TEST

Methylmalonic acid blood test

A blood test that helps detect vitamin B12 deficiency by measuring methylmalonic acid.

WHAT IT MEASURES
Methylmalonic acid, a substance that rises when vitamin B12 is insufficient

SAMPLE
Blood

FASTING NEEDED?
No, unless required for other tests

HOW LONG IT TAKES
Usually less than 10 minutes

RESULTS IN
Several days; timing varies by laboratory

USED FOR
Diagnosing vitamin B12 deficiency and checking treatment response

MAIN LIMITATION
Reduced kidney function can raise methylmalonic acid

Overview

A methylmalonic acid blood test measures the amount of methylmalonic acid, often shortened to MMA, in your blood.

Your body needs vitamin B12 to process methylmalonic acid. When cells do not have enough usable vitamin B12, MMA can build up. This makes MMA a useful marker of how well vitamin B12 is working inside the body.

The test is often used when a standard vitamin B12 result is low, borderline, or does not match your symptoms. It may also help assess whether vitamin B12 treatment has corrected the underlying chemical change.

An elevated MMA result does not prove that you have vitamin B12 deficiency. Kidney function, age, pregnancy, medicines, recent treatment, and uncommon inherited conditions can affect the result.

Why the test is ordered

Your clinician may order MMA to investigate possible vitamin B12 deficiency. Vitamin B12 supports normal blood cell production and the health of the brain and nerves.

The test may be helpful when:

MMA may also be measured during the investigation of methylmalonic acidemia. This is a group of rare inherited conditions that affect how the body breaks down certain nutrients. That investigation usually involves additional blood, urine, and genetic tests.

- Your vitamin B12 result is borderline or difficult to interpret
- A blood count shows unusually large red blood cells or anemia
- You have numbness, tingling, balance problems, memory changes, or unexplained tiredness
- You have conditions or medicines that may reduce vitamin B12 absorption
- Your clinician wants to check your response to vitamin B12 treatment

Who should have the test

MMA is not usually used as a general screening test for everyone. A vitamin B12 blood test is often performed first.

Your clinician may consider MMA if your symptoms or risk factors suggest deficiency but your vitamin B12 result is uncertain. Risk factors can include stomach or bowel surgery, disorders affecting nutrient absorption, a diet with little or no vitamin B12, and long-term use of certain medicines.

Metformin, which is used for diabetes, can reduce vitamin B12 levels over time. Acid-reducing medicines like omeprazole or lansoprazole may also contribute by making B12 harder to release from food. These medicines do not mean that you are deficient, and you should not stop them without medical advice.

MMA testing may be less straightforward if you have reduced kidney function. In that situation, your clinician may interpret MMA alongside other tests rather than relying on it alone.

How to prepare

Fasting is not usually needed for an MMA blood test. You may eat and drink normally unless the laboratory has given instructions for another test being collected at the same time.

Tell the person who ordered the test about:

Do not stop prescribed medicines or supplements solely for this test unless you have been specifically told to do so.

When possible, MMA is measured before vitamin B12 treatment begins. However, testing should not delay treatment when there is concern about significant nerve or brain effects from B12 deficiency.

- Vitamin B12 tablets, injections, or multivitamins
- Metformin and acid-reducing medicines
- Recent exposure to nitrous oxide, including repeated recreational use
- Kidney disease, pregnancy, or a recent blood transfusion
- Recent antibiotics or treatment for vitamin B12 deficiency

What happens during the test

A healthcare professional places a band around your upper arm and cleans a small area of skin. A needle is inserted into a vein, usually inside the elbow, and a tube of blood is collected.

You may feel a brief scratch or sting. The needle is then removed, and pressure is applied to reduce bleeding and bruising.

The appointment usually takes less than 10 minutes. The sample may be sent to a specialist laboratory, so the result can take several days.

Understanding your results

Your report will show your MMA result and the laboratory's reference range. There is no single cut-off that is appropriate in every situation. Ranges and interpretation vary by laboratory, age, sex, pregnancy status, medicines, kidney function, and clinical context.

A raised MMA result may support vitamin B12 deficiency, especially when vitamin B12 is low or borderline and kidney function is normal.

A mildly raised result is less clear. Reduced kidney filtration can allow MMA to accumulate even when vitamin B12 is adequate. Your clinician may compare the result with your kidney tests, blood count, symptoms, diet, medicines, and other vitamin measurements.

