



# Infantile Neuroaxonal Dystrophy

**Infantile Neuroaxonal Dystrophy (INAD) is a rare inherited disorder affecting the nerve axons (which are responsible for conducting messages) in the brain and other parts of the body, causing a progressive loss of vision and of physical and mental skills.**

## What is the cause?

INAD is caused by an abnormal build-up of substances in the nerves throughout the brain and body which prevents them working properly. These deposits (sometimes called spheroid bodies, because of their appearance under the microscope) are found particularly in the nerve endings going to muscles, skin and conjunctiva (around the eyes). It is not certain how or why these deposits build up on the nerves but it is likely that the normal process whereby the body clears unwanted chemicals is not working properly due to the gene responsible for this action being faulty.

## How is it diagnosed?

Until recently, the diagnosis could only be by examining a piece of skin or conjunctiva, under a microscope, and confirming the presence of the 'spheroid bodies' in the nerve axons contained within it. Spheroid bodies are found in other related, but different, disorders but the symptoms the children have, and the age at which they appear, confirm the diagnosis. Commonly now, testing of the PLA2G6 gene on a blood sample will be done first and may confirm the diagnosis without the need for the biopsies.

## Does it have an alternative name?

In the 1950's Dr Seitelberger described the disorder and it is still sometimes known as Seitelberger's Disease.

## Is it inherited?

INAD is an autosomal recessive disorder; this means that both parents are carriers of the disease. Human beings have about 30,000 to 40,000 different genes, each of which has a function in making an individual person. The genes are arranged in pairs (one of the pair from each parent) on 23 chromosomes. Inevitably, some of these genes are faulty; a normal gene can overcome a faulty one, but if both genes in the pair are faulty, the genetic instructions cannot work. Most people carry different faulty genes but in INAD (and other recessive conditions) parents, though healthy themselves, carry the same faulty genes, and risk passing them on to their children. Each pregnancy carries

- a **25 per cent** chance of the child being **affected**
- a **75 per cent** chance of the child **not being affected**.

## Is prenatal testing available?

Due to recent advances in genetic studies, prenatal testing for INAD is now usually possible if the PLA2G6 gene has been found in the affected child.



## How common is it?

This is uncertain but the incidence is likely to be less than 1:200,000

## How does the disease progress?

The infant's development starts to slow down between the ages of six months and two years. Over the following years they will lose skills previously learned and vision will become increasingly impaired and, eventually, lost. Nystagmus (rapid, wobbly eye movements) and squints may be the first signs of this. They will become hypotonic (floppy), especially in the legs and body (more so than in the arms). Over the course of several years, the child becomes totally dependant again, often physically very stiff (spastic) and eventually loses all understanding or real awareness of their surroundings.

The condition is not a painful one and the child will be unaware of what is happening in the later stages of the disease. The brain's control of the muscles responsible for chewing, coughing, swallowing and so on eventually becomes affected so that assistance with a feeding tube may be needed, and chestiness will develop and may lead to infections and increasing physical weakness. Eventually the combination of the diseased brain and physical weakness becomes too great to sustain life, and death usually occurs between the ages of five to ten years. Parents and carers will be aware of the child's increasing frailty, and death is usually relatively peaceful and expected when the time comes.

## Is there any treatment?

Although there is no treatment yet available that can stop the disease, every effort is made to treat the symptoms as they occur. Drugs can be given to treat infections; pain relief and sedative drugs can be given if required, and feeding can be assisted.

Physiotherapists and others can advise parents on positioning, seating and exercising the limbs to maintain comfort; teachers for the visually impaired will be able to give advice as to how to help the child make use of the vision they have and how best to help stimulate them in ways that do not depend on vision. Specialist schooling will be required and it will be important for the child to have this stimulating environment and social contact and, indeed, for the parents to have some time for themselves and other members of the family and friends. Though not scientifically proven, many children gain some symptomatic relief from some of the complementary therapies such as cranial osteopathy and massage.

## Is any research being done?

Research is progressing in various areas concerning degenerative neurological disorders, and with the discovery of the PLA2G6 gene mutation, it is hoped that, in time, understanding of what the gene does will advance, with the eventual hope of gene therapy. Sadly, therefore, any treatment that could stop or reverse the disease process is unlikely to be discovered quickly enough to help children already affected. Your neurologist and information available from the support group can keep you informed of research progress.

## Is there a support group?

Children Living with Inherited Metabolic Diseases (CLIMB), and can provide written information, telephone advice, support and contact (if wanted) with other families. Telephone their helpline on 0800 652 3181 or visit their website at [www.climb.org.uk](http://www.climb.org.uk).

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