CONDITION

Microcephaly

Microcephaly is a condition in which a baby's or child's head is smaller than expected for their age and sex.

WHAT IT IS
Smaller-than-expected head size linked to brain growth

BODY SYSTEM
Nervous system

MAIN SYMPTOMS
Small head, developmental delay, seizures, feeding problems

WHAT CAUSES IT
Genetic changes, infections, exposures, or unknown causes

HOW IT IS DIAGNOSED
Repeated head measurements compared with growth charts

MAIN TREATMENT
Developmental support and treatment of associated problems

CAN IT BE CURED?
No, reduced brain growth cannot be reversed

IS IT AN EMERGENCY?
Sometimes, with prolonged seizures or breathing trouble

LONG-TERM OUTLOOK
From typical development to lifelong support needs

Overview

Microcephaly means that a baby's or child's head is smaller than expected for their age and sex. It usually reflects reduced brain growth, although head size and brain development do not always match exactly.

The condition may be present at birth, called congenital microcephaly. In other children, head growth slows after birth. This is sometimes called postnatal or acquired microcephaly.

Head size is measured around the widest part of the head. Clinicians compare the measurement with growth charts for children of the same age and sex. For babies born early, the expected measurement is adjusted for how many weeks early they were born.

Microcephaly is a condition rather than a single disease. It has many possible causes and a

wide range of effects. Some children have a small head but develop as expected. Others have differences in movement, learning, communication, feeding, hearing, or vision.

The measurement alone cannot predict a child's future. The cause, severity, brain growth pattern, examination findings, and progress over time are also important.

Symptoms

A smaller-than-expected head size is the defining feature. The forehead may slope backward, although head shape differs among children and appearance alone cannot confirm microcephaly.

Some children have no other noticeable concerns. When the underlying cause has affected brain development, possible symptoms include:

A developmental delay means that a child reaches one or more milestones later than expected. It does not show by itself how much progress the child will make.

Symptoms may be present from infancy or become clearer as skills grow more complex. A child may also have differences involving other organs if the microcephaly is part of a genetic condition or resulted from an infection during pregnancy.

- Delayed sitting, walking, talking, or learning
- Muscle stiffness, weakness, or poor coordination
- Feeding or swallowing difficulties
- Seizures
- Hearing or vision problems
- Unusual irritability or difficulty settling
- Problems with attention, behaviour, or communication

Causes and risk factors

Microcephaly develops when the brain does not grow as expected or when previously formed brain tissue is damaged. Sometimes no specific cause is found, even after testing.

Genetic causes include changes in a single gene or in chromosomes, the packages that carry genetic information. A genetic change may be inherited from one or both parents, or it may occur for the first time in the child. Some genetic conditions mainly affect head and brain growth, while others affect several parts of the body.

Certain infections during pregnancy can interfere with fetal brain development. Examples include cytomegalovirus, rubella, toxoplasmosis, and Zika virus. Whether an infection affects the fetus depends on factors such as the specific infection and when it occurs.

Other possible causes include reduced blood or oxygen supply to the developing brain, severe fetal malnutrition, and exposure during pregnancy to alcohol or certain harmful substances. Some medicines can affect fetal development, but necessary medication should not be stopped during pregnancy without medical advice. The risks of stopping treatment may be serious.

Microcephaly that develops after birth can be associated with severe brain infection, major brain injury, prolonged lack of oxygen, severe malnutrition, or particular genetic and metabolic conditions. Metabolic conditions affect how the body processes nutrients or produces energy.

Having one possible risk factor does not mean a child will develop microcephaly. In many cases, it is not caused by anything a parent did or did not do.

Diagnosis

Microcephaly is diagnosed by measuring head circumference and comparing it with an appropriate growth chart. The tape is placed above the eyebrows and ears and around the widest part at the back of the head.

Because technique affects the result, an unexpected measurement is usually checked. Measurements over time help show whether the head is continuing to grow along its own pattern or falling further behind expected growth.

A clinician will also review pregnancy and birth history, previous growth records, illnesses, development, and family head sizes. The examination may assess head shape, muscle tone, movement, vision, hearing, growth, and physical features that could suggest a particular cause.

Tests do not confirm every cause, and not every child needs the same investigations. Depending on the history and examination, assessment may include:

An MRI uses a strong magnet to create detailed images. It does not use X-rays, but young children may need support or sedation to remain still.

Parents and other close relatives may have their head circumference measured. A smaller head size can run in a family without causing developmental problems.

- Magnetic resonance imaging, or MRI, to examine brain structure
- Genetic testing for chromosome or gene changes

- Blood or urine tests for infection or metabolic conditions
- Hearing and vision assessments
- A developmental evaluation covering movement, language, learning, and social skills

Treatment and management

There is no treatment that can make the brain grow to a typical size or reverse established microcephaly. Care instead focuses on the child's abilities, health concerns, development, and participation in everyday life.

Children who are developing as expected may need only routine growth and developmental follow-up. Others benefit from early support, which can begin before the final cause is known.

Management may include physical therapy for movement and posture, occupational therapy for daily activities, and speech and language therapy for communication or swallowing. Educational support can be adjusted as the child grows.

