MOLECULAR BASIS OF MITOCHONDRIAL DISEASE

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oxidative stress

Free radicals

frataxin
Nicholaus Friedreich, 1863

Inherited disease

Mitochondrial disease

Movement problems (ataxia)

Nervous system

FA
nerve conduction studies

reflex

EMG
magnetic resonance imaging (MRI)

computed tomography (CT)

Genetic testing
Autosomal recessive disease

FXN gene, 9 chromosome

1:50,000 САД

Figure 2. In an autosomal recessive disorder, 2 mutated genes are inherited, 1 from each parent. This type of disorder is usually passed on by 2 carriers. The carriers' health is rarely affected, but they have 1 mutated gene (recessive gene) and 1 normal gene (dominant gene) for the condition. Two carriers have a 25 percent chance of having an unaffected child with 2 normal genes, a 50 percent chance of having an unaffected child who also is a carrier, and a 25 percent chance of having an affected child with 2 recessive genes.

Figure 1 - Gel images of GAA expansion of Friedreich's ataxia patients, heterozygotes, and normal controls.
SIGNS AND SYMPTOMS

• THE AGES OF 5 AND 15 YEARS
• ATAXIA
• HEART DISEASE
• SPINAL CORD AND PERIPHERAL NERVES DEGENERATE
• CEREBELLUM (AWKWARD, UNSTEADY MOVEMENTS AND IMPAIRED SENSORY FUNCTIONS)

Include loss of tendon reflexes, especially in the knees and ankles
loss of sensation in the extremities

Dysarthria

hypertrophic cardiomyopathy

loss of tendon reflexes, especially in the knees and ankles
Foot deformities

Kyphoscoliosis

Motor weakness of the lower extremities
Hypertrophic cardiomyopathy

Myocarditis, myocardial fibrosis, cardiac enlargement

Progressive cardiac failure
loss of vibratory and position senses from the onset, initially affecting the feet and hands

Progressive limb and gait ataxia

Friedreich's Ataxia
This condition causes problem with walking, speech impairment and loss of feeling in the arms as well as legs. In Friedreich's ataxia, there is damage to some parts of the brain as well as spinal cord and the heart is also affected.
insulin

- carbohydrate intolerance
- and 10 percent develop diabetes

- a defect (mutation) in a gene labeled FXN

- Nystagmus

- Friedreich's ataxia develops hearing and vision loss

- Dysarthria
between the ages of 5 and 15 years

rare occasions as late as age 75

cured or treated

Physical therapy
TREATMENTS

- treatments for diabetes, if present
- Surgical procedures
- Insulin
- Coenzyme Q10 + vitamin E
- Levohydroxytryptophan, chelates
- medications
A Potential New Therapeutic Approach for Friedreich Ataxia: Induction of Frataxin Expression With TALE Proteins

Open

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Study of beta cells and neurons indicate incretin analogs as potential therapeutics for Friedreich’s ataxia.
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INCREASE FRATAXIN LEVELS THROUGH DRUG TREATMENTS, GENETIC ENGINEERING AND PROTEIN DELIVERY SYSTEMS
The Friedreich’s Ataxia Research Alliance (FARA)

- http://www.curefa.org/index.php
- http://www.fara.org.au/