Congenital myasthenic syndromes (CMS)

This fact sheet is for children and adults diagnosed with congenital myasthenic syndrome. It’s a complex subject, so information has been adapted to suit all audiences. Not all information will apply to every person with this condition.

What is CMS?
CMS are a group of inherited conditions which are present from birth or early childhood. Many different genetic defects in a series of different genes can cause CMS. These defects cause problems with the way the messages are transmitted from the nerves to the muscles, causing weakness (myasthenia) and the muscles tire easily (fatigue). Muscle weakness varies depending on the type of genetic defect, so impact on mobility ranges from mild to severe. In the less severe cases the condition may causes drooping eyelids and fatigue, but only mildly interferes with daily life. In the most severe cases however, where breathing or other essential bodily functions are greatly affected, CMS can be life-threatening or even fatal.

Symptoms usually start in early childhood, although there are some adult onset cases, and are similar to those of myasthenia gravis but can’t be treated with the steroids and treatments which are effective on myasthenia gravis.

Is CMS the same as myasthenia gravis?
No. When most people talk about myasthenia they mean myasthenia gravis - an autoimmune condition like rheumatoid arthritis, which can affect both children and adults. Myasthenia gravis causes the body to produce proteins that block and destroy some of their receptors, making messaging from nerves to muscles less effective. Myasthenia gravis can be treated with steroids, immunosuppressive drugs and thymectomy (surgical removal of the thymus gland).

How is CMS inherited?
In the majority of cases children with CMS will inherit a faulty gene from each parent. This is called an autosomal recessive (AR) mutation. If each parent only has one copy of the faulty gene, they will not have any symptoms themselves, but there will be a 25% chance that any future pregnancy will result in a child with the condition.

Children who have inherited an AR type of CMS will pass on one copy of the faulty gene to their child but are unlikely to have affected children because the chances of their partner also carrying a faulty CMS gene are very small, unless they marry a blood relative.

The type of CMS known as ‘slow channel CMS’ is known to be inherited in a different way. It is an autosomal dominant disorder which means that it can be passed on from either parent to their child. If either parent has the condition there is a 50% chance of any future pregnancy resulting in a child with CMS. In other rare cases, the foetus may develop a sudden new fault in its genetic makeup without the parents carrying any faulty genes.

For further information about genetics and inheritance, please see our Inheritance and the muscular dystrophies factsheet.
How is CMS diagnosed?
A specialist needs to make a clinical diagnosis and carry out further testing for CMS, which will include taking a clinical history and tests which measure the function and response of muscles and nerves to repeated stimulation.

Further tests will also need to be carried out to exclude other causes of symptoms, including specialised genetic investigations using DNA from a blood sample and a muscle biopsy to exclude other similar neuromuscular conditions. A final definite diagnosis is made through genetic analysis of a DNA sample.

Once a diagnosis of CMS is made, families should be referred to a specialist genetics centre for a full discussion of the genetic implications of the diagnosis. Prenatal diagnosis can be offered in a future pregnancy if the genetic mutation has been identified.

What are the symptoms of CMS?
While various symptoms may need further investigation, they can vary greatly from person to person and not all symptoms will be found or experienced in the same way. The following symptoms may be noticed in someone with CMS:

- **In the womb**: decreased movement and too much amniotic fluid (polyhydramnios).
- **From birth**: stiff joints (arthrogryposis) reduced movements, a weak suck and cry, difficulty feeding, swallowing and possibly episodic breathing difficulties.
- **Children**: may start walking late, become tired with exercise, only able to walk short distances, unable to hold their arms above the head for long, and have difficulty climbing stairs. They may also have difficulty chewing food, scoliosis (curvature of the spine) a waddling gait and a tendency to fall easily. Sometimes there are distinctive facial features such as a prominent lower jaw, high arched palate and crowded teeth (malocclusion), droopy eyes when tired, reduced eye movement with occasional double vision and unclear or nasal speech. Children with CMS may also get frequent chest infections and need hospital treatment.
- **Adults**: may have similar problems to those of children but noticed at a later age. They are often described as poor sports people at school, easily fatigued especially on climbing stairs and have weakened ability to move their fingers and wrists.

Symptoms can vary greatly from person to person and not all will be present or experienced in the same way although fatigue is a common characteristic.

Many other conditions that affect muscle, nerve and brain function can cause similar symptoms to the above.

