# Cobalamin Deficiency: A reversible cause of Mixed Delirium and Psychosis in an Elderly Patient with recent COVID-19 infection

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## Introduction


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- Cobalamin (Vitamin B12) is an essential water soluble vitamin important for DNA and neurotransmitter synthesis and metabolism.
- Risk factors for cobalamin deficiency include poor dietary intake, deficits in absorption, autoimmune diseases, medications, and advanced age.
- B12 deficiency can lead to neuropsychiatric symptoms such as depression, agitation, delirium, hallucinations, insomnia, paranoia and delusions (1-3).
- Neuropsychiatric symptoms can result from COVID-19 infection due to its effect on the central nervous system (CNS).
- The differential diagnosis in a patient with new onset neuropsychiatric symptoms should include primary cobalamin deficiency, COVID-19 infection or SARS-CoV-2-induced cobalamin deficiency.

## Case Presentation

A 91 year old female with a history of hypothyroidism, type II diabetes mellitus, coronary artery disease, and recent COVID-19 infection (38 days prior to arrival) presented to the hospital with a one week history of behavioral changes including refusal to eat, confusion and both auditory and visual hallucinations.

The patient had no focal neurological deficits, but did exhibit dry mucous membranes, suprapubic tenderness, confusion, and paranoia (observed holding her purse tightly to her chest and reporting a fear that someone may steal it).

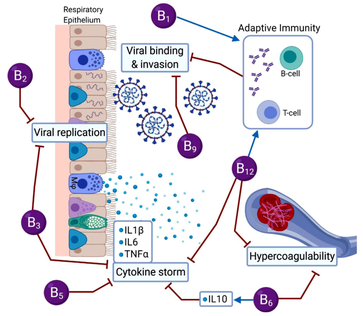
Upon admission, medical workup was negative for any acute cardiac, infectious or intracranial process. COVID-19 PCR testing was negative while COVID-19 antibodies were positive, confirming a recent COVID infection. Further testing revealed low-normal Vitamin B12 of 242 pg/mL (normal: 211-911 pg/mL) and elevated homocysteine of 19.1 umol//L (normal: 5-15 umol/L) and methylmalonic acid of 0.43 umol/L (normal: 0.00-0.40 umol/L).

Upon discovery of her Vitamin B12 deficiency, the patient was given cyanocobalamin 1,000 mcg IM. About 24 hours after administration of the B12 injection, the patient's family noted she had returned to her baseline. She was observed ambulating, eating without difficulty, and no longer clinging to her purse.

The patient's symptoms of mixed delirium and psychosis were attributed to cobalamin deficiency in the context of protein-calorie malnutrition due to poor PO intake. At a virtual hospital follow up 1 week after discharge, the patient's mental status was improved. She was recommended to continue weekly B12 supplementation for at least 4 weeks.

## Discussion

- B12 deficiency has frequently been associated with neuropsychiatric disorders in the elderly population. Acute onset psychosis outside the context of a psychiatric illness is considered secondary and warrants a broad differential diagnosis. Such patients should be evaluated for substance use, neurologic conditions, trauma, nutritional conditions, infectious etiologies and endocrine disorders.
- Due to this patient's recent COVID-19 infection we consider the virus's potential impact on the CNS and B12 metabolism. The pathophysiology of how COVID-19 affects the CNS appears to be multifactorial including hypoxia, angiotensin-converting enzyme 2 activation, direct neuronal injury, hyperinflammatory immune response, etc. (4). Findings suggest that COVID-19 can interfere with B12 metabolism by impairing the intestinal microbiome (5, 6).

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- In this case, a low normal B12 level with concurrently elevated levels of serum methylmalonic acid and homocysteine confirmed a deficiency of Vitamin B12. Her symptoms improved dramatically after receiving a single IM dose of Vitamin B12 1000 mcg. While a primary B12 deficiency is likely based on her history of poor PO intake, SARS CoV2 induced cobalamin deficiency is also a possible etiology.

## Conclusions

- As the COVID-19 pandemic continues to evolve, this case highlights the importance of keeping a broad differential diagnosis for patients who present with new acute onset neuropsychiatric symptoms.
- The pathophysiology of SARS-CoV-2 virus may explain its association with Vitamin B12 deficiency. In patients suspected to have B12 deficiency or with new onset neuropsychiatric symptoms, it is reasonable to evaluate them for a COVID-19 infection.
- Timeliness of the correct diagnosis is essential in patients who present with such symptoms. As we see in this patient case, as well as in many other reported cases, early diagnosis and treatment of B12 deficiency can lead to a complete resolution of symptoms.

## References

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