CONDITION

Subcortical ischemic vascular disease

Subcortical ischemic vascular disease is long-term damage to deep brain tissue caused by reduced blood flow through small blood vessels.

WHAT IT IS
Small-vessel damage in deep brain tissue

BODY SYSTEM
Brain, nervous system, heart and circulation

MAIN SYMPTOMS
Slowed thinking, walking difficulty, poor balance, urinary urgency

WHAT CAUSES IT
Small-vessel damage linked to aging and vascular risks

HOW IT IS DIAGNOSED
Brain MRI, clinical assessment, and risk-factor testing

MAIN TREATMENT
Vascular risk reduction, rehabilitation, and symptom management

CAN IT BE CURED?
No - existing brain injury usually remains

IS IT AN EMERGENCY?
Sometimes - sudden stroke symptoms require emergency care

LONG-TERM OUTLOOK
Often gradual, with progression linked to further vessel damage

Overview

Subcortical ischemic vascular disease is a condition caused by damage to small blood vessels deep inside the brain. "Subcortical" means below the brain's outer layer. "Ischemic" means that tissue has received too little blood and oxygen.

The small vessels involved supply the brain's white matter and other deep structures. White matter contains nerve fibers that connect different parts of the brain. Damage to these connections can affect thinking speed, walking, balance, mood, and bladder control.

Brain scans may show white matter changes, small old strokes called lacunes, or tiny areas of bleeding called cerebral microbleeds. These findings are part of a broader group of changes called cerebral small vessel disease.

Some people have scan changes without noticeable symptoms. Others develop gradual difficulties or have a stroke. The amount seen on a scan does not always match how a person feels or functions.

This condition is not the same as an acute ischemic stroke. It usually develops over years, although it increases the risk of stroke and can worsen after a new stroke.

Symptoms

Symptoms tend to appear gradually. They may be subtle at first and can overlap with other brain, nerve, joint, or bladder conditions.

Possible symptoms include:

Memory can be affected, but the pattern may differ from Alzheimer's disease. With small-vessel damage, slowed thinking and problems with attention or planning can be more noticeable than forgetting recent events.

Many of these symptoms have other possible causes. For example, poor balance can come from inner-ear problems, medication effects, arthritis, poor vision, or nerve damage in the feet. A medical assessment is needed to understand what is contributing.

- Slower thinking or needing more time to complete tasks
- Difficulty planning, organizing, or switching between tasks
- Short, shuffling steps or trouble starting to walk
- Poor balance, unsteadiness, or repeated falls
- Weakness or clumsiness, especially after a small stroke
- Urinary urgency, frequency, or loss of bladder control
- Low mood, reduced motivation, or emotional changes
- Mild speech or swallowing problems after a stroke

Causes and risk factors

The condition develops when small arteries and arterioles in the brain become damaged. Arterioles are very small blood vessels that carry blood into brain tissue. Damage may narrow the vessels, weaken their walls, or interfere with their ability to regulate blood flow.

Age is an important risk factor. Changes are more common later in life, but they should not

automatically be dismissed as "normal aging."

High blood pressure is one of the strongest modifiable risk factors. Over time, pressure against vessel walls can contribute to thickening, stiffness, and leakage. Other factors associated with small-vessel damage include:

Rare inherited conditions can cause small-vessel changes at a younger age. One example is CADASIL, which is caused by a change in the NOTCH3 gene. An inherited cause may be considered when several close relatives have early strokes, migraine with aura, or early cognitive decline. Most people with subcortical ischemic vascular disease do not have CADASIL.

- Diabetes
- Smoking
- High cholesterol and other cardiovascular risks
- Previous stroke or transient ischemic attack
- Kidney disease
- Sleep apnea
- Low physical activity
- Conditions affecting blood vessels throughout the body

Diagnosis

The condition is usually identified through a combination of symptoms, medical history, examination, and brain imaging.

Magnetic resonance imaging, or MRI, gives the clearest view of small-vessel changes. It may show:

A computed tomography, or CT, scan may show more extensive white matter changes or old strokes, but it is less sensitive than MRI. Scan findings must be interpreted in context because similar-looking changes can occur with migraine, inflammation, multiple sclerosis, and some inherited or metabolic conditions.

