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## Korsakoff syndrome

A topic in the Alzheimer's Association® series on understanding dementia.

### About dementia

Dementia is a general term for a decline in mental ability severe enough to interfere with daily life. Dementia is not a single disease; it's the umbrella term for an individual's changes in memory, thinking or reasoning. There are many possible causes of dementia, including Alzheimer's. Disorders grouped under the general term "dementia" are caused by abnormal brain changes. These changes trigger a decline in thinking skills, also known as cognitive abilities, severe enough to impair daily life and independent function. They also affect behavior, feelings and relationships.

Brain changes that cause dementia may be temporary, but they are most often permanent and worsen over time, leading to increasing disability and a shortened life span. Survival can vary widely, depending on such factors as the cause of the dementia, age at diagnosis and coexisting health conditions.

### Korsakoff syndrome

Korsakoff syndrome is a chronic memory disorder caused by severe deficiency of thiamine (vitamin B1). Thiamine helps brain cells produce energy from sugar. When levels fall too low, brain cells cannot generate enough energy to function properly.

Korsakoff syndrome is most commonly caused by alcohol misuse but can also be associated with AIDS, cancers that have spread throughout the body, chronic infections, poor nutrition, eating disorders and certain other conditions. It is also common in people whose bodies do not absorb food properly (malabsorption). This can sometimes occur with a chronic illness or after weight-loss (bariatric) surgery.

Korsakoff syndrome is often — but not always — preceded by an episode of Wernicke encephalopathy, which is an acute brain reaction to severe lack of thiamine. Wernicke encephalopathy is a medical emergency that causes life-threatening brain disruption, profound confusion, staggering and stumbling, lack of coordination and abnormal involuntary eye movements.

Because the chronic memory loss of Korsakoff syndrome often follows an episode of Wernicke encephalopathy, the chronic disorder is sometimes known as Wernicke-Korsakoff syndrome. Many physicians think of them as different stages of the same disease. But Korsakoff syndrome can also develop in individuals who have not had a clear-cut prior episode of Wernicke encephalopathy.

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Korsakoff syndrome and its associated thiamine deficiency is not the only mechanism through which heavy drinking may contribute to chronic thinking changes and cognitive decline. Alcohol misuse may also lead to brain damage through the direct toxic effects of alcohol on brain cells; the biological stress of repeated intoxication and withdrawal; alcohol-related cerebrovascular disease; and head injuries sustained when inebriated.

### **Prevalence**

Scientists don't know exactly how many people have Korsakoff syndrome alone, but it's estimated that Wernicke-Korsakoff syndrome occurs in 1% to 2% of the general population in the United States. It's widely considered less common than Alzheimer's disease, vascular dementia, frontotemporal dementia or dementia with Lewy bodies. Like more common types of dementia, it may be underdiagnosed. The disorder affects slightly more males than females, and is evenly distributed between ages 30 and 70.

### **Symptoms**

Korsakoff syndrome causes problems learning new information, inability to remember recent events and long-term memory gaps. Memory difficulties may be strikingly severe while other thinking and social skills are relatively unaffected. For example, individuals may seem able to carry on a coherent conversation but moments later are unable to recall that the conversation took place or with whom they spoke.

Those with Korsakoff syndrome may “confabulate,” or make up, information they can't remember. They are not “lying” but may actually believe their invented explanations. Scientists don't yet understand the mechanism by which Korsakoff syndrome may cause confabulation. The person may also see or hear things that are not there (hallucinations).

### **Diagnosis**

Korsakoff syndrome is made based upon a detailed clinical evaluation, patient history and various tests, including routine laboratory screens and liver function tests that can rule out other disorders. Testing for B1 and thiamine levels also can help the diagnostic process. Experts recommend that a medical workup for memory loss or other cognitive changes always include questions about an individual's alcohol use. Brain imaging may identify brain changes that are indicative of Korsakoff. The syndrome may sometimes be hard to identify because it may be masked by symptoms of other conditions common among those who misuse alcohol, including intoxication or withdrawal, infection or head injury.

Anyone admitted to the hospital for an alcohol-related condition should be professionally screened for memory loss and cognitive change. The screening should

include supplementary questions to assess recent memory. If screening suggests impairment, the person should receive a more detailed cognitive workup.

### **Causes and risk factors**

Scientists don't yet know exactly how Korsakoff syndrome damages the brain. Researchers do know that chronic alcohol exposure is neurotoxic (poisonous) to the nervous system, causing brain damage. Also, chronic alcohol use lowers vitamin B1. Research has shown that severe vitamin B1/thiamine deficiency disrupts several biochemicals that play key roles in carrying signals among brain cells and in storing and retrieving memories. These disruptions destroy brain cells and cause widespread microscopic bleeding and scar tissue.

Researchers have identified several genetic variations that may increase susceptibility to Korsakoff syndrome. Poor nutrition may also raise risk.

Most cases of Korsakoff syndrome result from alcohol misuse. Scientists don't yet know why heavy drinking causes severe thiamine deficiency in some alcoholics, while others may be affected primarily by alcohol's effects on the liver, stomach, heart, intestines or other body systems.

Korsakoff syndrome may sometimes be associated with disorders other than alcohol misuse, including anorexia, overly stringent dieting, fasting, starvation or weight-loss surgery; uncontrolled vomiting; AIDS; kidney dialysis; chronic infection; or cancer that has spread throughout the body.

### **Outcomes**

Wernicke encephalopathy, a related disorder that sometimes precedes Korsakoff syndrome, is a medical emergency. Untreated, it causes death in up to 20% of cases and progresses to Korsakoff syndrome in 85% of survivors. Abnormal eye movements that occur in Wernicke encephalopathy may respond to injectable thiamine within a few days. Lack of coordination and clumsiness may begin to improve after about a week but may take several months to clear up completely. Confusion also takes several months to clear up. As confusion clears, the severe memory problems associated with Korsakoff syndrome may become more noticeable.

In those who develop Korsakoff syndrome with or without a preceding episode of Wernicke encephalopathy, there are few studies on long-term outcomes. Available data suggest that about 25% of those who develop Korsakoff syndrome eventually recover, about half improve but don't recover completely, and about 25% remain unchanged. Some research suggests that those who recover from an episode may have a normal life expectancy if they abstain from alcohol.

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## **Treatment**

Some experts recommend that heavy drinkers and others at risk of thiamine deficiency take oral supplements of thiamine and other vitamins under their doctor's supervision.

Many experts also recommend that anyone with a history of heavy alcohol use who experiences symptoms associated with Wernicke encephalopathy, including acute confusion, prolonged nausea and vomiting, unusual fatigue or weakness, or low body temperature or blood pressure, be given injectable thiamine until the clinical picture grows clearer.

Once acute symptoms improve, individuals should be carefully evaluated to determine if their medical history, alcohol use and pattern of memory problems may be consistent with Korsakoff syndrome. For those who develop Korsakoff syndrome, extended treatment with oral thiamine, other vitamins and magnesium may increase chances of symptom improvement. If there is no improvement, consideration should be given to treatment of comorbid deficiencies and medical conditions, and the need for long-term residential care or supportive accommodation.

Abstaining from alcohol and maintaining a healthy diet is a cornerstone of effective long-term treatment. Those with Korsakoff syndrome have a reduced tolerance for alcohol and may be at high risk for further alcohol-related health problems.

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