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Effects of Omega-3/6 Dietary Ratio Variation After a Myocardial Infarction in a Rat Model

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Background: Following a myocardial infarction, apoptosis occurs in the limbic system via a mechanism involving inflammation. Consumption of high concentrations of omega-3 fatty acid is well known to be beneficial for cardiac health, to reduce inflammatory reaction, and to produce neutral metabolites, whereas omega-6 fatty acid produces proinflammatory metabolites. Since these two essential fatty acids are metabolized by the same group of enzymes, the resulting competition would affect the level of the different metabolites and thus the balance between proinflammatory and neutral metabolites. The aim of this study is to determine the effect of different omega-3/6 dietary ratios

on infarct size and on apoptosis in the limbic system in our rat model of myocardial infarction.

Methods: Male Sprague-Dawley rats were divided randomly into three dietary groups containing 5:1, 1:1, and 1:5 ratios of omega-3 to omega-6. They were fed the special diet for 2 weeks prior to left anterior descending coronary artery occlusion for 40 minutes followed by 24 hours of reperfusion. Myocardial infarction size was determined and apoptosis was evaluated in the hippocampus and amygdala.

Results: A significant 32% infarct size reduction was observed in the group 5:1 and 1:1 against the 1:5 group. Caspase-3 enzymatic activity was doubled in the CA1 and dentate gyrus in the 1:5 group compared with the 1:1 and 5:1 groups. Also, caspase-8 enzymatic activity was increased in the dentate gyrus at 24 hours and caspase-9 was enhanced in the CA1 at 24 hours in the 1:5 group relative to the 1:1 and 5:1 groups.

Conclusions: These results indicate that a high ratio of omega-3 to omega-6 reduced infarct size and helps to reduce apoptosis in the limbic system after a myocardial infarction.