

Tests used in diagnosing dementia

This sheet explains the more common tests and assessments doctors currently use to diagnose dementia. Those who are being assessed for dementia will find it helpful to be prepared for what, for some people, can be a long and emotionally difficult process.

What does assessment for dementia involve?

There is no one diagnostic test for Alzheimer's disease or for most other causes of dementia. Instead, doctors use a number of different tests and assessments to determine whether symptoms fit certain criteria and to rule out other possible causes of these symptoms.

The first step towards a diagnosis is to talk to your doctor about your concerns. It is a good idea to take a close family member or friend along to the appointment to assist in providing additional information. It is also a good idea to take along a list of the memory changes or any other changes in mood, thinking or behaviour that have been concerning you, including when you first noticed them and how often you notice them. You should also take a list of the medications you are taking or bring your medications with you to the appointment.

Your doctor may assess you or may make a referral to a specialist doctor such as a geriatrician (a specialist in illnesses and disabilities in older people), a neurologist (a specialist in disorders of the brain and nerve pathways), or a psychiatrist (a specialist in disorders of thinking, emotion and behaviour).

Assessment for dementia includes the following:

Personal history

The doctor usually spends some time discussing your medical history and gathering information about your changes in memory and thinking.

Physical examination and laboratory tests

The symptoms of dementia can be due to a number of other possible causes, such as vitamin deficiency, infection, metabolic disorders and side effects from drugs, which are often easily treated. Therefore, an early step in diagnosing dementia is to rule out these causes through a physical examination, blood tests and urine tests.

Routine laboratory tests used in the diagnosis of dementia include:

- Blood tests to investigate:
 - Anaemia
 - Infection
 - Electrolyte balance (salt and water)
 - Liver function
 - Vitamin B12 deficiency
 - Thyroid function
 - Drug interactions and dosing problems
- Urine tests to investigate infection.

Mental status evaluation including cognitive testing

Cognitive tests are used to measure and evaluate cognitive, or ‘thinking’, abilities such as memory, concentration, spatial awareness, problem solving, counting and language skills.

Most doctors use short cognitive screening tests comprising a series of questions (either verbal, or on paper) when assessing these abilities. Some examples of these include the Mini-Mental State Examination, Abbreviated Mental Test Score, GP-Cog, NUCOG, and the longer Alzheimer’s Disease Assessment Scale – Cognitive (ADAS-Cog). If more detailed testing is required you may be referred to a neuropsychologist – a psychologist specialising in the assessment and measurement of cognitive function.

These tests are vital in the diagnosis of dementia and are often used to differentiate between types of dementia. They can also be used to assess mood and may help diagnose depression, which can cause symptoms similar to those of dementia.

Neuropsychological testing is also commonly used to monitor the progression of Alzheimer's disease and other causes of dementia.

Special arrangements can be made for testing people who do not speak English or who have communication difficulties. Your doctor can give you advice about this.

Some of the commonly used cognitive tests include:

Mini-Mental State Examination (MMSE)

This test is usually conducted by your doctor or specialist in his/her office and takes around 5 minutes to complete. The MMSE is the most common neuropsychological test for the screening of Alzheimer's disease and other causes of dementia. It assesses skills such as reading, writing, orientation and short-term memory.

You can expect to be asked a series of questions about where you are and what day it is. You will also be asked to complete short mental tests such as subtracting numbers, spelling a word backwards, remembering three unconnected words and copying a diagram on paper.

Alzheimer's Disease Assessment Scale – Cognitive (ADAS-Cog)

This 11-part test is more thorough than the MMSE and can be used for people with mild symptoms. It is considered the best brief examination for memory and language skills and is often used as a measure in clinical drug trials. It takes around 30 minutes and is usually conducted by a specialist in their office, or you may be referred to a psychologist for the test.

Neuropsychological testing

This involves a number of very sensitive psychometric assessments that will be administered by a neuropsychologist (a psychologist who has been trained in the assessment of dementia and other disorders of higher mental function). A typical testing session will take between 1 and 2 hours and may be conducted over more than one visit.

