

# Genetic basis for Huntington disease

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Huntington's disease is **primarily** a inherited disease that causes failure of the neurological system. There have been some cases (10%) in which mutations have resulted in this condition as well, although such incidences are rare. The gene responsible for this disease is present on chromosome **4p16.3** and the condition is caused when a **CAG trinucleotide sequence repeats for a higher than normal number of times**. Individuals in whom the CAG sequence repeats less than 20 times are not at risk for this disease, whereas those where the sequence repeats more than 40 times are at a definite risk. In those with between 20 and 40 repeats, risk increases with higher repeats.

Huntington's disease is a rare disease affecting about 1 in 10,000 people, however, the disease is **autosomal dominant**, causing a higher incidence of the disease among those who already have this gene. Also, symptoms for the disease typically manifest when an individual is in his/her thirties or later. Since people are not aware till a later age, the chance of unknowingly passing this disease on to their children increases.

There are typically three main symptoms, also known as a **clinical triad**, to identify individuals with this disease. These are (1) chorea - which is an involuntary dancing movement (2) cognitive decline and (3) psychiatric symptoms such as being suicidal.

The primary reason for the neurological degeneration is because the excessively repeating CAG patterns cause the resulting proteins to fold in a way that results in an oversized protein product. This errant protein gets chopped up in pieces in the brain, enters the cytoplasm of nerve cells and affect the normal functioning of these cells. Since brain cells control thinking and movement, they result in the triad of symptoms described above.

Huntington's disease does not have any known cure. The CAG sequence that causes Huntington's disease, in its normal form, has been found to be critical for our survival. It is only the excessive repeats that lead to this condition. People with this disease do not live past their forties or fifties. Typical treatments are to control their symptoms and to improve their quality of life.

## Resources:

1. Biology - Today & Tomorrow, Cecie Starr, Christine A.Evers, Lisa Starr
2. Huntington's Disease: Stages and Therapies, Veronica Santini, MD,  
<https://www.youtube.com/watch?v=ECcqSm7d1Ro&t=2476s>