

Why Cognitive Changes Might Occur With Hyperemesis Gravidarum

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Background. Over 60 case reports exist of Wernicke's encephalopathy (WE) associated with Hyperemesis Gravidarum (HG). Historically, only supplemental thiamine has been recommended to treat Wernicke's, however it is known that the brain is metabolically demanding, requiring 28% of daily energy. What is evident in all case reports of Wernicke's in HG is significant weight loss and accelerated starvation in the setting of the metabolic demand of advancing pregnancy.

Method. Extrapolating from known nutrient content of animal brain used for food, we present an approximation of nutrients which may exist in the human brain. We also highlight the metabolic role of essential nutrients as support for a paradigm shift for comprehensive and early nutrition support.

Results.

Nutrient	Estimated amount contained in a 2.5-3 pound human brain *	Function
Water	70% weight of the adult brain	
Cholesterol	27.9 grams	Precursor of several steroid hormones
Energy-producing substrates		
Protein	155 grams	12 amino acids identified in beef brain
Fat (saturated)	41 grams	Fatty acids reflect dietary intake
Fat (polyunsaturated)	32 grams	Same as above
Fat (monounsaturated)	56 grams	Same as above
Carbohydrates	Essentially none	Obligate consumer of carbohydrate
Fat soluble vitamins		Provide no energy
Vitamin A	None identified	Found in visual pigments, renal development
Vitamin D	Vitamin D receptors found	Multiple functions, including as a neurosteroid
Vitamin E	32 mg	Membrane antioxidant
Vitamin K	None identified	Blood clotting, calcium metabolism
Water soluble vitamins		Provide no energy
Thiamine (B1)	1.1 mg	Cofactor for decarboxylation of 2 keto acids and transketolation
Riboflavin (B2)	2.4 mg	Coenzyme in redox reactions of fatty acids, TCA cycle
Niacin (B3)	14 mg	Coenzyme for dehydrogenases
Pyridoxine (B6)	3.4 mg	Coenzyme in amino acid metabolism
Folate (B9)	98 mcg	Coenzyme in single carbon metabolism
Cobalamin (B12)	120 mcg	Metabolism coenzyme, neural myelination
Biotin	None identified	Carboxylation coenzyme
Ascorbic Acid (C)	14 mg	Biosynthesis of collagen and dopamine
Pantothenic acid	15 mg	Coenzyme in fatty acid metabolism
Choline	None identified	Acetylcholine precursor
Minerals or electrolytes		Provide no energy
Calcium	126 mg	Intracellular signal component for astrocytes
Copper	3.4 mg	Component of dopamine
Iodine	None identified	Part of thyroid molecule
Iron	31 mg	Component of myelin
Magnesium	210 mg	Cofactor in thiamine metabolism
Manganese	0.36 mg	Role in carbohydrate, amino acid, cholesterol metabolism
Phosphorus	4.9 grams	Critical component of ATP
Potassium	3.4 grams	Regulation of neuromuscular activity
Sodium	1.7 grams	Neuromuscular function
Zinc	18.4 grams	Development and maintenance of central neural system

Estimated nutrient composition of 2.5-3 pound human brain* (*Beef brain nutrient content. USDA National Database for Standard Reference Release 27, August 2014)

Conclusion. Our poster suggests multiple nutrients are present in brain, many of which are involved in energy metabolism and/or neurological function, and are likely also needed to prevent and treat Wernicke's.

Nausea and vomiting of pregnancy (NVP) → ↓ Food and fluids → ↑ Weight loss → ↑ Gestational Malnutrition

Hyperemesis gravidarum → ↑ catabolism → 1. ↑ Muscle loss (cardiac and respiratory)

2. ↓ Neurotransmitters → Wernicke's & altered sensorium gestosis (ASG)

3. ↓ Immune function → ↑ Risk of infection

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