Feeding difficulties may require assessment by a feeding or swallowing specialist. Support can include safer feeding techniques, changes to food texture, or nutrition planning. More intensive feeding support is sometimes needed when a child cannot eat enough safely.

Seizures, muscle stiffness, reflux, constipation, sleep problems, or behavioural concerns may be treated individually. Hearing aids, glasses, communication devices, mobility equipment, or other assistive technology may improve independence and access to learning.

Treatment plans are reviewed over time because needs can change. Care may involve primary care, paediatrics, neurology, genetics, rehabilitation, therapy services, hearing and vision specialists, and school support.

Complications

Complications are related mainly to the underlying effect on the brain rather than head size alone. More severe microcephaly is generally more likely to be associated with additional difficulties, but an individual outcome cannot be predicted from one measurement.

Possible complications include epilepsy, intellectual disability, cerebral palsy, and ongoing feeding or swallowing problems. Cerebral palsy is a group of lifelong conditions affecting movement and posture because of an early disturbance in brain development.

Swallowing problems may allow food or liquid to enter the airway. This can lead to poor weight gain or repeated chest infections. Limited movement may contribute to tight joints, hip

problems, pain, or difficulty with positioning.

Some children need lifelong help with communication, mobility, personal care, or medical needs. Others have mild learning differences or no major functional limitations.

Prevention

Many cases of microcephaly cannot be prevented. This is especially true when the cause is an inherited or newly occurring genetic change. Prevention is also not possible when the cause remains unknown.

Some causes linked to pregnancy may be partly preventable. Routine vaccination before pregnancy can reduce the risk of infections such as rubella. Avoiding alcohol during pregnancy prevents alcohol-related fetal harm. Protection from mosquito bites may be important in places where infections such as Zika are spreading.

Before or during pregnancy, medication and supplement use can be reviewed with a qualified healthcare professional. Prescribed medication should not be stopped without advice.

Food safety, hand hygiene, and avoiding known infection exposures can lower some pregnancy-related infection risks, although they cannot remove every risk. Good pregnancy care can also identify concerns about fetal growth or maternal health.

These steps support a healthy pregnancy but cannot guarantee that microcephaly will not occur.

Living with it and what to expect

The course of microcephaly differs widely. Head size often remains below the usual range as a child grows. Some children's heads grow steadily along a lower growth curve, while others show a widening difference over time.

Development may follow a typical pattern, progress more slowly, or be uneven. For example, movement may be more affected than communication, or the reverse. Skills and support needs can become clearer during the preschool and school years.

Microcephaly itself is not usually progressive, meaning that the original difference in brain growth does not automatically keep damaging the brain. However, some underlying genetic or metabolic conditions can cause new or worsening symptoms. Follow-up helps distinguish a stable condition from one that is changing.

Routine care may include tracking growth, development, nutrition, seizures, sleep, hearing,

vision, mobility, and school progress. Therapy goals often change from learning early movement or communication skills to increasing independence and participation.

Many children take part in family, school, and community life. The level of assistance needed ranges from little additional support to lifelong care. Families may also benefit from practical help, respite services, accessible education, and contact with others who have similar experiences.

When to get medical help

Arrange a routine appointment if you are concerned about a child's head growth, development, feeding, hearing, vision, movement, or behaviour. Bring any available growth records. A single measurement may need to be repeated before conclusions are drawn.

Seek prompt medical assessment if a child:

Call emergency services for a first seizure, a seizure lasting five minutes or longer, repeated seizures without recovery, serious breathing difficulty, blue or grey lips, or unresponsiveness. Follow an existing seizure emergency plan if the child has one.

Routine developmental follow-up remains important even when there are no urgent symptoms.

- Loses skills they had previously gained
- Develops new or increasingly frequent seizures
- Regularly coughs, chokes, or struggles while feeding
- Is not gaining weight or has fewer wet nappies than usual
- Develops new weakness, unusual stiffness, or reduced alertness

Common questions

Does a small head always mean microcephaly?

No. Head size differs naturally, and some families have smaller head measurements without developmental problems. Diagnosis requires an accurate measurement interpreted using age- and sex-based growth charts, often with repeat measurements and family information.

Can a child with microcephaly have normal intelligence?

Yes. Some children develop and learn within the expected range. Others have mild to severe learning difficulties. Head size alone cannot determine intelligence or future abilities.

Does microcephaly get worse with age?

The head usually remains smaller than average, but microcephaly does not always worsen. Many children continue to make developmental progress. The course is more likely to change when the underlying cause is a progressive genetic or metabolic condition.

Can microcephaly be seen before birth?

Sometimes. Ultrasound later in pregnancy may show that the fetal head is smaller than expected. Measurements before birth are estimates, so follow-up imaging and examination after birth may be needed.

Is microcephaly inherited?

It can be, but not always. Some genetic forms are passed through families, while others result from a new genetic change. Infections, injuries, and pregnancy exposures are not inherited. Genetic counselling can help explain recurrence chances when a cause is identified.

Can therapy make the head grow?

Therapy does not increase head or brain size. Its purpose is to help a child develop movement, communication, learning, feeding, and everyday skills as fully and safely as possible.

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