

## Higher maternal plasma docosahexaenoic acid during pregnancy is associated with more mature neonatal sleep-state patterning<sup>1,2,3,4</sup>

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**Background:** The effect of docosahexaenoic acid (DHA) on the developing fetal central nervous system (CNS) and related functional outcomes in infancy remain unexplored. Sleep and wake states of newborns provide a tool for assessing the functional integrity of the CNS.

**Objective:** We investigated whether CNS integrity in newborns, measured with sleep recordings, was associated with maternal concentrations of long-chain polyunsaturated fatty acids, especially DHA.

**Design:** Plasma phospholipid fatty acid concentrations were measured in 17 women at parturition. On postpartum day 1 (P1) and day 2 (P2), a pressure-sensitive pad under the infants' bedding recorded body movements and respiratory patterns to measure sleep and wake states.

**Results:** Maternal plasma phospholipid DHA ranged from 1.91% to 4.5% by wt of total fatty acids. On the basis of previously published data and the median DHA concentration, the women were divided into 2 groups: high DHA (> 3.0% by wt of total fatty acids) and low DHA ( $\leq$  3.0% by wt of total fatty acids). Infants of high-DHA mothers had a significantly lower ratio of active sleep (AS) to quiet sleep (QS) and less AS than did infants of low-DHA mothers. Furthermore, the former infants had less sleep-wake transition and more wakefulness on P2. Correlations of maternal DHA status with infant sleep states were consistent with these data. Also, the ratio of maternal n-6 to n-3 fatty acids on P1 was inversely associated with QS and positively associated with arousals in QS. On P2, maternal n-6:n-3 was positively associated with AS, sleep-wake transition, and AS:QS.

**Conclusion:** The sleep patterns of infants born to mothers with higher plasma phospholipid DHA suggest greater CNS maturity.

**Key Words:** Long-chain polyunsaturated fatty acids • long-chain PUFAs • docosahexaenoic acid • central nervous system • infant sleep • sleep recordings • active sleep • quiet sleep • pregnancy • prenatal nutrition • maternal diet • phospholipids