CONDITION

Wernicke-korsakoff syndrome

Wernicke-korsakoff syndrome is brain damage caused by severe vitamin B1 deficiency, affecting coordination, thinking, and memory.

WHAT IT IS
Brain dysfunction caused by severe vitamin B1 deficiency

BODY SYSTEM
Nervous system

MAIN SYMPTOMS
Confusion, poor balance, abnormal eye movements, severe memory loss

WHAT CAUSES IT
Vitamin B1 deficiency, often from alcohol or malnutrition

HOW IT IS DIAGNOSED
Clinical assessment; MRI and blood tests provide support

MAIN TREATMENT
Urgent thiamine replacement, nutrition, rehabilitation, and alcohol support

CAN IT BE CURED?
Sometimes - early brain changes may reverse

IS IT AN EMERGENCY?
Yes - suspected acute Wernicke encephalopathy

LONG-TERM OUTLOOK
Early treatment helps, but memory disability may persist

Overview

Wernicke-korsakoff syndrome is a condition caused by a severe lack of thiamine, also called vitamin B1. The brain needs thiamine to turn food into energy and keep nerve cells working.

The condition includes two closely linked problems. Wernicke encephalopathy is the sudden, early stage. Encephalopathy means that the brain is not working normally. It can cause confusion, poor coordination, and abnormal eye movements. It is a medical emergency because prompt thiamine treatment may prevent permanent damage.

Korsakoff syndrome is a longer-term disorder involving severe memory problems. It may develop after untreated or incompletely treated Wernicke encephalopathy. Some people have features of both stages, which is why the combined term Wernicke-korsakoff syndrome is used.

Long-term heavy alcohol use is a common setting for this condition, but it is not the only cause. Any illness or situation that causes severe undernutrition, prolonged vomiting, or poor absorption of nutrients can lead to thiamine deficiency.

Symptoms

Symptoms can appear over hours or days during Wernicke encephalopathy. They are not always easy to recognise. A person may not have all of the features commonly associated with the condition.

Possible acute symptoms include:

Balance problems may be severe enough that the person cannot walk without help. Eye changes can be subtle and may only be found during an examination.

Korsakoff syndrome mainly affects memory. A person may have great difficulty forming new memories, even when they can hold a normal conversation. Older memories may also have gaps.

Other possible features include repeating questions, losing track of recent events, difficulty learning new tasks, and needing help with planning. Some people unconsciously fill gaps in memory with incorrect details. This is called confabulation ; it is not deliberate lying.

Insight may be limited. The person may not realise how much their memory or judgement has changed.

- New confusion, disorientation, unusual sleepiness, or reduced alertness
- Trouble walking, standing, or coordinating movements
- Rapid, jerking, or restricted eye movements
- Double vision or drooping eyelids
- Weakness, low energy, or marked loss of interest
- Poor appetite, nausea, or signs of undernutrition

Causes and risk factors

Wernicke-korsakoff syndrome results from severe thiamine deficiency. The body stores only a limited amount of thiamine, so supplies can fall when intake or absorption remains poor.

Alcohol can contribute in several ways. It may replace nutritious food, reduce thiamine absorption, interfere with how the body uses thiamine, and increase nutritional needs. Liver

disease related to alcohol may add to the risk.

The condition can also occur without alcohol use. Relevant situations include prolonged or repeated vomiting, severe eating restriction, cancer, major illness, and conditions that prevent nutrients from being absorbed properly.

People who have had bariatric surgery may be at risk, particularly if they develop ongoing vomiting or cannot take recommended nutritional supplements. Other digestive surgery, dialysis, or long periods of intravenous feeding without adequate vitamins can also contribute.

Giving carbohydrate, including glucose, increases the body's need for thiamine. In someone who is already severely deficient, this can bring on or worsen neurological symptoms. Emergency treatment for dangerously low blood sugar should not be delayed, but clinicians generally give thiamine before or alongside carbohydrate when deficiency is suspected.

Diagnosis

There is no single test that can reliably confirm or exclude Wernicke-korsakoff syndrome. Diagnosis is mainly based on symptoms, examination findings, nutritional history, and risk factors.

