

Abstract

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Developmental and neurobehavioral effects of perinatal exposure to diets with different omega-6:omega-3 ratios in mice.

Santillán ME, Vincenti LM, Martini AC, de Cuneo MF, Ruiz RD, Mangeaud A, Stutz G.

Instituto de Fisiología, Facultad de Ciencias Médicas, Universidad Nacional de Córdoba, Córdoba, Argentina.

OBJECTIVE: To investigate in mice the effect of diets enriched with soy or sunflower oil with different omega-6:omega-3 ratios on gestation, reproductive success, physical maturation, and the neurobiological development of the pups.

METHODS: Dams were assigned, throughout gestation and lactation, to different groups: a commercial diet (CD), a soy oil-enriched diet (SOD), or a sunflower oil-enriched diet (SFOD). Measurements during gestation were dams' body weights and daily food intakes. Measurements in the offspring were physical parameters (body weight, body length, body mass index, fur appearance, pinna detachment, incisor eruption, eye opening, and puberty onset) and behavioral preweaning tests (surface righting reflex, negative geotaxis, and cliff avoidance).

RESULTS: The SOD and SFOD dams became significantly heavier than the CD dams from gestational days 14 and 19, respectively, to parturition. There were no significant differences in gestational length or food consumption during pregnancy or lactation or in maternal weight during lactation. Diets did not modify litter size, sex ratio, survival index at weaning, or body weight. The SFOD and SOD offspring were significantly shorter than the CD offspring at weaning. The mean offspring physical scores of SOD and SFOD offspring were higher than CD offspring and simple reflexes were earlier in the SOD and SFOD groups. In SFOD offspring, puberty onset was significantly delayed, at postnatal days 26 and 27 in male and female offspring, respectively.

CONCLUSION: This study suggests that the maintenance of an adequate omega-6:omega-3 ratio is necessary for the optimal growth and development of murine offspring. In populations that do not have sufficient provision of polyunsaturated fatty acids in the diet, their consumption would be advisable during gestation and lactation because these improve most neurodevelopmental outcomes included in this study. Copyright 2010 Elsevier Inc. All rights reserved.

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