While iron supplementation can correct anemia at any stage, there is little evidence to support the idea that iron supplementation can correct neurodevelopmental deficits caused by iron deprivation in utero or in early childhood.

Key insights
Iron is an essential nutrient throughout the human life cycle, but particularly for the developing fetus, the neonate, and in early childhood. Before birth, iron needs are met through maternal iron transfer, and after birth, through dietary sources. Breast milk is low in iron, and care should be taken to offer additional sources of iron to breastfed infants. Worldwide, iron deficiency remains one of the most common micronutrient deficiencies in children, affecting an estimated 43% of the global population. Although a child with iron deficiency will continue to grow, depletion of tissue iron stores will cause specific clinical symptoms.

Current knowledge
Iron deficiency during fetal development and the first 2 years of life is associated with poor growth and decreased cognitive, motor, and emotional development. Deficiency of iron during this critical window of development can permanently alter the brain and nervous system. The strongest evidence for the effect on neurological outcomes comes from studies in school-aged children and teenagers with iron deficiency and iron deficiency anemia: modest improvements in cognitive outcomes were obtained after iron supplementation. However, the effects of iron supplementation in infants and young children are less clear.

Practical implications
The fetus obtains its iron via the placenta, and 80% of iron is transferred during the final trimester of pregnancy. However, the clinical benefits of maternal iron supplementation on birth outcomes require further study. An alternate strategy to improve the infant’s iron stores is delayed cord clamping. Full-term, breastfed infants should begin an iron supplement at 4 months, and formula-fed infants should be given iron-enriched formulas. At weaning and beyond, children should be offered a varied diet that includes foods rich in heme and non-heme iron.

Recommended reading