Abstract


Prenatal choline and the development of schizophrenia.

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BACKGROUND: The primary prevention of illness at the population level, the ultimate aim of medicine, seems out of reach for schizophrenia. Schizophrenia has a strong genetic component, and its pathogenesis begins long before the emergence of psychosis, as early as fetal brain development. Cholinergic neurotransmission at nicotinic receptors is a pathophysiological mechanism related to one aspect of this genetic risk. Choline activates these nicotinic receptors during fetal brain development. Dietary supplementation of maternal choline thus emerges as a possible intervention in pregnancy to alter the earliest developmental course of the illness.

AIM: Review available literature on the relationship of choline supplementation or choline levels during pregnancy and fetal brain development.

METHODS: A Medline search was used to identify studies assessing effects of choline in human fetal development. Studies of other prenatal risk factors for schizophrenia and the role of cholinergic neurotransmission in its pathophysiology were also identified.

RESULTS: Dietary requirements for choline are high during pregnancy because of its several uses, including membrane biosynthesis, one-carbon metabolism, and cholinergic neurotransmission. Its ability to act directly at high concentrations as a nicotinic agonist is critical for normal brain circuit development. Dietary supplementation in the second and third trimesters with phosphatidyl-choline supports these functions and is associated generally with better fetal outcome. Improvement in inhibitory neuronal functions whose deficit is associated with schizophrenia and attention deficit disorder has been observed.

CONCLUSION: Prenatal dietary supplementation with phosphatidyl-choline and promotion of diets rich in choline-containing foods (meats, soybeans, and eggs) are possible interventions to promote fetal brain development and thereby decrease the risk of subsequent mental illnesses. The low risk and short (sixmonth) duration of the intervention makes it especially conducive to population-wide adoption. Similar findings with folate for the prevention of cleft palate led to recommendations for prenatal pharmacological supplementation and dietary improvement. However, definitive proof of the efficacy of prenatal choline supplementation will not be available for decades (because of the 20-year lag until the onset of schizophrenia), so public health officials need to decide whether or not promoting choline supplementation is justified based on the limited information available.

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