Giant Axonal Neuropathy

National Institute of Neurological Disorders and Stroke (NINDS)

Source

National Institute of Neurological Disorders and Stroke (NINDS). Giant Axonal Neuropathy Information Page.

Giant axonal neuropathy (GAN) is a rare inherited genetic disorder that affects both the central and peripheral nervous systems. The majority of children with GAN will begin to show symptoms of the disease sometime before five years of age. Signs of GAN usually begin in the peripheral nervous system, which controls movement and sensation in the arms, legs, and other parts of the body. The typical symptoms of GAN are clumsiness and muscle weakness that progresses from a “waddling gait” to a pronounced difficulty in walking. Additional symptoms include numbness or lack of feeling in the arms and legs, seizures, nystagmus (rapid back and forth movement of the eyes), and impaired cognitive development. A characteristic sign of the disease is dull, tightly curled hair that is markedly different from the parents’ in color and texture.

Researchers have discovered more than 20 different mutations associated with GAN in a gene, GAN1, which makes a protein called *gigaxonin*. These mutations disrupt the regulation or production of gigaxonin in the nervous system. As a result, axons, which are the long tails of neurons that allow them to communicate with other nerve cells, swell up with tangled filaments and become abnormally large. Eventually these axons deteriorate and cause problems with movement and sensation since neurons are no longer able to communicate with each other.

Doctors diagnose GAN by using several tests, including one that measures nerve conduction velocity, a brain MRI, and a peripheral nerve biopsy (in which a bit of tissue from a peripheral nerve is removed and examined to look for swollen axons). A definitive diagnosis using genetic testing is available on a research basis only.

GAN is inherited in an autosomal recessive pattern, which means that both parents of a child with GAN have to carry a copy of the mutated gene. Parents, typically, will show no signs of the disease.