

Bone Marrow ARA, EPA, and DHA Fatty Acids are Correlated with Femur Minerals Content and Enzyme of Bone Formation in Growing Rabbits

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Abstract : The effects of long-term supplementation with different dietary omega-6/omega-3 (ω -6/ ω -3) polyunsaturated fatty acid (PUFAs) ratios on the bone marrow fatty acids level, plasma biomarkers of bone metabolism, and minerals content in bone were evaluated in rabbits. Weanling male and female New Zealand white rabbits were randomly assigned to five groups and fed ad libitum for 100 days on diets containing 70 g/kg different dietary oils which providing the following ω -6/ ω -3 ratios: soy bean oil (SBO control, 8.68), sesame oil (SO, 21.75), fish oil (FO, 0.39), DHA algae oil (DHA, 0.63), and DHA and ARA algae oils (DHA/ARA, 0.68). The bone marrow arachidonic (ARA), eicosapentaenoic (EPA), and docosahexaenoic (DHA) fatty acid levels were significantly influenced by and reflected the dietary ω -6/ ω -3 ratios fed to rabbits. Rabbits fed on the FO diet maintained a lower ω -6/ ω -3 ratio and a higher EPA and DHA levels, those fed on the DHA/ARA diet maintained a lower ω -6/ ω -3 ratio and a higher ARA level, while those fed on the SO diet maintained a higher ω -6/ ω -3 ratio and a lower ARA level. Plasma alkaline phosphatase (ALP) activity was significantly higher in male and female rabbits fed the DHA/ARA diet compared with those fed the control, SO, FO, or DHA diets. There was a significant main effect of dietary treatment on femur calcium (Ca), phosphorous (P), magnesium (Mg), and zinc (Zn) contents in both genders. This study confirmed that different dietary oil sources with varying ω -6/ ω -3 ratios significantly altered the fatty acids level of bone marrow. In addition, the significant elevation in minerals content and the maintenance of optimal Ca/P ratio in bone of DHA/ARA and DHA fed groups beside the significant elevation in ALP activity in the DHA/ARA fed group proved that marine algae oils may be promising dietary sources for promoting bone mineralization and formation, thus improving bone mass during the growth stage.

Keywords : arachidonic (ARA), docosahexaenoic (DHA), eicosapentaenoic (EPA), growing rabbits

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