Introduction to Rett Syndrome

Written and reviewed by: My Child Without Limits Advisory Committee

Rett syndrome is a disorder that begins in childhood and mostly affects females. A child who has Rett syndrome usually starts off developing normally. Then, over time, the child loses intentional use of the hands and speech, and has unusual hand movements, slowed brain and head growth, walking abnormalities, seizures, and mental retardation.
Rett syndrome was identified by Dr. Andreas Rett, an Austrian doctor who first described it in an article in 1966. However, it was not until after a second article about the disorder was published in 1983 that the disorder was generally recognized.

Who Does Rett Syndrome Affect?

One of every 10,000 to 15,000 infant girls will develop Rett syndrome. It affects all racial and ethnic groups worldwide. Rett syndrome is rarely seen in boys. The chances of a family having a second child with Rett syndrome are less than one percent.

Why Does Rett Syndrome Mostly Affect Girls and Not Boys?

Girls have two X chromosomes in every cell. If they have Rett syndrome, some of the cells will use the defective gene. Other cells will use the healthy genes which will help to make up for the cells using the defective gene.

However, boys only have one X chromosome in every cell. They lack the extra X chromosome that can protect their bodies from being completely overcome by the disorder. Therefore boys with the cell mutation that causes Rett syndrome often die before or shortly after birth.

What Causes Rett Syndrome?

Rett syndrome is caused by a mutation - or random change - of a gene in the X chromosome. Chromosomes contain the genes that dictate how we look, grow, and function.

Is Rett Syndrome Inherited?
Not usually. Although Rett syndrome is a genetic disorder — meaning that it's cause by a faulty gene or genes — less than one percent of recorded cases are inherited or passed from one generation to the next.

How Is Rett Syndrome Diagnosed?

How Rett syndrome shows up and progresses changes from child to child. Most of the time the child seems to grow and develop normally until symptoms gradually begin to appear. Over time, mental and physical symptoms become obvious. The symptoms looked for by doctors include:

- Hypotonia (loss of muscle tone) (This is usually the first symptom.)
- Loss of purposeful use of the hands
- Loss of speaking ability
- Problems crawling or walking
- Less eye contact
- Compulsive hand movements such as wringing and washing (This symptom can appear suddenly.)
- Apraxia - or loss of motor functions This symptom affects every body movement, including eye gaze and speech.
- Autistic-like behaviors
- Toe walking
- Sleep problems
- Walking with the legs spread far apart
- Teeth grinding and difficulty chewing
- Slowed growth
- Seizures
- Learning disabilities
- Breathing difficulties while awake such as hyperventilation (breathing more than is necessary), apnea (breath holding), and air swallowing

Recently, scientists developed a genetic test that can confirm if a child has Rett syndrome. This test involves searching for the mutation on the child's X chromosome. Given what we know about the genes involved in Rett syndrome, such tests are able to confirm the syndrome in up to 80 percent of all cases.
Some children may have the genetic mutations that are typical in Rett syndrome but do not have the most common signs of the syndrome. These children are described as having "atypical" or "variant" Rett syndrome. Atypical cases make up about 15 percent of the total number of diagnosed cases.
A pediatric neurologist (doctor who treats the nervous system) or developmental pediatrician should be consulted to make sure that the diagnosis of Rett syndrome is correct. This physician uses a highly specific set of guidelines that will determine if the child has the syndrome.

What are the Stages of Rett Syndrome?

There are four stages of Rett syndrome:

Stage I
Stage I, called early onset, usually begins when the child is between six and 18 months old. This stage is often overlooked because, in this early part of the child's life. symptoms of the disorder may not be very noticeable to the parents or the child's doctor.

During this stage, the infant may begin to have less eye contact and not be as interested in her toys. There may be delays in skills like sitting and crawling. Hand wringing and decreasing head growth may occur, but not enough to draw attention. This stage usually lasts for a few months but can persist for more than a year.

Stage II
Stage II, or the rapid destructive stage, usually begins between ages one and four and may last for weeks or months. Symptoms may appear slowly or rapidly. During this stage hand skills and spoken language can be lost.
Certain hand movements that are typical of Rett syndrome, such as wringing, washing, clapping, or tapping, as well as repeatedly moving the hands to the mouth may be seen. Hands are sometimes clasped behind the back or held at the sides, with random touching, grasping, and releasing. The movements persist while the child is awake but disappear during sleep.

