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Serum IGF-I concentration and growth during infancy correlate to polyunsaturated fatty acid pattern

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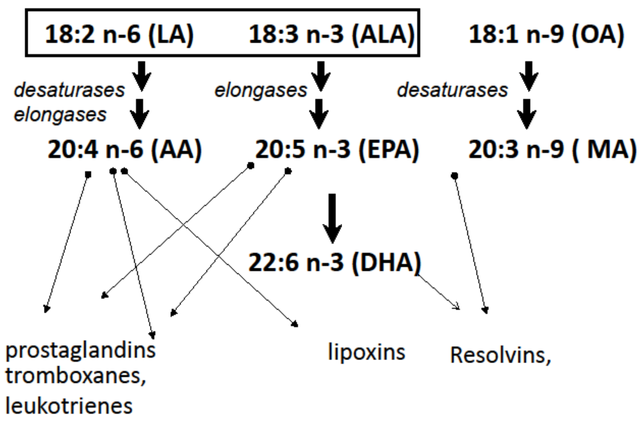
Background

Insulin-like growth factor-I (IGF-I) is important for fetal as well as infant growth, and is influenced by nutrition. Essential fatty acids are necessary for normal growth but cannot be synthetized in mammals. In young pigs, docosahexaenoic acid (DHA)-enriched food is associated with higher IGF-I levels but studies in human infants are lacking.

The n-6 and n-3 essential fatty acids, linoleic acid (LA, 18:2n-6) and a-linolenic acid (ALA, 18:3n-3), compete for the same enzyme activities for further transformation into long-chain polyunsaturated fatty acids (LCPUFAs) such as dihomo-g-linolenic acid (DGLA, 20:3n-6), arachidonic acid (AA,20:44n-6), eicosapentaenoic acid (EPA,20:5n-3) and DHA (22:6n-3).
The unsaturated PUFA mead acid (MA, 20:3n-9) is desaturated from oleic acid (OA)



Aims & objectives

To assess levels of polyunsaturated fatty acids (PUFA) relate to IGF-I, birth size and growth during infancy.

Conclusions

During infancy, essential fatty acids correlate to IGF-I as well as to birth size. Whether this is through growth hormone level or nutrition per se remains to be elucidated.

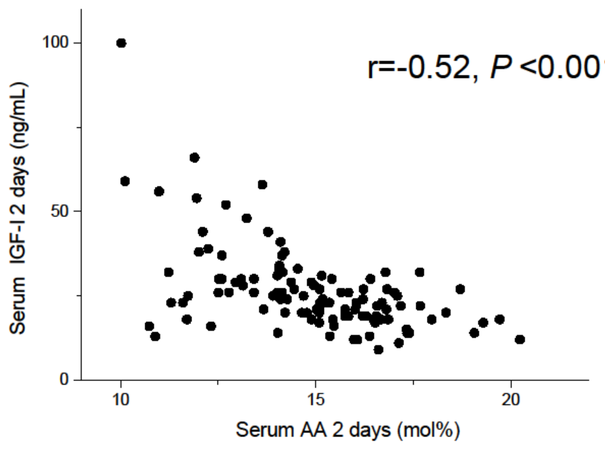
Results

1. Essential fatty acids and IGF-I

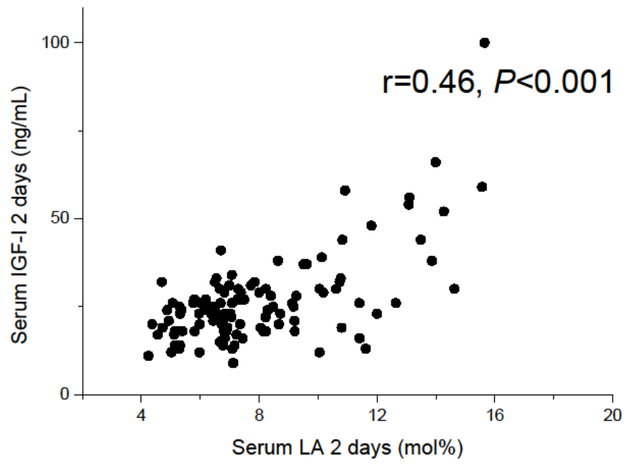
1.1. At birth IGF-I correlated negatively to cord omega n6/n3 (r=-0.25, *P* <0.01) and cord AA (r=-0.34, *P* <0.001).