A variety of tests will be used and these will be selected according to the educational level and mental ability of the person being tested. They may include tests of memory such as recall of a paragraph, tests of the ability to copy drawings or figures and tests of reasoning and comprehension.

Radiological tests

Standard X-rays may be taken and those who smoke will commonly require a chest X-ray to rule out lung cancer, which may be causing a secondary brain tumour.

Brain scans

Various brain-scanning techniques are sometimes used to show brain changes and to rule out other conditions such as tumour, infarcts (strokes – dead areas of brain tissue) and hydrocephalus (fluid on the brain). These scanning techniques include:

Structural brain imaging

Structural brain imaging provides information about the shape, position or volume of brain tissue. Techniques include computerised tomography (CT) and magnetic resonance imaging (MRI). CT involves taking many X-rays from different angles in a very short period of time. These images are then used to create a three-dimensional image of the brain. This technique is mainly used to rule out other causes of dementia, such as stroke, brain tumour, multiple sclerosis or haemorrhage. MRI provides much better resolution than CT to see the brain structure in more detail. MRI uses powerful magnets and radiowaves to produce very clear three-dimensional images of the brain. Currently MRI is the radiological test of choice. As well as ruling out treatable causes of dementia, MRI can reveal patterns of brain tissue loss, which are characteristic of dementia and can be used to discriminate between different forms of dementia such as Alzheimer's disease and frontotemporal dementia.

Functional brain imaging

Functional brain imaging reveals how well cells in various brain regions are working by showing how actively the cells use sugar or oxygen. Functional techniques include positron emission tomography (PET) and functional MRI (fMRI). The technique currently most commonly used in dementia diagnosis is fluorodeoxyglucose (FDG)-PET, which measures the use of glucose by the brain.

Molecular brain imaging

Molecular brain imaging uses highly targeted radiotracers to detect cellular or chemical changes linked to specific diseases. Molecular imaging technologies include PET and single photon emission computerised tomography (SPECT). In both of these tests, a small amount of radioactive material is injected into the patient and detectors are placed on the brain to detect emissions. PET provides visual images of activity in the brain. SPECT is used to measure blood flow to various regions of the brain. In Australia, these techniques are usually only used in research.

Cerebrospinal fluid proteins

Cerebrospinal fluid (CSF) is a clear fluid that bathes and cushions the brain and spinal cord. The CSF can be sampled through a procedure called a lumbar puncture, or spinal tap. This procedure involves taking a sample of the cerebrospinal fluid via a needle inserted into the lower part of the back – a short and painless surgical procedure. This fluid can be used to check certain proteins in the brain that are associated with dementia. Like molecular brain imaging, this procedure is mostly used in research in Australia at the present time.

Blood tests

Research teams in Australia and around the world are working hard to develop tests that can detect a unique chemical ‘signature’ of Alzheimer’s disease in blood samples. At present these tests are still very much in the research and development phase; however, it is feasible that we could see such tests available for clinical use within the next 5–10 years.

Some questions you may wish to ask your doctor regarding tests used in diagnosing dementia

- What tests will be conducted?
- Who will be performing the tests and how long will they take?
- Should I prepare for the tests in any way?
- Will any of the tests involve pain or discomfort?
- Will there be any cost involved?
- What follow-up will be necessary and who will follow up?
- How will I be informed of the test results and the diagnosis?

If you are diagnosed with dementia

Obtaining an early and accurate diagnosis can improve the quality of life for people with dementia. Talk to your doctor about treatment and ongoing assessment. Support and information is available through Dementia Australia.

This sheet is provided for your information only and does not represent an endorsement of any assessment or treatment by Dementia Australia.

Thanks to Professor David Ames for reviewing this material.

Further Information

Dementia Australia offers support, information, education and counselling. Contact the National Dementia Helpline on **1800 100 500**, or visit our website at dementia.org.au



For language assistance phone the Translating and Interpreting Service on **131 450**