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METABOLIC DISORDERS

IODINE DEFICIENCY AND LEARNING DISABILITIES

The effect of prolonged iodine deficiency on learning and motivation to achieve was studied in 100 male children selected from both severely iodine-deficient (SID) and mildly iodine-deficient (MID) villages and reported from the Department of Psychology, Kashi Vidyapeeth, Varanasi, and Department of Endocrinology, Banjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, India. Mean urinary iodine excretion and serum thyroxine concentration were significantly lower, and serum TSH was significantly higher, in the SID group than in the MID group. SID compared to MID children were slower learners, having lower scores on maze and pictorial learning tasks, and the SID group scored significantly lower on the achievement motivation scale. The SID and MID groups were matched for age, socioeconomic status, and formal education. Cretins were excluded, and study subjects were required to read and write. (Tiwari BD, Godbole MM et al. Learning disabilities and poor motivation to achieve due to prolonged iodine deficiency. Am J Clin Nutr May 1996;63:782-6). (Reprints: MM Godpole, Associate Professor, Department of Medical Endocrinology, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow 226014, India).

COMMENT. Iodine deficiency results in slow learning ability and impaired motivation to achieve. In severely iodine-deficient (SID) children, the number of errors and time taken in maze learning were negatively correlated with urinary iodine excretion and thyroxine concentrations, and showed a positive correlation with thyroid stimulating hormone. In contrast, tests involving verbal learning and free-recall, a less demanding cognitive task than maze learning, did not distinguish between severely and mildly iodine-deficient children, but SID children were slower on serial testing, showing impairment of formation of new stimulus-response associations or engrams. Optimal iodine nutrition is important in the prevention of learning disabilities and failure to achieve academically. The following report supports a correlation between neonatal triiodothyronine levels and later cognition.

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Low triiodothyronine concentration in preterm infants was correlated with a mean 6.6 point deficit in overall IQ scores (8.5 deficit on verbal scale) on the WISC scales at 8-year follow up in a study of 236 infants examined at the Infant and Child Nutrition Group, Medical Research Council Dunn Nutrition Unit, Cambridge, UK. (Lucas A, Morley R, Fewtrell MS. BMJ 4 May 1996;312:1132-3). Brook CGD, of Cobbold Laboratories, Middlesex Hospital, London, in a Commentary: Do preterm infants need thyroxine replacement? (BMJ 1996;312:1133) cautions that thyroxine therapy for hypothyroid mothers is unlikely to benefit premature babies, and triiodothyronine replacement in premature infants may be dangerous. Neonatologists generally withhold therapy pending a retest after the infant reaches term. An increased risk of developing cerebral palsy and cognitive deficits has been reported in premature infants with low thyroxine levels in the first week of life (N Engl J Med March 28 1996).

Iodine deficiency diseases (IDD), a major international public health problem especially affecting developing countries, may be prevented by the administration of iodinated salt. My colleague, Dr Charles Swisher, provided me with several references to the topic, pointing out that estimates have shown 200 million affected by IDD and 800 million people at risk worldwide for IDD, a total of "1 billion brains" at risk of maldevelopment or malfunction! The most serious complication of IDD is endemic cretinism, but milder forms of IDD may be associated with impaired cognitive function and learning disabilities in later childhood. For further reviews of IDD, see Delange F. Thyroid Spring 1994;4:107-128; Lamberg BA. Ann Med Oct 1991;23:367-372; Hetzel BS et al. Neuropath & Applied Neurobiol 1988;14:93-104; Maberly GF. J Nutrition Aug 1994;124(8 Suppl):1473-78S.

ATTENTION DEFICITS AND CONGENITAL HYPOTHYROIDISM

The ability to sustain attention was studied using continuous performance tasks in 48 children with early treated congenital hypothyroidism (CH) and 35 healthy controls at the University of Groningen, The Netherlands. In 38 patients with T4 levels <50 nmol/l as neonates, performance of a computer-paced task declined over time, suggesting impairment of sustained attention. In a self-paced task, an initial performance decline was followed by an improvement in the final stages, this pattern being most pronounced in the low T4 group, reflecting a greater performance variability over time and a problem with sustained attention. The performance of the 10 children with intermediate T4 levels (\geq 50 nmol/l as neonates) fell between the control group and the low T4 group. The performance declines were correlated with intelligence, but the difference in performance decline between the low T4 group and controls was not related to intelligence. No correlation was found between onset of treatment for CH and sustained attention. A suboptimal motor system may have been a factor underlying the sustained attention deficit in CH children. (Kooistra L et al. Sustained attention problems in children with early treated congenital hypothyroidism. Acta Paediatr April 1996;85:425-9). (Respond: Dr L Kooistra, University of Groningen, Laboratory of Experimental Clinical Psychology, Grote Kruisstraat 2/1, 9712 TS Groningen, The Netherlands).

COMMENT. Motor, cognitive, and motivational factors may influence scores on continuous performance tasks. All three factors can be important influences on sustained attention in children with congenital hypothyroidism.