



## Clinical Nutrition

Volume 37, Issue 4, August 2018, Pages 1367-1374

Original article

# Maternal plasma n-3 and n-6 polyunsaturated fatty acids during pregnancy and features of fetal health: Fetal growth velocity, birth weight and duration of pregnancy

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<https://doi.org/10.1016/j.clnu.2017.06.010>

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### Highlights

- The maternal n-3:n-6 PUFA ratio is positively associated with fetal growth velocity and duration of pregnancy.
- In particular a higher n-3 PUFA status is proposed for favourable pregnancy outcomes.
- An optimal balance between maternal n-3 and n-6 PUFA's is important for fetal health.

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## Summary

### Background & aims

Maternal **fatty acids** are essential for **fetal growth** and development. Here, we examine associations between maternal mid-pregnancy plasma n-3 and n-6 **polyunsaturated fatty acids** (PUFAs) and fetal health determined by fetal growth velocity, birth weight and duration of pregnancy.

### Methods

Participants were 6974 pregnant women and their infants from a population-based birth cohort, the Generation R Study. **Maternal plasma** n-3:n-6 PUFA ratio and n-3 and n-6 PUFA percentage in **glycerophospholipids** in mid-pregnancy were related to fetal growth velocity calculated from repeatedly measured weight, length and **head circumference**, birth weight, and duration of pregnancy.

### Results

A higher maternal mid-pregnancy n-3:n-6 PUFA ratio was associated with a higher growth velocity of the **fetal weight** ( $\beta = 0.082$  SD-score/week, 95% CI 0.055; 0.108,  $P < 0.001$ ), length ( $\beta = 0.085$  SD-score/week, 95% CI 0.052; 0.119,  $P < 0.001$ ); and head ( $\beta = 0.055$  SD-score/week, 95% CI 0.019; 0.091,  $P = 0.003$ ).

We also observed positive associations between n-3:n-6 PUFA ratio and birth weight ( $\beta = 0.76$  SD-score, 95% CI 0.22; 1.29,  $P = 0.006$ ), and duration of pregnancy ( $\beta = 1.32$  weeks, 95% CI 0.24; 2.40,  $P = 0.02$ ).

### Conclusions

These results are consistent with the hypothesis that a

higher n-3:n-6 PUFA ratio is important for fetal health.

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## Keywords

Birth weight; Fatty acids; Fetal growth; Population-based cohort; Pregnancy

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