Fragile X Syndrome

Jennifer Thorne-Lehman MA

Definition

Fragile X Syndrome is caused by a mutation on the X chromosome, which leads to a lack of a certain protein (FMR-1protein). Because this particular protein impacts the way brain cells work, the lack of it results in mental retardation. Fragile X Syndrome is the second most common cause of mental retardation resulting from chromosome mutation (after Down Syndrome). The retardation may be very mild, moderate or severe.

Chromosome: humans have 23 pairs of chromosomes that carry the genes that make up our characteristics such as height, eye color, and skin color. Females have two X chromosomes and males have one X chromosome and one Y chromosome. Genes on the chromosomes create these characteristics by producing different molecules, including the proteins our bodies and brains need to function correctly.

Mutation: mutation means change. If parts of molecules in the genes are lost, rearranged or paired in the wrong way to other molecules, the change may lead to something in the body working incorrectly.

Introduction

Fragile X Syndrome is inherited through a person's mother who "carries" this mutation on one of her X chromosomes. Both males and females may have Fragile X syndrome, but it is more common in males and also usually more severe in males. A mother who carries this mutation has a 50% chance of passing the mutated X chromosome to each of her children in a form that results in the syndrome. Her children may have Fragile X syndrome or they may be carriers like she is. Approximately 1 in every 259 females has this mutation either as a carrier or as a full mutation. If a male child becomes a carrier, all his daughters will also be carriers since he contributes his mutated X chromosome to them, but his sons will not be carriers because they receive his unaffected Y chromosome.

In addition to mental retardation there are specific physical and behavioral characteristics of this syndrome. Females usually have a milder form of the syndrome, so these characteristics may be harder to notice in females. Even in males, these characteristics often do not become noticeable until late childhood or early adolescence.

Common Physical Characteristics:

- Large head with a long face and prominent chin
- Large flat ears
- Large hands
- In males, large testicles
- Low muscle tone and joint hypermobility (double jointed or "loose joints")
- Unusual way of walking (abnormal gait)

Common Behavioral Characteristics:

- Crowds, noise and other environmental stimuli that would not bother the average person often overwhelm individuals with Fragile X Syndrome.
- Hyperactivity and inattention
- Poor eye contact
- Avoid being touched

- Rapid, repetitive speech
- Difficulty adapting to change
- Anxiety

Conditions That Often Occur With Fragile X Syndrome:

- Twenty-five percent (25%) of individuals with Fragile X Syndrome also have Autism.
- Mitral Valve Prolapse (heart murmur)
- Strabismus (cross eyed)
- Serous otitis (fluid behind the eardrums)
- Dislocated hips
- Epilepsy/seizure disorders
- Attention Deficit Hyperactivity Disorder (ADHD)

Diagnosis

Testing for Fragile X Syndrome is done by taking a blood sample and sending it to a laboratory for analysis. This can be done through the individual's primary care physician. It is very important to ask for a "Direct DNA Test" for Fragile X Syndrome and to ask that both PCR and Southern Blot testing be preformed, because this combination of tests provides diagnosis that is 99% accurate. Couples with a family history of Fragile X Syndrome should seek this test and genetic counseling prior to becoming pregnant. Diagnosis can also be made during pregnancy by amniocentesis or chorionic villus sampling (CVS) as early as ten weeks into the pregnancy.

Prevention and Treatment

Currently the only prevention for Fragile X Syndrome is for parents to be tested prior to pregnancy to determine if they are "carriers", or even possibly mildly affected. There is no cure for Fragile X Syndrome, but many treatments can help lessen the effects of this condition. These include:

- Therapies, including speech/language therapy, occupational therapy and physical therapy
- Medication for hyperactivity, anxiety and/or depression
- Early intervention and special education services to promote maximum developmental progress
- Behavior therapy and/or counseling services to help the individual cope with behavioral and emotional aspects of this disorder
- Regular medical screening in order to identify any associated medical conditions the individual may be experiencing (see "Conditions That Often Occur With Fragile X Syndrome" above)

Emergency Situations – What can go wrong?

Individuals with Fragile X Syndrome do not experience any greater risk for emergency situations that the average person, although hyperactivity and inattention may cause them to be slightly more accident-prone.

Conclusion

Fragile X Syndrome is a common cause of mental retardation and is associated with a combination of physical and behavioral characteristics that benefit from specialized supports. Because these characteristics are difficult to notice in some individuals with Fragile X Syndrome, they may not yet have received this diagnosis. If Fragile X Syndrome is suspected, it can be diagnosed with a simple blood tests taken by the individual's primary care physician. Accurate diagnosis may assist the team in understanding the individual's behavior and identify support strategies.

References

Belser, Richard C, and Sudhalter, Vicki: Conversational Characteristics of Children With Fragile X Syndrome: Repetitive Speech, American Journal on Mental Retardation, Volume 106, Number 1, 2001, pages 28-38.

Mental Retardation and Developmental Disabilities Research Reviews: Fragile X Syndrome, Volume 1, Number 4, 1995.