CONDITION

Thiamine deficiency

Thiamine deficiency occurs when the body lacks enough vitamin B1 to support the nerves, heart, and energy production.

WHAT IT IS
Too little vitamin B1 in the body

BODY SYSTEM
Nervous system, heart and circulation, digestive system

MAIN SYMPTOMS
Fatigue, weakness, numbness, confusion

WHAT CAUSES IT
Low intake, poor absorption, or increased need

HOW IT IS DIAGNOSED
Clinical assessment and whole-blood thiamine testing

MAIN TREATMENT
Thiamine replacement and treatment of the cause

CAN IT BE CURED?
Yes - replacement corrects deficiency; damage may remain

IS IT AN EMERGENCY?
Sometimes - confusion, eye changes, breathing difficulty, or collapse

LONG-TERM OUTLOOK
Good early; delayed nerve or memory damage may persist

Overview

Thiamine deficiency means that your body does not have enough thiamine, also called vitamin B1. Thiamine helps cells turn food into energy. It is especially important for the brain, nerves, muscles, and heart.

The body stores only a limited amount of thiamine. A shortage can therefore develop when intake remains low, absorption is poor, or the body needs more than usual. Prolonged vomiting, severe malnutrition, alcohol dependence, and some forms of digestive surgery are important risk factors.

Mild deficiency may cause vague symptoms such as tiredness, poor appetite, or irritability. More serious deficiency can damage nerves or affect the heart and brain.

Severe thiamine deficiency has several recognized forms. Beriberi mainly affects the nerves or circulation. "Dry" beriberi causes nerve and muscle problems, while "wet" beriberi affects the heart and causes fluid buildup.

Wernicke encephalopathy is an urgent brain disorder caused by severe thiamine deficiency. It can cause confusion, difficulty walking, and unusual eye movements. Without prompt treatment, some people develop Korsakoff syndrome , which causes lasting problems with memory and learning.

Symptoms

Symptoms differ according to how severe the deficiency is and which organs are affected. Early symptoms can be difficult to recognize because they occur in many other conditions.

Possible early symptoms include:

As nerve damage progresses, numbness may spread upward from the feet. Muscle weakness, painful calves, reduced reflexes, or difficulty walking can develop. These nerve symptoms are sometimes called peripheral neuropathy.

When deficiency affects the heart and circulation, symptoms may include a fast heartbeat, shortness of breath, swelling of the legs, or rapid fluid-related weight gain. Severe cases can lead to heart failure, meaning the heart cannot pump blood effectively enough for the body's needs.

Wernicke encephalopathy may cause:

Not everyone with Wernicke encephalopathy has all three features. Symptoms may also be mistaken for alcohol intoxication, withdrawal, infection, or another neurological condition.

In babies, deficiency can cause poor feeding, vomiting, unusual irritability, a weak or changed cry, breathing problems, or heart failure. An unwell baby needs prompt medical assessment.

- Tiredness, weakness, or reduced stamina
- Poor appetite, nausea, or unintended weight loss
- Irritability, low mood, or difficulty concentrating
- Tingling, burning, or reduced feeling in the feet
- New confusion, unusual sleepiness, or reduced alertness
- Unsteady walking or poor coordination
- Double vision or rapid, abnormal eye movements

Causes and risk factors

The body cannot make thiamine, so it must come from food or supplements. Deficiency usually develops because too little is taken in, too little is absorbed, or the body is using or losing more than usual.

Alcohol dependence is an important risk factor. Alcohol can reduce food intake, interfere with thiamine absorption and use, and reduce the amount stored in the liver. Risk is higher when alcohol use occurs together with weight loss or poor nutrition.

Other situations that can increase risk include:

Risk can also rise during refeeding , when nutrition is restarted after prolonged undernutrition. The sudden increase in carbohydrate processing raises the body's need for thiamine. Refeeding should be medically managed when someone has been severely undernourished.

A diet based mainly on foods with little thiamine can contribute to deficiency. However, diet is not always the only cause. Someone may eat regularly but still develop deficiency because of vomiting, poor absorption, or increased need.

- Prolonged or repeated vomiting, including severe vomiting during pregnancy
- An eating disorder or another cause of severe food restriction
- Bariatric surgery or other surgery affecting the stomach or intestines
- Conditions that interfere with nutrient absorption
- Long periods of nutrition given without adequate vitamins
- Dialysis or other situations that increase vitamin loss
- Serious illness accompanied by poor intake or increased energy needs

Diagnosis

There is no single test that reliably answers every case. Diagnosis is based on your symptoms, risk factors, examination, and laboratory results.

A whole-blood test can measure thiamine diphosphate, the main active form of thiamine in blood cells. Some specialist laboratories assess the activity of an enzyme called transketolase, which depends on thiamine. Plasma or serum thiamine mainly reflects recent intake and may be less useful for judging the body's stores.

Other tests may check for problems that can occur alongside deficiency. These can include blood counts, electrolytes, kidney and liver function, magnesium, and signs of malnutrition.

Heart tests may be needed if there is swelling, breathlessness, or a fast heartbeat.

Wernicke encephalopathy is primarily a clinical diagnosis. Brain imaging may support the diagnosis or help exclude other causes, but a normal scan does not reliably rule it out. Blood samples may be collected, but treatment should not be delayed when Wernicke encephalopathy is suspected.

Improvement after thiamine replacement can support the diagnosis, although it does not show how much existing nerve or brain damage will recover.

Treatment and management

Treatment replaces thiamine and addresses the reason it became low. The route and intensity of treatment are based on the severity of symptoms, the person's ability to absorb tablets, and whether the brain or heart may be affected.