Breathing irregularities such as episodes of apnea (breath holding) and hyperventilation (over breathing) may occur, although breathing is usually normal during sleep. Some girls also display symptoms that are like autism - such as loss of social interaction and communication. General irritability and sleep irregularities may be seen. The child may have an unsteady walking gait, and trouble starting motor movements.

Stage III
Stage III, which is also called the plateau, usually begins between ages two and 10 and can last for years. Apraxia (being unable to perform complex movements), and seizures may occur often during this stage. However, there may also be improvement in the child's behavior, such as less irritability, crying, and autistic-like features.
A person in Stage III may show more interest in her surroundings, and her alertness, attention span, and communication skills may improve. Many remain in this stage for most of their lives.

Stage IV
Stage IV, the last stage, is called the late motor deterioration stage, and can last for years or decades. This stage is characterized by a reduced ability to move. Muscle weakness, rigidity (stiffness), spasticity (uncontrolled muscle activity), dystonia (increased muscle tone with abnormal posturing of extremity or trunk), and scoliosis (curvature of the spine) are other major features of this stage. Those who were previously able to walk may stop walking. In general, there is no reduction in learning ability, communication, or hand skills in stage IV. Repetitive hand movements may decrease, and eye gaze usually improves.

Why Are Some Cases of Rett Syndrome More Severe than Others?

Rett syndrome acts differently in different people. Some girls have serious symptoms that begin at birth, while others may have symptoms that appear later or are milder.

Because females have two copies of the X chromosome and need only one working copy for genetic information, the extra X chromosome is turned off in a process called X inactivation. This process occurs randomly so that each cell is left with one active X chromosome. How severe Rett syndrome is, can have to do with the number of cells that have a normal copy of the gene after X inactivation takes place.

If X inactivation turns off the X chromosome that is carrying the defective gene in more of the child's cells, the symptoms will be mild. But, if a larger percentage of cells have the normal gene turned off, the disorder may occur earlier and the symptoms may be more severe.

Can Rett Syndrome Be Treated?

Yes. Although there is no cure for Rett syndrome, the symptoms can often be treated and managed. Medication may be prescribed for breathing irregularities and motor difficulties. Drugs may also be used to control seizures.

Occupational therapy may be used to help the child develop skills needed for performing activities such as dressing, feeding, and practicing arts and crafts. Physiotherapy (physical therapy like massage and exercise) and hydrotherapy (therapy using water) may be used to help strengthen the muscles and relieve pain.

Some children may require special equipment and aids such as braces to stop scoliosis (spine curvature), splints to adjust hand movements, and nutritional programs to help them maintain adequate weight. Special academic, social, work-related, and support services may also be used.

Rett Syndrome Prognosis

The path and timeline of Rett syndrome, including the age when it begins and how severe the symptoms are, changes from child to child. However, even though the symptoms may cause problems, it is believed many people who have Rett syndrome can live into middle age and possibly beyond. While it is estimated that there are many middle-aged women (in their 40s and 50s) with the disorder, not enough women have been studied to make dependable estimates about life expectancy beyond age 40.

What Research is Being Done to Find a Cure or Additional Treatments?

Within the Federal Government, two institutes - the National Institute of Neurological Disorders and Stroke (NINDS) and the National Institute of Child Health and Human Development (NICHD), support clinical and basic research on Rett syndrome.

Understanding the cause of this disorder is needed to develop new therapies to manage specific symptoms, as well as for providing better methods of diagnosis.

Progress has already been made. It is hoped that additional studies will help scientists to better understand this syndrome and lead to new therapies.

Rett Syndrome Resources

International Rett Syndrome Foundation
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http://www.rettsyndrome.org
Tel: 513-874-3020

Easter Seals
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Suite 1800
Chicago, IL 60606-4802
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http://www.easterseals.com
Tel: 312-726-6200 or 800-221-6827
Fax: 312-726-1494

National Institute of Child Health and Human Development (NICHD)
National Institutes of Health, DHHS
31 Center Drive, Rm. 2A32 MSC 2425
Bethesda, MD 20892-2425
http://www.nichd.nih.gov
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