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Innovative nutritional strategies to preserve bone health: The role of fish oils supplementation in counteracting senile osteoporosis

Keywords: Osteoporosis, aging, nutrition, lipids, SAMP8, inflammation

Laurent Léotoing1,2,3, Fabien Wauquier1,2,3, Véronique Coxam1,2,3 and Yohann Wittrand1,2,3

1. Clermont Université, Université d’Auvergne, Unité de Nutrition Humaine, BP 10448, F-63000 CLERMONT-FERRAND
2. INRA, UMR 1019, UNH, CRNH Auvergne, F-63009 CLERMONT-FERRAND
3. Equipe Alimentation, Squelette et Métabolismes

e-mail : yohann.witrant@clermont.inra.fr

Scientific question:
The aim of this study was to analyze the impact of fatty acid quality on the age related establishment of osteoporosis. The SAMP8 mouse strain was chosen as a progeria model as compared to the SAMR1 control strain. Two months old mice were divided in different groups and subjected to the following diets: (1) standard “growth” diet – (2) “sunflower” diet (high ω6/ω3 ratio) – (3) “borage” diet (high ω6-linolenic acid) – (4) “fish” diet (high in long chain ω3). Mice were fed ad libitum through the whole protocol. At 12 months old, bone and fat masses were measured, inflammation parameters and bone cell markers expression were investigated. We demonstrated for the first time that borage and fish diets restored inflammation and bone parameters using an original model of senile osteoporosis that mimics clinical features of aging in humans. Therefore, our study strongly encourages nutritional approaches as relevant and promising strategies for preventing aged-related locomotor dysfunctions.

Figure 1 Experimental protocol design:

Table 1: Diets formulations

Figure 2 Bone status (Sf: Sunflower diet; Bo: borage diet; Fi: fish diet). Significant different groups are represented by different letters as analyzed by ANOVA (p<0.05).

Figure 3 Weight tissues: A: Total body weight gain over the complete study. B: Food intake. C: Quadriceps weight. D: Visceral adipose tissues weight. (Sf: Sunflower diet; Bo: borage diet; Fi: fish diet). Significant different groups are represented by different letters as analyzed by ANOVA (p<0.05).

Figure 4 Expression of bone cell markers (A and B: pro-resorbing markers; C and D pro-forming markers) determined by transcriptomic analysis on bone tissues. (Sf: Sunflower diet; Bo: borage diet; Fi: fish diet). Significant different groups are represented by different letters as analyzed by ANOVA (p<0.05).

Figure 5 Inflammation parameters: A: Spleen weight measurements. B: C-reactive protein analysis in blood samples. D: Expression of IL-6 transcripts in bone tissues (tibiae). (Sf: Sunflower diet; Bo: borage diet; Fi: fish diet). Significant different groups are represented by different letters as analyzed by ANOVA (p<0.05).

Better fat quality,

Better aging

Better bone health,