Mild deficiency without serious neurological symptoms may be treated with oral thiamine. Injections into a vein or muscle are generally used when deficiency is severe, absorption is uncertain, vomiting prevents tablets from staying down, or Wernicke encephalopathy is suspected.

Thiamine treatment is often started before laboratory confirmation because delaying treatment can allow brain or heart complications to progress. If glucose is medically necessary, it should not be withheld, but people at risk should receive thiamine promptly as part of their care.

Management may also involve:

People who have been severely undernourished may need monitoring during refeeding. This is because shifts in phosphate, potassium, magnesium, and body fluid can affect the heart, muscles, and nervous system.

Do not rely on self-treatment if you have confusion, walking difficulty, eye symptoms, marked weakness, or breathing problems. Supplements cannot assess or manage complications, and they do not correct the underlying cause.

- Restoring balanced nutrition gradually and safely
- Correcting low magnesium or other nutrient problems
- Treating persistent vomiting or poor absorption
- Providing support for alcohol dependence or an eating disorder
- Reviewing nutrition after bariatric or digestive surgery

Complications

Untreated deficiency can cause lasting injury, particularly when the brain or nerves are involved.

Possible complications include peripheral neuropathy, ongoing muscle weakness, falls, and reduced mobility. Heart complications can include fluid overload and heart failure. Severe metabolic disturbance can also cause lactic acidosis, in which acid builds up in the blood.

Wernicke encephalopathy can progress to coma or other serious neurological problems. Korsakoff syndrome may follow, causing difficulty forming new memories, gaps in past memory, and confusion about the order of events. These memory problems may persist even after thiamine levels are corrected.

Early treatment improves the chance of recovery. However, replacing thiamine stops the deficiency; it cannot always reverse tissue damage that has already occurred.

Prevention

Many cases can be prevented, although not every episode is predictable.

Thiamine is found in pork, beans, lentils, peas, nuts, seeds, whole grains, and enriched or fortified breads and cereals. A varied diet usually supplies enough for people who absorb nutrients normally.

Diet alone may not protect someone with persistent vomiting, severe malnutrition, alcohol dependence, or impaired absorption. In these situations, medical care may include preventive thiamine supplementation and nutrition monitoring.

After bariatric surgery, take recommended vitamin supplements and attend planned blood tests and follow-up appointments. Seek care early if repeated vomiting makes it difficult to keep food or supplements down.

If you are dependent on alcohol, stopping suddenly can cause dangerous withdrawal. Medical support can help manage withdrawal safely while addressing nutrition and thiamine needs.

Living with it and what to expect

Thiamine levels can be restored, but recovery from symptoms is less predictable. Heart and eye-related problems may begin improving relatively quickly after treatment. Appetite, energy, and strength may improve as nutrition recovers.

Damaged nerves heal slowly. Tingling, numbness, balance problems, or weakness can take weeks or months to improve, and some symptoms may remain. Physiotherapy, mobility support, pain management, and fall prevention may help during recovery.

Memory problems caused by Korsakoff syndrome can be long-lasting. Some people need rehabilitation, reminders, structured routines, or help with daily activities and finances.

Follow-up focuses on whether symptoms are improving and whether the original cause has been controlled. This may include nutrition review, repeat blood tests, digestive assessment, alcohol treatment, or follow-up after surgery. Persistent or worsening symptoms need reassessment because another condition may be present alongside thiamine deficiency.

When to get medical help

Seek emergency medical help for:

These symptoms are especially concerning after prolonged vomiting, severe food restriction, major weight loss, bariatric surgery, or heavy alcohol use.

Arrange prompt medical assessment if you have persistent numbness, burning feet, worsening weakness, balance problems, leg swelling, poor appetite, or unexplained weight loss. Repeated vomiting or difficulty keeping food down also needs early assessment, particularly during pregnancy or after digestive surgery.

Routine follow-up is appropriate once treatment has begun and symptoms are stable. Attend planned reviews so recovery, nutrition, and the underlying cause can be monitored.

- New confusion, severe drowsiness, collapse, or difficulty waking
- New trouble walking together with confusion or abnormal eye movements
- Severe shortness of breath, blue or grey lips, or rapidly worsening swelling
- Fainting, chest pain, or signs of severe weakness
- An unwell baby with poor feeding, breathing difficulty, or unusual sleepiness

Common questions

Is thiamine deficiency the same as beriberi?

Beriberi is a group of symptoms caused by severe thiamine deficiency. Dry beriberi mainly affects nerves and muscles, while wet beriberi mainly affects the heart and circulation. Not everyone with low thiamine has developed beriberi.

Can I be deficient even if I eat normally?

Yes. Vomiting, poor intestinal absorption, increased nutritional needs, dialysis, or previous digestive surgery can cause deficiency despite regular meals. Alcohol can also interfere with thiamine absorption, storage, and use.

Does thiamine deficiency cause anxiety or depression?

Deficiency can cause irritability, low mood, poor concentration, and tiredness. These symptoms have many possible causes, so they do not confirm a vitamin deficiency by themselves.

How quickly does thiamine treatment work?

Some symptoms may begin to improve soon after replacement, but nerve and memory recovery can take much longer. The timing is influenced by how severe and prolonged the deficiency was and whether permanent tissue damage occurred.

Can thiamine deficiency come back?

Yes. Replacement corrects the shortage, but deficiency can return if vomiting, poor intake, impaired absorption, alcohol dependence, or another underlying cause continues. Follow-up and prevention plans are therefore important.

Can I treat it with an over-the-counter vitamin?

A supplement may help prevent or correct mild dietary deficiency, but it is not suitable as the only response to neurological, heart, or severe nutritional symptoms. Serious deficiency may require injected thiamine, monitoring, and treatment of the cause.

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