac omega-3 FA content, RBC EPA+DHA was highly correlated with cardiac EPA+DHA; the RBC omega-3 response to supplementation was similar to that of the heart; RBCs are easily collected and analyzed; and they have a less variable FA composition than plasma. Therefore, RBC EPA+DHA (also called the Omega-3 Index) may be the preferred surrogate for cardiac omega-3 FA status.

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