How does CMS progress?
It is important to get a correct diagnosis to be able to predict the long term outcome. If diagnosed early, CMS can be treated and prevented, to some extent, with medication. Almost all children with CMS will be able to walk independently and it does not affect intellect in any way. Some CMS is so mild that it is only diagnosed in late childhood, adolescence or even adulthood. Supportive treatment is offered in all cases.

Breathing support, help with feeding, monitoring of lung function, physiotherapy and speech and language therapy may be needed. Most CMS patients find that their muscle strength improves with time and the need for medication reduces. In some rare cases no treatment which helps is found. Some will need life-long medication to maintain muscle strength. In some instances, although body strength improves with treatment, eyelid droop and eye movements do not.
**What are the different types of CMS?**

There are many types of CMS- dependent on where the problem in sending messages from the nerve to muscle occurs.(see diagram on the next page)

Identifying where the problem occurs may allow drugs to be described which can help with the management of symptoms. CMS can fall into three categories:

- **pre-synaptic** - at the nerve ending, where there is a fault in the production and release of the chemical (acetylcholine) which signals to the muscle to contract
- **synaptic** - in the gap between the nerve and muscle, or
- **postsynaptic** - on the muscle where there is a fault in the receptors that receive the chemical message.

Many of the defects are known to be caused by alterations in known genes and so can be identified using a DNA test. Some people require a muscle biopsy to test how the nerve-muscle junction works. There are forms of CMS that can't yet be identified but rapid advances in research are helping to find more of the genes responsible.

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**Medication, anaesthesia and operations**

Some drugs such as antibiotics, cardiovascular drugs and drugs for psychiatric conditions should be avoided by people with CMS because they interfere with normal neuromuscular function and may make symptoms worse.

Always check with the doctor who treats your CMS before taking any new medication as it can be very dangerous to start a new drug without consultation. It is also very important to inform the anaesthetist and surgeon of your diagnosis before undertaking any surgery or treatment. A Medic-Alert card or bracelet is an important source of information to emergency care providers about the special situation of a person with CMS.

**Exercise**

It is important to try to get as much gentle exercise as possible and to continue physiotherapy which can help prevent complications like joint stiffness (contractures) However it may help to use a wheelchair for distances to help conserve strength.

**In the event of serious health concerns**

Your GP is the first point of contact for minor illness but for more serious concerns, you should contact your physician or paediatrician and **in an emergency dial 999 for an ambulance**. It is advisable to keep a list of useful numbers handy for family members and carers to contact in an emergency.
If your child has CMS you should have a rapid access agreement to the paediatric service at the local hospital to avoid having to wait to be seen if he or she is unwell.

People who have breathing difficulties and recurrent chest infections should be under the care of a specialist respiratory centre and will be advised to have an annual flu and pneumococcal vaccine. Parents and carers should also be trained in cardiopulmonary resuscitation.

Talking to your child’s school
It is a good idea to talk to your child’s school and school friends about the allowances that need to be made for their condition. For example they may not understand the additional preparations involved at home and in travelling to and from school which might mean needing to start school late and leave early.

It might also need to be explained that your child needs to use a computer or laptop rather than writing by hand, and that he or she needs extra time to complete work and take tests. He or she should also avoid sitting on the floor and having to get up and sit down frequently. They should use a chair of appropriate height.

You will need to agree a suitable level of participation in PE and sport, with the opportunity to stay indoors during playtime if necessary. They should not be expected to raise their hand or shout aloud in the classroom. They may need extra time for eating and drinking and be able to take medication at a specific time without fail.

Children can be teased or criticised for their droopy eyes, squint, slurred speech and quiet voice and symptoms can vary from day to day and time to time. It is therefore important that they are listened to and offered appropriate support. A statement of special education needs is often needed to get extra assistance in the school or help with transport and referral to the community paediatrician and their nursing team will provide essential support.

Where to go for more information
Apart from your doctor and hospital specialist there are specialist nurses in many centres who will offer help, advice and support to a family. Ask your GP or hospital specialist whether such a service exists in your area.

The Myasthenia Gravis Association can be contacted for further information about parent and patient groups, and support. Call 01332 290219 or 0800 919922 (free phone), email mg@mga-charity.org, or visit www.mga-charity.org

For advice about home adaptations and local authority grants contact the occupational therapist in your local social services department. Your GP or health visitor can also refer you to the Children with Disabilities Team in your local social services department.

You may also want further information on:

Disability Living Allowance:

Blue Badge Parking scheme:
Contact your local authority or visit www.direct.gov.uk/en/DisabledPeople/MotoringAndTransport

Carer’s allowance:
Contact your local benefits office or visit www.direct.gov.uk/en/CaringForSomeone