Because waiting can allow further brain injury, treatment may begin as soon as Wernicke encephalopathy is suspected. A person does not need to have confusion, eye changes, and poor coordination all at once.

Blood tests may measure thiamine or related markers, but a result can take time and may not reflect the amount available inside brain cells. Treatment should not be delayed while waiting for it. Other blood tests may check magnesium, blood sugar, electrolytes, liver function, infection, and other causes of confusion.

An MRI scan may show changes in areas of the brain that are sensitive to thiamine deficiency. However, a normal MRI does not rule the condition out.

Clinicians may also investigate stroke, head injury, infection, alcohol withdrawal, medication effects, liver-related brain dysfunction, and other causes of sudden confusion or poor coordination.

Longer-term memory problems can be assessed through cognitive or neuropsychological testing. These tests examine memory, attention, reasoning, and the ability to learn new information.

Treatment and management

Suspected Wernicke encephalopathy requires urgent treatment in hospital. Thiamine is usually given into a vein or muscle because tablets may not be absorbed reliably during the acute stage. Treatment should begin promptly rather than waiting for scan or blood-test results.

The exact treatment plan is based on the clinical situation. It may include repeated thiamine replacement, fluids, nutrition, and correction of magnesium or other deficiencies. Magnesium matters because the body needs it to use thiamine properly.

The person will also be monitored for low blood sugar, infection, liver problems, injury from falls, and alcohol withdrawal. Alcohol withdrawal can itself be dangerous and may need medically supervised treatment.

Eye symptoms and alertness may improve after thiamine treatment. Walking and balance can take longer. Memory problems may improve slowly or remain significant, especially once Korsakoff syndrome is established.

Ongoing management may include:

A calm, predictable routine can help someone with persistent memory difficulties. Written schedules, labelled storage, alarms, and repeating tasks in the same order may support independence.

- Continued thiamine and nutritional support
- Treatment for the illness that caused vomiting or poor absorption
- Support to stop or reduce alcohol use safely
- Occupational therapy for everyday skills and home safety
- Physical therapy for strength, walking, and balance
- Cognitive rehabilitation and structured memory aids
- Social care, supported housing, or help with finances when needed

Complications

Without prompt treatment, Wernicke encephalopathy can cause permanent brain damage. Severe cases can lead to loss of consciousness and can be fatal.

Poor balance and coordination increase the risk of falls, fractures, and head injuries. Reduced alertness may affect swallowing and raise the risk of food or fluid entering the lungs.

Korsakoff syndrome can cause lasting difficulty with memory, judgement, and learning. A

person may struggle to manage medicines, money, meals, appointments, or personal safety without support.

Other complications often reflect the underlying cause. These may include severe undernutrition, liver disease, nerve damage in the hands or feet, or complications of ongoing alcohol use. Not everyone develops these problems.

Prevention

Wernicke-korsakoff syndrome cannot always be prevented, especially when severe vomiting or serious illness develops quickly. However, recognising and treating thiamine deficiency early can reduce the risk of permanent brain injury.

People at increased risk may be offered preventive thiamine by their healthcare team. This can include people who are undernourished, drink alcohol heavily, have persistent vomiting, or have poor nutrient absorption. The appropriate form and duration are based on the reason for the risk.

After bariatric or other digestive surgery, take recommended vitamin supplements and attend nutrition monitoring. Seek medical advice promptly if repeated vomiting makes it difficult to eat, drink, or keep supplements down.

If alcohol is affecting nutrition or health, support is available. Suddenly stopping after regular heavy alcohol use can cause serious withdrawal, so it may be safer to make a plan with an alcohol treatment service or healthcare professional.

A balanced diet supports thiamine intake, but food alone is not adequate treatment for suspected Wernicke encephalopathy.

Living with it and what to expect

Recovery differs between people and between symptoms. Acute confusion and eye movement problems may improve relatively quickly after thiamine treatment. Balance, walking, and mental processing may recover more slowly over weeks or months.

