

# Abstract

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## Maternal DHA Equilibrium during Pregnancy and Lactation Is Reached at an Erythrocyte DHA Content of 8 g/100 g Fatty Acids.

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**BACKGROUND:** Low long-chain PUFA (LC-PUFA, or LCP) consumption relates to suboptimal neurodevelopment, coronary artery disease, and [postpartum (PP)] depression. Maternal-to-infant LCP transport during pregnancy and lactation is at the expense of maternal status, a process known as biomagnification. Despite biomagnification, maternal and infant LCP status generally declines during lactation.

**OBJECTIVE AND METHODS:** To assess the 1) turning point of biomagnification [level from which maternal (m)LCP status exceeds infant (i)LCP status]; 2) LCP equilibrium (steady-state-level from which mRBC-LCP stop declining during lactation); 3) corresponding iLCP-status; and 4) the relationship between RBC-DHA and RBC-arachidonic acid (AA), we measured RBC-fatty acids in 193 Tanzanian mother-infant pairs with no, intermediate (2-3 times/wk), and high (4-5 times/wk) freshwater fish consumption at delivery and after 3 mo of exclusive breast-feeding.

**RESULTS:** At 3 mo, mRBC-DHA was lower than the corresponding iRBC-DHA up to a mRBC-DHA of 7.9 g%. mRBC-DHA equilibrium, with equivalent mRBC-DHA at both delivery and at 3 mo PP, occurred at 8.1 g%. This mRBC-DHA equilibrium of 8.1 g% corresponded with an iRBC-DHA of 7.1-7.2 g% at delivery that increased to 8.0 g% at 3 mo. We found between-group differences in mRBC-AA; however, no differences in iRBC-AA were observed at delivery or 3 mo. Relations between RBC-DHA and RBC-AA were bell-shaped.

**CONCLUSIONS:** We conclude that, at steady-state LCP intakes during lactation: 1) biomagnification occurs up to 8 g% mRBC-DHA; 2) mRBC-DHA equilibrium is reached at 8 g%; 3) mRBC-DHA equilibrium corresponds with an iRBC-DHA of 7 g% at delivery and 8 g% after 3 mo; 4) unlike RBC-DHA, mRBC-AA and iRBC-AA are independently regulated in these populations; and 5) bell-shaped RBC-DHA vs. RBC-AA-relations might support uniform iRBC-AA. A (maternal) RBC-DHA of 8 g% might be optimal for infant neurodevelopment and adult cardiovascular disease incidence.

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