Assessment may include blood pressure measurements, blood tests for diabetes and cholesterol, and questions about smoking, sleep, medications, and past strokes. A neurological examination checks movement, sensation, coordination, walking, reflexes, and speech.

If thinking has changed, brief cognitive tests may assess memory, attention, language, and planning. More detailed neuropsychological testing can help identify the pattern and severity

of difficulty. Other tests may be needed when symptoms or scan findings suggest a different condition.

- White matter hyperintensities, which are bright areas on certain MRI images
- Lacunes, which are small cavities left by earlier deep brain injuries
- Recent small subcortical infarcts
- Cerebral microbleeds
- Enlarged spaces around small blood vessels

Treatment and management

Existing areas of brain injury usually cannot be removed or reversed. Management focuses on lowering the chance of further vessel damage, treating related conditions, and helping you function safely.

Blood pressure management is central. Treatment may involve lifestyle changes and blood pressure medicine. The appropriate target and choice of medicine are individual decisions, especially for someone who is frail, becomes dizzy on standing, or has other medical conditions.

Diabetes and cholesterol may also need treatment. Stopping smoking lowers the risk of stroke and further blood-vessel injury. Regular movement, a balanced eating pattern, adequate sleep, and limiting excess alcohol can support overall vascular health.

Aspirin or another antiplatelet medicine is not automatically needed just because small-vessel changes appear on a scan. These medicines reduce blood clotting but can also increase bleeding. They may be recommended after certain strokes or for another cardiovascular reason. The decision should be based on your full medical history.

Treatment for ongoing difficulties may include:

Rehabilitation can improve function even when scan changes remain. If cognitive problems affect medication use, finances, cooking, or driving, practical support and safety planning may help maintain independence.

- Physiotherapy for strength, walking, and balance
- Occupational therapy for daily tasks and home safety
- Speech and language therapy for communication or swallowing problems
- Bladder assessment and continence support

- Review of medicines that may worsen dizziness, confusion, or falls
- Treatment for depression, anxiety, or sleep problems
- Mobility aids or home adaptations when needed

Complications

Subcortical ischemic vascular disease increases the likelihood of future stroke. A stroke may cause sudden weakness, numbness, speech difficulty, vision loss, or loss of coordination.

Accumulated damage can contribute to vascular cognitive impairment. This term covers changes ranging from mild difficulty with thinking to vascular dementia, where the problems interfere substantially with everyday life. Not everyone with MRI changes develops dementia.

Walking may become slower or less steady over time. This can raise the risk of falls, injury, reduced activity, and loss of confidence. Bladder symptoms and swallowing problems may also affect quality of life.

Cerebral microbleeds can be a sign of fragile small vessels. Their number and location may matter when clinicians consider medicines that affect clotting. Do not stop a prescribed medicine based only on a scan report; the risks of bleeding and clotting need to be considered together.

Prevention

Subcortical ischemic vascular disease cannot always be prevented. Age, previous vessel damage, and inherited factors cannot be changed.

The chance of further damage may be reduced by addressing factors that can be changed. This includes controlling high blood pressure and diabetes, avoiding tobacco, and treating cardiovascular risks when appropriate.

Physical activity suited to your ability can support blood pressure, balance, and general brain health. If unsteadiness limits exercise, supervised activity or physiotherapy may be safer than exercising alone.

Regular follow-up is useful because high blood pressure and diabetes may cause no obvious symptoms. Taking prescribed medicines consistently and discussing side effects can make long-term treatment more manageable.

There is no proven supplement that clears white matter changes or restores damaged small vessels. Supplements can also interact with medicines, including those used to prevent blood

clots.

Living with it and what to expect

The course differs from person to person. Some people have mild MRI changes that remain stable for years and never cause clear disability. Others have gradual changes in walking or thinking, particularly if new small-vessel injuries occur.

Symptoms may progress slowly rather than changing every day. A noticeable step down can happen after a stroke, illness, hospitalization, or period of reduced activity. Some function may return with recovery and rehabilitation, although underlying scan changes usually remain.