Severe memory loss is often the most persistent problem. Some people gradually regain useful skills, while others continue to need daily supervision or supported living. Improvement may continue over a long period, but complete recovery cannot be promised.

The underlying cause affects the outlook. Continued nutritional deficiency or alcohol use can lead to further injury. Stable nutrition, thiamine treatment, alcohol support when relevant, and

treatment of digestive or medical problems help protect against another episode.

People with Korsakoff syndrome may appear socially fluent despite being unable to remember recent events. Family and support workers may need to provide information repeatedly without confrontation. Simple routines and environmental prompts often work better than relying on the person to remember instructions.

Routine follow-up may involve monitoring nutrition, alcohol use, liver health, walking, home safety, and the ability to manage daily tasks. Care needs can change, so reassessment is useful if independence, behaviour, or mobility changes.

When to get medical help

Call emergency services for new confusion, severe drowsiness, collapse, inability to walk, or abnormal eye movements-especially when the person is undernourished, has been vomiting repeatedly, or drinks alcohol heavily. Suspected Wernicke encephalopathy needs immediate assessment and thiamine treatment.

Do not assume sudden confusion is simply intoxication. Stroke, infection, low blood sugar, head injury, alcohol withdrawal, and other emergencies can look similar.

Arrange a routine medical appointment for gradually worsening memory, repeated questions, increasing difficulty with daily tasks, persistent poor balance, weight loss, or concerns about nutrition. These symptoms need assessment but are not usually an emergency when they are stable and longstanding.

Seek prompt medical advice after weight-loss surgery if vomiting continues, supplements cannot be kept down, or new numbness, weakness, confusion, or balance problems develop.

Common questions

Is Wernicke-korsakoff syndrome the same as dementia?

It can cause a lasting cognitive disorder that resembles dementia, especially through severe memory loss. However, it has a specific cause-thiamine deficiency-and may improve to some extent with treatment. Other thinking abilities can remain stronger than memory.

Can you get it without drinking alcohol?

Yes. Prolonged vomiting, severe undernutrition, eating disorders, poor nutrient absorption, bariatric surgery, cancer, and other serious illnesses can cause thiamine deficiency. Alcohol use is an important risk factor, but it is not required.

Can a blood test rule it out?

No. Blood tests can support the assessment and identify related problems, but they cannot reliably exclude Wernicke encephalopathy. If the condition is suspected, treatment is usually started without waiting for results.

Is the memory loss permanent?

It can be. Some people improve over months with thiamine, good nutrition, rehabilitation, and treatment of the underlying cause. Established Korsakoff syndrome often leaves significant memory difficulties, and the amount of recovery cannot be predicted with certainty.

Why is thiamine given by injection or drip?

During an acute episode, thiamine must reach the body quickly and absorption from the digestive system may be unreliable. Treatment through a vein or muscle is therefore used initially. Tablets may be used later as part of ongoing care.

Can Wernicke-korsakoff syndrome come back?

Further episodes are possible if severe thiamine deficiency returns. Ongoing nutritional care, prescribed supplements, treatment of vomiting or poor absorption, and support with alcohol use can reduce this risk.

Sources

- National Institute for Health and Care Excellence. Alcohol-use disorders: diagnosis and management of physical complications . Clinical guideline CG100, published 2010 and updated 2017.
- Galvin R, Bråthen G, Ivashynka A, Hillbom M, Tanasescu R, Leone MA. "EFNS guidelines for diagnosis, therapy and prevention of Wernicke encephalopathy." European Journal of Neurology . 2010;17(12):1408-1418.
- Thomson AD, Cook CCH, Touquet R, Henry JA. "The Royal College of Physicians report on alcohol: guidelines for managing Wernicke's encephalopathy in the accident and emergency department." Alcohol and Alcoholism . 2002;37(6):513-521.
- Sechi G, Serra A. "Wernicke's encephalopathy: new clinical settings and recent advances in diagnosis and management." The Lancet Neurology . 2007;6(5):442-455.
- Arts NJM, Walvoort SJW, Kessels RPC. "Korsakoff's syndrome: a critical review." Neuropsychiatric Disease and Treatment . 2017;13:2875-2890.