A result within the laboratory range makes substantial untreated vitamin B12 deficiency less likely. It cannot completely exclude deficiency, particularly if you recently started B12 supplements or treatment.

A low MMA result is generally not considered a sign of illness.

What affects the results

Reduced kidney function is the most important source of a misleading high MMA result. The kidneys normally remove MMA from the blood, so reduced filtration can raise the number without showing vitamin B12 deficiency.

Other influences include:

Recent exercise is not considered a major influence on MMA. A blood transfusion does not usually change MMA directly in the way it can change a blood count, but related illness and treatment may still matter.

- Recent vitamin B12 treatment: Tablets or injections can lower MMA quickly and may hide evidence of an earlier deficiency
- Age: MMA may rise with age, partly because kidney function often declines
- Pregnancy: Changes in metabolism, blood volume, and kidney handling can alter vitamin B12 markers
- Nitrous oxide: It can stop vitamin B12 from working properly, even when the measured B12 level appears acceptable
- Antibiotics like amoxicillin or doxycycline : Some antibiotics may lower MMA by changing gut bacteria that contribute to its production
- Inherited metabolic conditions: Methylmalonic acidemia can cause much larger elevations and requires separate investigation
- Dehydration or acute illness: These can affect kidney function and make interpretation less straightforward

Accuracy and limitations

MMA can identify a functional shortage of vitamin B12 that a standard B12 test may miss. This is useful because total blood B12 includes forms that may not be available to cells.

The test can still say "high" when vitamin B12 is not the problem. Kidney impairment is the main reason. Age, pregnancy, inherited metabolic disorders, and some treatments can also produce a misleading result.

It can also miss deficiency. MMA may return toward normal after vitamin B12 tablets or

injections, including supplements started before testing. No result should be interpreted without considering symptoms and other laboratory findings.

Homocysteine is another substance that can rise in vitamin B12 deficiency, but it can also rise with folate deficiency and for other reasons. Serum B12, active B12, a blood count, folate, kidney tests, and sometimes intrinsic-factor antibody testing may provide a clearer answer.

If an inherited metabolic condition is suspected, urine organic acids, acylcarnitine testing, and genetic testing are more appropriate than MMA alone.

Risks and complications

This test has the usual minor risks of a blood draw. You may develop a small bruise, brief soreness, or feel faint.

Ongoing bleeding or infection at the needle site is uncommon. Seek advice if swelling, redness, pain, or bleeding becomes worse rather than better.

What happens next

If MMA is raised, routine follow-up usually involves reviewing your vitamin B12 level, kidney function, blood count, symptoms, diet, medicines, and medical history. Further tests may be needed to find out why vitamin B12 is low or not being absorbed properly.

If vitamin B12 treatment is started, your clinician may follow your symptoms and blood count. Repeat MMA is sometimes used to confirm that the metabolic abnormality has improved, but it is not necessary in every case.

Arrange prompt medical advice if you develop worsening numbness, weakness, difficulty walking, new confusion, or loss of bladder or bowel control. These symptoms have several possible causes and need timely assessment.

Call emergency services for severe breathing difficulty, chest pain, fainting that does not quickly resolve, or sudden one-sided weakness or difficulty speaking. These are emergency symptoms regardless of an MMA result.

Common questions

- Can I drink coffee before the test? Usually yes because fasting is not normally required. Avoid coffee if you were told to fast for other blood tests.
- Does the time of day matter? MMA does not usually need to be collected at a particular time. Follow the laboratory's instructions if it is being combined with timed tests.
- Can I exercise beforehand? Normal activity is unlikely to meaningfully affect MMA. Avoiding unusually intense exercise may still help if other blood tests are being collected.
- Should I stop vitamin B12 supplements first? Do not stop them without advice. Recent supplements or injections can lower MMA, so tell your clinician when and how much you took.
- Why is my MMA high when my vitamin B12 is normal? Possible explanations include reduced kidney function, a functional B12 problem, nitrous oxide exposure, or differences in how total B12 is measured.
- Is there a urine version of the test? Yes. MMA can be measured in urine, especially during investigation of inherited metabolic disorders, but blood testing is commonly used when assessing vitamin B12 status.

Sources

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