Long-term care often focuses on preserving independence. This may involve keeping active, reducing fall risks, using reminders, simplifying complex tasks, and reviewing hearing and vision. Family or other support may become more important if planning, judgment, or mobility changes.

Routine follow-up can monitor blood pressure, diabetes, cholesterol, walking, falls, mood, bladder symptoms, and thinking. A new or worsening symptom does not always mean the condition has progressed. Medication effects, infection, dehydration, sleep problems, pain, or depression can also temporarily reduce function.

Driving may need review if reaction time, vision, judgment, or movement is affected. Local licensing rules differ. An occupational therapy driving assessment may help when ability is uncertain.

When to get medical help

Seek emergency help for any sudden sign of stroke, even if it improves within minutes. Symptoms can include:

Brief symptoms may be a transient ischemic attack, sometimes called a TIA or "mini-stroke." A TIA requires urgent assessment because the risk of a full stroke may be higher soon afterward.

Arrange routine medical follow-up for gradual changes such as slower walking, repeated minor falls, worsening concentration, low mood, or increasing urinary urgency. Earlier assessment can identify treatable contributors and help with safety.

More prompt assessment is appropriate after an unexplained fall with injury, rapidly worsening confusion, repeated choking, or a sudden decline that develops over hours or days. These changes may have causes other than small-vessel damage, including infection or medication

effects.

- Weakness or numbness on one side of the face or body
- A drooping face
- New trouble speaking or understanding speech
- Sudden vision loss or double vision
- Sudden severe unsteadiness or loss of coordination
- A sudden, unusually severe headache
- New confusion or loss of consciousness

Common questions

Is subcortical ischemic vascular disease dementia?

No. It describes blood-vessel-related changes in deep brain tissue. Some people have no cognitive symptoms. More extensive damage can contribute to vascular cognitive impairment or vascular dementia, but a scan finding alone does not establish dementia.

Are white matter changes the same thing as this condition?

White matter changes are one common imaging feature. Mild changes can occur with age or migraine and may not cause symptoms. Their location, amount, associated scan findings, and your clinical history help determine their importance.

Can the brain damage be reversed?

Established areas of tissue injury usually remain visible. However, rehabilitation may improve walking, balance, communication, and daily function. Managing vascular risks may reduce the chance of additional damage.

Will I have a stroke?

The condition increases stroke risk, but it does not mean a stroke is certain. Risk is influenced by factors such as blood pressure, diabetes, smoking, previous stroke, and the overall pattern of blood-vessel changes.

Does this always get worse?

No. Some people remain stable for long periods. Progression is more likely when further small-vessel injury or additional strokes occur. Regular review helps address risks and identify changes that have another treatable cause.

Is it the same as Binswanger disease?

Not exactly. Binswanger disease is a term traditionally used for a more severe form of subcortical small-vessel injury associated with substantial white matter damage and cognitive decline. It is not a label for every person with small-vessel changes.

Sources

- Wardlaw JM, Smith EE, Biessels GJ, and colleagues. "Neuroimaging standards for research into small vessel disease and its contribution to ageing and neurodegeneration." The Lancet Neurology . 2013;12(8):822-838.
- Wardlaw JM, Smith C, Dichgans M. "Small vessel disease: mechanisms and clinical implications." The Lancet Neurology . 2019;18(7):684-696.
- Wardlaw JM, Debette S, Jokinen H, and colleagues. "European Stroke Organisation guideline on covert cerebral small vessel disease." European Stroke Journal . 2021;6(2):CXI-CLXII.
- Smith EE, Saposnik G, Biessels GJ, and colleagues. "Prevention of Stroke in Patients With Silent Cerebrovascular Disease: A Scientific Statement from the American Heart Association/American Stroke Association." Stroke . 2017;48(2):e44-e71.
- Skrobot OA, Black SE, Chen C, and colleagues. "Progress toward standardized diagnosis of vascular cognitive impairment: guidelines from the Vascular Impairment of Cognition Classification Consensus Study." Alzheimer's & Dementia . 2018;14(3):280-292.