Laboratory Testing for Vitamin B_{12} Deficiency

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Background

Vitamin B_{12} is found in animal products such as meat, seafood, dairy products and eggs. Dietary deficiency of Vitamin B_{12} is unusual except in strict vegans. Causes of Vitamin B_{12} deficiency include pernicious anaemia, gastric resection and malabsorption. Pregnancy and long term use of Metformin or proton pump inhibitor / H2 receptor antagonist may also lead to low Vitamin B_{12} levels. Vitamin B_{12} deficiency may lead to megaloblastic anaemia and neurological symptoms including peripheral neuropathy, cognitive impairment and sub-acute combined degeneration of the cord.

Scope

Vitamin B_{12} testing in adults in hospitals in the Republic of Ireland.

Key recommendations

Limit Vitamin B_{12} testing to patients with a recognised clinical indication and avoid Vitamin B_{12} testing as part of a routine order set, e.g. for newly admitted patients.

Epidemiology

Vitamin B_{12} is a very commonly requested test. University Hospital Limerick received over 40,000 samples annually prior to the implementation of local guidelines which resulted in a 70% reduction in samples received without any reduction in the number of low Vitamin B_{12} results.

Testing

Who to test-indications for testing

- Hematological
  - unexplained anaemia / other cytopenias
  - unexplained macrocytosis
- Neurological
  - sub acute combined degeneration of the cord
  - peripheral neuropathy
  - dementia
  - unexplained neurology
- glossitis
- pregnancy
- malabsorption
- strict vegans
- previous gastric resection
- metformin therapy
- prolonged proton pump inhibitor or H2 receptor antagonist therapy

Who not to test

There is no value in re-testing Vitamin B_{12} in patients who are already on parenteral Vitamin B_{12} unless FBC parameters or neurological symptoms fail to improve.

Routine screening for Vitamin B_{12} deficiency is not indicated.

How to test

A Vitamin B_{12} immunoassay is currently the standard routine diagnostic test. It is a widely available and low cost test. However, it lacks specificity and sensitivity. The significance of Vitamin B_{12} test results should be assessed in conjunction with the clinical features. If there is strong clinical suspicion of Vitamin B_{12} deficiency despite a normal or borderline Vitamin B_{12} test result, treatment should not be delayed to avoid neurological impairment. Additionally interpretation of the results can be difficult during pregnancy and in patients on combined oral contraceptives.

Second line tests to help assess Vitamin B_{12} status include homocysteine, methylmalonic acid and holotranscobalamin, however these are not as widely available as Vitamin B_{12} immunoassay at present.

Homocysteine is raised in Vitamin B_{12} deficiency. However, homocysteine is not specific to Vitamin B_{12} deficiency and may also be elevated in folate deficiency, Vitamin B_6 deficiency, renal failure and hypothyroidism.

Methylmalonic acid is raised in Vitamin B_{12} deficiency. However, it also may be falsely elevated in patients with renal failure, small bowel bacterial overgrowth and haemoconcentration.

Holotranscobalamin may be more specific than serum Vitamin B_{12} levels. It is also likely to be more accurate in pregnancy and in patients on combined oral contraceptives.

References

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