1.2. At 2 days of age

AA correlated negatively to IGF-I



LA correlated positively to IGF-I

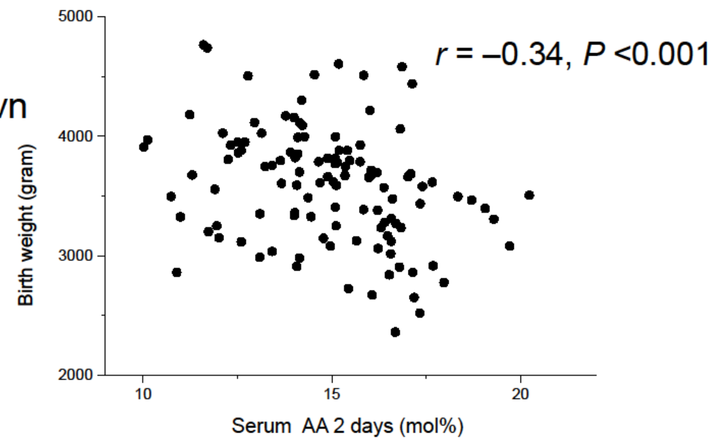


2. Essential fatty acids and growth

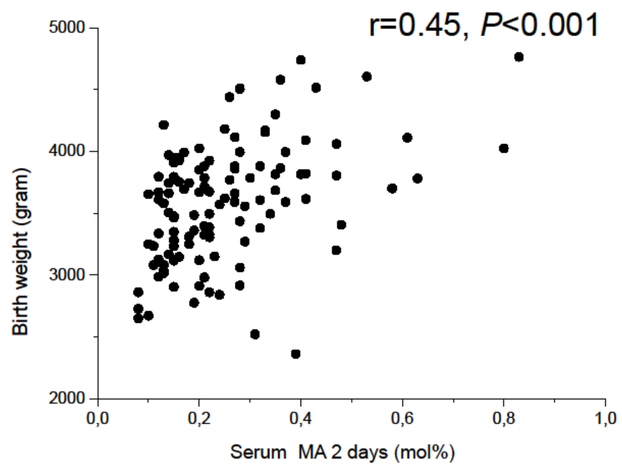
1.1. At birth, AA had a negative correlation to birth length (r=-0.29, *P*=0.001) and weight (r=-0.25, *P* <0.01) and MA had a positive correlation to birth length (r=0.34, *P* <0.001) and weight (r=-0.34, *P* <0.001).

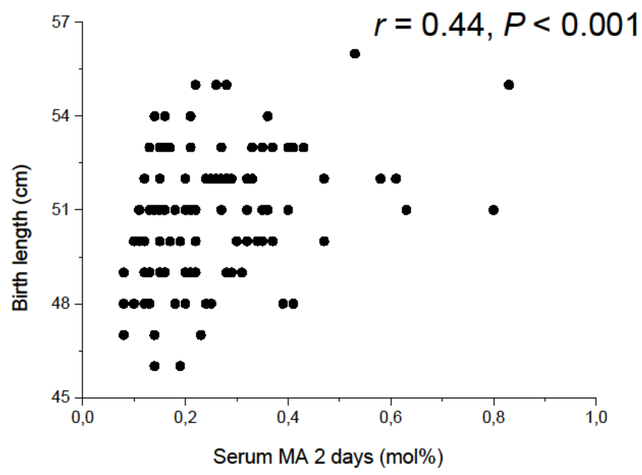
1.2. At two days of age

The negative correlation between AA and birth weight was also shown at two days of age:



MA correlate closely to birth weight and birth length





Methods

The setting was a population-based consecutive longitudinal cohort comprising 126 full-term, normal size infants (50% females) followed prospectively with anthropometric measurements as well as blood sampling from cord blood, serum at 2 days of age and at four and 12 months. Only those which had complete series of PUFA analyses were included. Parents completed food questionnaires on each occasion.

At one month of age, 95% were given some breastfeeding and at four months 64% were exclusively breastfed.

IGF-I were assessed using the IDS-iSYS-technique and leptin using RIA (Linco Research).

Essential fatty acids were analyzed with masspectrometry technique.

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