

## SPINOCEREBELLAR ATAXIA TYPE 1 (SCA1)

### **Spinocerebellar ataxia type 1**

Spinocerebellar ataxia type 1 (SCA1) is a type of inherited cerebellar ataxia. It is caused by a defect in a gene. This results in damage to certain parts of the brain, particularly the cerebellum (ie the co-ordination centre).

### **What are the symptoms?**

SCA1 is a progressive cerebellar ataxia.

Most people experience the following symptoms; balance problems (ataxic gait), inco-ordination of limb movements, slurred speech (dysarthria) and problems with eye movements. As the SCA1 progresses many people develop swallowing problems (dysphagia). Other possible symptoms include problems with stiffness, cramps and impaired sensations (ie: reduced feelings in hands and feet). [*The Lancet Neurology* 2004; 3:291-304]

Symptoms and their severity vary between individuals.

A minority of people with SCA1 develop mild cognitive problems, such as a decline in verbal and non-verbal intelligence and memory problems but they are not sufficient to interfere with everyday life. [*Handbook of Ataxia Disorders*. Ed. Klockgether, 2000]

### **What causes SCA1?**

SCA1 is an inherited condition caused by a defect in the so-called SCA1 gene, located on the 6th chromosome. (Each person has 23 pairs of chromosomes). This gene is more extended than normal in people with SCA1. The SCA1 gene was so called because it was the first gene identified that was associated with a spinocerebellar ataxia.

All genes are made up of nucleotides that are held together in a chain. Each nucleotide is identified by a letter (A, T, C or G). The SCA1 gene is extended because of extra copies of a series of nucleotides identified by the letters C-A-G. In general, the more additional copies there are, the more severe the condition and the earlier the age of onset.

The SCA1 gene has instructions for the production of a protein called ataxin 1. The abnormally extended SCA1 gene results in the production of an altered ataxin 1 protein. Research is underway to understand what the function of the ataxin 1 protein is and what happens when it is altered. Much information on the disease mechanism of SCA1 and how the altered ataxin affects different parts of the brain has been gained from studies using SCA1 mouse models. This information is important in order to develop treatments. Research using such mouse models has recently given promising results for a form of gene therapy (known as RNAi). [*Nature Med* 2004;10(8):816-20]. More information in Ataxia UK's magazine.

### **How is SCA1 inherited?**

SCA1 is inherited in an autosomal dominant way. For more information on inheritance see Ataxia UK's *Genetics and ataxia* leaflet.

### **When do symptoms start?**

On average SCA1 symptoms start at about 35 years of age; mostly people will need to use a wheelchair after a number of years. However the age of onset does vary from about 15-55 years of age. In general the earlier the age of onset the larger the number of CAG copies.

### **Will the number of CAG copies predict age of onset or disease severity?**

Although using a statistical analysis it appears that the more CAG copies people have the earlier the age of onset and the more severe the condition this does not mean that you can make predictions on what will happen in an individual person with SCA1.

Sometimes, SCA1 results in earlier age of onset and more severe symptoms as the gene is passed down the generations. This phenomenon is known as anticipation. The explanation for this phenomenon is the instability of the extended SCA1 gene, which gets longer as it passes from parent to child. [Handbook of Ataxia Disorders. Ed. Klockgether, 2000]

### **How is SCA1 diagnosed?**

A genetic test will confirm a diagnosis of SCA1. This involves taking a blood sample to detect the abnormal gene.

### **How common is SCA1?**

There is no recent information on the prevalence of SCA1 in the UK. Ataxia UK is currently funding research to address this lack of knowledge. The first study published from this research estimates that the prevalence of all the dominant ataxias (of which SCA1 is one) in North East England is 1 in 12,500 [Ann Neurol. 2004 May; 55 (5):752-5].

### **Management of SCA1**

As with other cerebellar ataxias, physiotherapy and speech therapy can be helpful. A visit by an occupational therapist will be useful in order to assess the need for items such as walking aids, or for adaptations to the home. In people with severe swallowing problems a gastric tube may be needed to avoid under-nourishment and pneumonia. A neuro-ophthalmologist may be able to advise on any problems with vision.

It is important to see a neurologist, who will monitor the condition, on a regular basis.

**This information leaflet was written by Ataxia UK in collaboration with Dr Giunti, Neurologist at National Hospital for Neurology and Neurosurgery, London.**

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We have a number of other publications on the ataxias available free of charge. In addition we publish a quarterly magazine called *The Ataxian* containing articles on research, living with ataxia and other relevant information. Our website also contains news of research projects.



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