Dementia and Vitamin B12 Is There A Link ?

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Introduction

•**Dementia** is characterized by multiple cognitive symptoms, including loss of memory, difficulty using written or spoken language, and difficulty recognizing familiar objects.(1) The number of people with dementia is increasing dramatically with global aging.(Figrue1)

•The differential diagnosis of the dementia syndromes includes a large number of disorders, from Alzheimer's disease (AD) and vascular dementia to posttraumatic dementia, Hypovitaminosis is one of the few disorders causing dementia that are potentially curable today.(1)

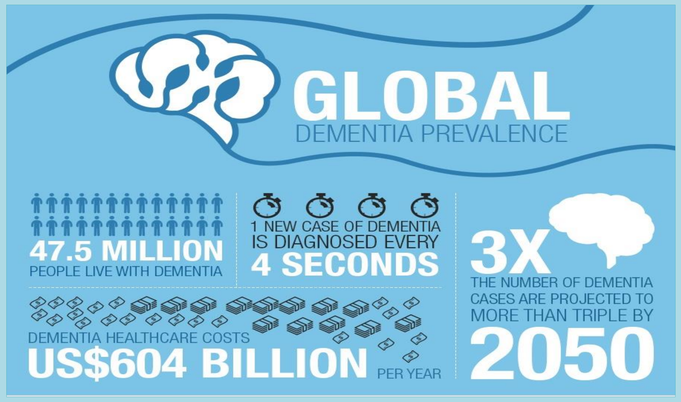

Figure 1 : Global Prevalence of Dementia (2)

•**Vitamin B12 (cobalamin)** is a water-soluble vitamin. It is crucial for neurologic function, red blood cell production and DNA synthesis.(3) Vitamin B12 is an essential vitamin, actually it was the subject of two Noble Prizes.(4)

•Deficiency in vitamin B12 can lead to a specific set of neurologic disorders, and one hematologic disorder (megaloblastic anemia). There are four main reasons a person becomes vitamin B12 deficient : malnutrition, malabsorption, ileal disease and medication.(3) The aim of this review is to find a correlation between vitamin B12 deficiency and dementia.

Diagnosis of vitamin B12 deficiency

- To diagnose vitamin B12 deficiency. We have to measure vitamin B12 levels and its metabolites (Figure2), such as methylmalonic acid and homocysteine (Hcy) because they have been shown to be more sensitive in the diagnosis of vitamin B12 deficiency than measurement of serum B12 levels alone.(3)

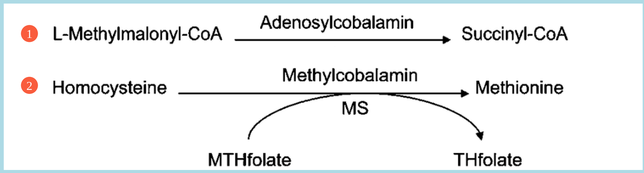

Figure 2 : Cobalamin Reactions (3)

Discussion

- A prospective population study by Zylberstein *et al* recruited women in 1968 and 1969 who were between the ages of 38 and 60 years at the time. Researchers measured their Hcy levels at baseline, and then followed the women for 30 years. The researchers found that higher Hcy in midlife is related to increased risk of AD in old age.(5)
- A study done in 2018 by Vashistha *et al* which include 110 Alzheimer's disease patients and 55 age matched controls observed that serum levels of homocysteine are significantly higher in patients in comparison to controls. This study concluded that higher serum homocysteine levels, lower vitamin D, vitamin B12 and folate levels are risk factor for the Senile Dementia Alzheimer's Type.(6)
- Many systematic reviews examined the relationship between vitamin B12 and cognitive function, four of them are summarized in **Table1** .

Table1. : Summary of Systematic Reviews Examining the Association Between Vitamin B12 (or Hyperhomocysteinemia) and the Onset of Dementia.(7)

Author, Year	Question	No. of Studies Included	Result
Moore et al, 2012 (8)	What is the association between low vitamin B12 levels, neurodegenerative disease, and cognitive impairment?	Unclear	Low serum vitamin B12 levels are associated with neurodegenerative disease and cognitive impairment
Ho et al, 2011(9)	What is the role of Hcy as a risk factor for dementia, cognitive decline, and cognitive impairment?	17	Individuals with AD have higher Hcy levels than controls; however, a causal relationship between high Hcy level and risk of developing dementia is not supported
Wald et al, 2011(10)	What is the relationship between serum Hcy and dementia?	8	There is a positive association between serum Hcy and dementia.
Van Dam and Van Gool, 2009(11)	What is the association between Hcy levels and AD?	18	Increased serum levels of Hcy predispose to AD; more studies are needed.

• Overall, the systematic reviews concluded that there may be an association between high Hcy levels and the onset of dementia.(7)

A recent international Consensus Statement, based upon recent reviews concluded that elevated plasma total homocysteine is a modifiable risk factor for development of cognitive decline, dementia, and Alzheimer's disease in older persons. (12)

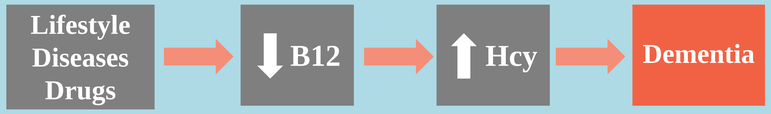

Figure 3 : the relationship between vitamin B12 and Dementia (12)

Conclusion

There is a clear indirect link between B12 deficiency and Dementia. Both conditions are common in elderly, Therefore, measurement of vitamin B12 and its metabolite is strongly recommended in patient with newly diagnosed dementia; In hope to reverse dementia or at least to improve cognitive dysfunction.

References

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