

Polyunsaturated fatty acids and fetal brain development

Unfulfilled promises

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Abstract

Question I have learned that one of the manufacturers of prenatal vitamins has added omega-3 fatty acids and claims that they help support fetal cognitive health and brain function. Is this based on evidence?

Answer The claim that polyunsaturated fatty acids help improve fetal brain and eye development has been made for more than a decade. Unfortunately it is not supported by evidence-based science. Long-term studies have failed to show such effects. Implying to women that using these products will improve the brain development of their children is unwarranted and misleading. Health Canada should clarify the contradictions in its statements about omega-3 fatty acids.

Acides gras polyinsaturés et développement du cerveau fœtal

Promesses brisées

Résumé

Question J'ai appris que l'un des fabricants de vitamines prénatales y a ajouté des acides gras oméga-3 et prétend qu'ils aident à maintenir la santé cognitive et la fonction cérébrale du fœtus. Cette affirmation se fonde-t-elle sur des données probantes?

Réponse L'affirmation que les acides gras polyinsaturés aident à améliorer le développement du cerveau et des yeux du fœtus existe depuis plus d'une décennie. Malheureusement, elle n'est pas étayée par la science fondée sur des données probantes. Des études à long terme n'ont pas réussi à démontrer de tels effets. L'insinuation voulant que les femmes qui utilisent ces produits amélioreront le développement cérébral de leurs enfants est injustifiée et trompeuse. Santé Canada devrait clarifier les contradictions qui existent dans les déclarations qu'a faites le ministère à propos des acides gras oméga-3.

Polyunsaturated fatty acids (PUFAs) of the omega-3 and omega-6 families are not synthesized by the human body,¹ making the parent fatty acids of these families— α -linolenic acid and linoleic acid—essential fatty acids that must be obtained through the diet.² The ratio of omega-3 to omega-6 PUFAs is critical because both families are metabolized by the same enzymes, and increasing the amount of omega-3 fatty acids in the diet, for example, might decrease the availability of the omega-6 fatty acids. Because the PUFAs required by the fetus are supplied by preferential placental transfer of long-chain PUFAs rather than the precursors α -linolenic acid and linoleic acid, it has been proposed that an additional maternal supply of docosahexaenoic acid (DHA) and arachidonic acid during pregnancy might improve early cognitive and visual development.³ Observational studies have suggested that prenatal arachidonic acid

status correlates positively with neurodevelopmental outcomes during early infancy, but not at older ages.⁴

Limited benefit

In the Health Canada document *Fish and Omega-3 Fatty Acids*,⁵ women are advised to consume at least 150 g of cooked fish weekly. With respect to PUFA supplementation with fish oil, although such supplements provide omega-3 fatty acids, Health Canada stated that there is insufficient evidence to draw conclusions on the effects of fish oil supplementation on infant development.⁵ Motherisk addressed this question in a recent systematic review of the potential effects of interventional supplementation of omega-3 fatty acids during pregnancy only on infant neurobehavioural and visual development, without the potential effects of breastfeeding or later dietary supplementation.⁶ Nine studies

met the inclusion criteria, 3 focusing on development of vision and 6 on neurobehavioural development. Synthesizing the existing data, most studies did not show sustained benefits to infant cognition or development of vision. Since the publication of this systematic review, a study published in May 2014 in *JAMA* also could not confirm a beneficial effect in a randomized trial of children aged 4 years.⁷

The randomized trials we reviewed focused on the effects of maternal PUFA supplementation on the neurocognitive and retinal development in the child; they found very limited, if any, benefits to supplementation. Even in the studies that found statistically significant differences between the treatment and control groups, the differences were small and of little potential clinical importance. These trials found that even high doses of omega-3 PUFAs (up to 3.7 g per day) were not associated with any detrimental effects.⁶

In the longitudinal studies by Helland et al, the limited effects evident at 4 years of age were nullified 3 years later.⁸⁻¹⁰ In the study by Dunstan et al, a single positive effect was contrasted by mostly negative results.¹¹ When comparing numerous end points, a single positive result might arise by chance only, as $P < .05$ means a 1 in 20 chance of “no difference” becoming “a significant difference,” especially as multiple comparison correction for the large number of comparisons was not performed in the study by Dunstan et al.¹¹ Similarly, Judge et al found 1 significantly positive effect in a large number of negative tests ($P < .05$).¹² If there was a genuine favourable effect, it was of small magnitude and might not have persisted in later years. Thus, in considering the results of these studies, a recommendation to supplement all expecting mothers with PUFAs to improve infant neurodevelopment is not currently supported by the existing data.

Recent developments

In the study published in May 2014, Makrides and colleagues conducted a 4-year follow-up of children born to women participating in a randomized trial of prenatal DHA supplementation. Their data indicate that such supplementation “does not influence objective assessments of cognition, language, and executive function.”¹⁷


Unfortunately, in a monograph on fish oil dated July 10, 2013, Health Canada states:

For products providing 100–5,000 mg EPA [eicosapentaenoic acid] + DHA including at least 100 mg DHA, per day: Helps support cognitive health and/or brain function.¹³

For products providing 150–2,000 mg EPA + DHA including at least 150 mg DHA, per day ... Helps support the development of the brain, eyes and nerves in children up to 12 years of age.¹³

These statements contradict previous Health Canada statements,⁵ and overwrite the statement by Makrides and colleagues quoted above that PUFAs were not shown to confer such effects.⁷

Conclusion

These incorrect and misleading statements are used inappropriately by manufacturers to declare benefits that are not supported by science. Implying to women that using these products will improve brain development of their children is unwarranted and misleading. Health Canada should clarify the ambiguity that exists in its statements. 

Competing interests

None declared

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