Long-term effects of iron deficiency anemia in infancy on tibialis anterior motor pattern during sleep in childhood

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Background

Iron deficiency, the most common single nutritional disorder in the world, is surprisingly prevalent in human infants, especially in the late infancy/toddler period (between the ages of 6 and 24 months). However, even if it is recognized that childhood iron deficiency anemia (IDA) has an impact on motor function only scarce data are available based on a relatively short period of time (activity during the waking time immediately preceding and following an afternoon nap in the laboratory). Finally, at 6 months of age, infants with IDA show an overall increase in motor activity compared to controls, using 24-h actigraphic monitoring; these differences are no longer observed at 12 and 18 months of age, after effective iron supplementation treatment. The increased activity during the period of IDA raises the issue of a shared underlying mechanism with restless legs syndrome (RLS). However, very little is know on the eventual long-lasting effects of transient IDA on sleep motor patterns, especially when it occurs in early stages of the developing brain.

Objective

The objective of this study was to detect eventual changes in the leg movement activity during sleep in 10-year-old children who suffered from IDA in their early developmental stages (6-18 months of age). The working hypothesis was based on the previous demonstration that the features of PLMS are peculiar in RLS and that there is a specific subgroup of PLMS that respond to dopamine agonist treatment, while other nonperiodic LM activities remain unchanged. The specific hypothesis of this study was then that a dopaminergic permanent subtle dysfunction might result from early IDA (iron is involved in

the dopaminergic metabolic pathways in humans) which can be picked up by a sophisticated analysis of PLMS.

Results

The results confirm the original hypothesis and show that previously IDA children, even after a successful correction of the deficiency, show subtle but detectable changes of their LM activity during sleep with an increase of PLMS with a inter-LM interval between approximately 10 and 50 s and with significantly higher periodicity index than age-matched healthy controls. Early developmental IDA might represent a risk factor for the development of increased PLMS activity in adulthood with a consequent hypothetical predisposition to PLMD and RLS.

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