Evidence of systemic thiamine deficiency in Alzheimer Disease demands intense research focus

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AIM*: To stimulate essential new research focused on the cause and treatment of thiamine deficiency (TD) in Alzheimer's Disease (AD)..*

BACKGROUND: Thiamine (Vitamin B1) is an organic micronutrient required in the human diet. Thiamine is readily available in a variety of foods including pork, whole/enriched grain products, organ and lean meats, yeast, eggs, green leafy vegetables, nuts and legumes. Scientific studies in AD and human and animal thiamine deficiency models reveal patterns of clinical, biochemical and brain pathology abnormalities (1).

A 1992 University of Manitoba nutrition study suggested the possibility of a secondary thiamine deficiency in AD correlating with scores of cognitive function (1-p.iii). This deficiency was detected in blood and occurred in spite of normally adequate dietary intakes of thiamine.

Two research questions ensued:

1. Is there evidence of thiamine deficiency in this disease state?
2. What is the potential of thiamine supplementation in AD?

METHOD: Scientific literature review on topic of thiamine and/or AD.

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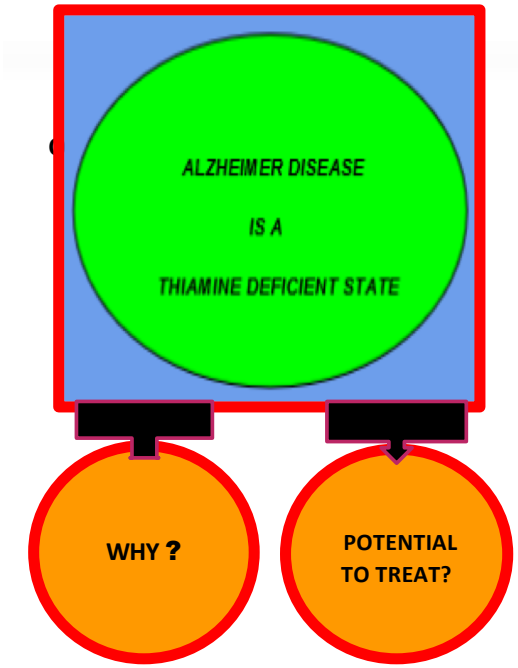
RESULTS:

1. ***Scientific evidence supports a unified theory that AD is a systemic thiamine deficient state of unknown cause (1-p.28,p.85, 2)***
   In AD and TD models there are similar patterns of :
   - ✓ clinical signs and symptoms (1-p.37)
   - ✓ biochemical abnormalities (1-p.13,29)
   - ✓ brain pathology abnormalities (1–p.41)
2. ***Thiamine supplementation can potentially correct*** the ***AD cholinergic deficit*** (1-p.64,3), abnormalities in ***B-amyloid*** (1-p.77, 2), **tau** (4), ***neuro inflammation*** (3,4,5,6) and ***memory*** (1-p.59), ***key targets of AD research***.

3. ***To date, limited oral thiamine supplementation trials in AD have had mixed results (1-p.49, 6).***



There is an urgent need for new studies into the cause and treatment of thiamine deficiency in AD. Collaboration of scientists from multiple disciplines is required in the hope that AD can be prevented, slowed or cured.

RESEARCH PRIORITIES:

1. ***Phase One: What causes thiamine deficiency in AD?***
   > thiamine requirement? (1-p.23,52)
   > thiamine excretion?
   < thiamine absorption? (1-p.52,3)
   < thiamine transport? (3)
   thiamine metabolic errors? (7)
   (treatment potential (8,9)
   other? *

2. ***Phase Two: What is the potential of thiamine supplementation in AD?***

- FORM: oral, intramuscular injections (10), parenteral (3), combination treatments?
- FORMULATION: include Mg (1)? other nutrients (1-p52,10)? thiamine precursors (5)?
- DOSAGE? TIMING? DURATION?
- SAFETY?
- BIOAVAILABILITY (in GIT and brain)?
- DISEASE STAGE of thiamine treatment (6, 9)?
- * Control for medications, medical conditions and dietary components affecting thiamine intake and utilization (1-p.52,p.,53,11)
- PRIMARY ENDPOINTS (1-p.24, p.25, p.54) ?

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