Fact Sheet:
Fragile X Syndrome

**Definition:** Fragile X syndrome is caused by a mutated gene on the X chromosome. Affected individuals have developmental delays, variable levels of mental retardation, and behavioral and emotional problems. They may also have characteristic physical traits. Males are affected more severely than females.

**Description:** Fragile X syndrome is the most common form of inherited mental retardation. Estimates of the incidence of this syndrome vary, but it is thought to affect about one in 2,000 girls and one in 1,250 boys. The syndrome is caused by a mutation in the FMR-1 gene, located on the X chromosome. The role of the gene is unclear, but it is probably important in early development.

The mutation involves a short sequence of DNA in the gene. This sequence is designated CGG. Normally, there are fewer than 50 adjacent copies of the CGG sequence. If the CGG sequence repeats more than 200 times, the FMR-1 gene is disabled.

The inheritance pattern of fragile X syndrome is complex. A condition called premutation may exist through several generations of a family, and no symptoms of fragile X will appear. During this premutation phase, the CGG sequence repeats 50-200 times. The size of the premutation expands over succeeding generations. Once the premutation reaches more than 200 repetitions, it becomes a full mutation. Individuals who have the full mutation may have fragile X syndrome.

**Causes & symptoms-** Fragile X syndrome is caused by a full mutation in the FMR-1 gene on the X chromosome. Because boys have just one copy of the X chromosome, they are more likely to develop symptoms than girls are. Fragile X boys appear normal at birth but development is delayed and they may have behavioral problems as they get older. Common behavioral problems include hyperactivity and attention problems known as attention deficit disorder. Approximately 90% of fragile X boys are mentally retarded, although the severity of the retardation varies. Characteristic physical traits appear later in childhood. These traits include enlarged testes, prominent ears, and a long, narrow face.

A girl's normal X chromosome may compensate for her fragile X chromosome. Approximately 30-50% of girls with a full mutation develop symptoms. These symptoms include mental impairment, ranging from mild learning disability to mental retardation, and behavioral problems. Characteristic physical traits are less noticeable in girls than in boys. Girls may not have these traits at all.

Children with fragile X syndrome often have frequent ear and sinus infections. Nearsightedness and lazy eye are also common. Many children experience digestive disorders that cause frequent gagging, vomiting, and discomfort. A small percentage may also experience seizures.
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Diagnosis - Behavioral and developmental problems may indicate fragile X syndrome, particularly if there is a family history of mental retardation. Definitive identification is made by means of a genetic test for the mutation. Individuals with the premutation or mutation may also be identified through genetic testing. Amniocentesis, chorionic villus sampling, and percutaneous umbilical blood sampling can be used to identify a fragile X chromosome before birth.

Treatment - Fragile X syndrome cannot be cured. To reach his or her full potential, a child may require speech and language therapy, occupational therapy, and physical therapy. The expertise of psychologists, special education teachers, and genetic counselors may also be needed. Drugs are used to treat hyperactivity, seizures, and other problems. Establishing a regular routine, avoiding over stimulation, and using calming techniques can help reduce behavioral problems.

Prognosis - Early diagnosis and intensive intervention offer the best prognosis for fragile X individuals. They can learn and are often good at memorizing and imitation. Most behavioral problems decrease by adulthood. About 50% of fragile X individuals develop mitral valve prolapse, a heart condition, as adults. Life span is typically normal.

Prevention - Neither the permutation nor the mutation is preventable.

Information from: Gale Encyclopedia of Medicine, Author: Julia Barrett