

## CFTR- related Metabolic Syndrome (CRMS) and CFTR Related Disorder

This fact sheet provides you with basic information about CFTR- related Metabolic Syndrome (CRMS) and CFTR Related Disorder. CRMS is being recognized more often now as a result of newborn screening for cystic fibrosis (CF). All states in the United States include CF in newborn screening. Newborn screening tests are done on a blood spot (from a heel stick) collected at birth and in the first weeks of life. A positive CF newborn screening test has to be followed up with other testing before making a diagnosis. Some newborns will have an abnormal CF screening test but do not meet the full criteria for CF disease. These infants may have CRMS. Older children who did not have newborn CF screening available at birth can present the same way as those with CRMS but will be called CFTR Related Disorder and not CRMS. All children with CRMS or CFTR Related Disorder need to have check-ups with a cystic fibrosis specialist doctor to be sure that any health problems are detected and treated properly.

To understand what CRMS/CFTR Related Disorder is, you also have to know a little about CF disease. Cystic fibrosis (CF) is a genetic 'inherited' disease. Genes are what tell the cells in our body how to work. They also determine things like what color hair and eyes you have. Each person has two sets of gene pairs – one from each parent. When a gene has a change in its code it is called a 'mutation'. Some mutations do not cause disease while others cause diseases like CF. CFTR stands for "Cystic Fibrosis Transmembrane Conductance Regulator". It is a protein that is made by the "CF gene". This protein helps make a salt channel that moves chloride in and out of cells in the body. If chloride cannot move normally, the cells do not work well and there is abnormal mucus that can build up in organs such as the lungs and pancreas. CF disease is caused when both of the CFTR genes have mutations. One mutation is from the mother and one from the father. A sweat test is done to measure how much chloride is in sweat. This test result is abnormal in CF and helps confirm the diagnosis.

Cystic fibrosis can cause a number of health problems. Usually CF causes problems with the pancreas and intestines that affect digestion. This leads to malabsorption of fat and protein resulting in nutrition problems and poor growth. CF causes thick mucus that gets stuck in the airways (breathing tubes) or sinuses. This mucus blocks the airways. It also makes a person more prone to lung and sinus infections. Over time this leads to lung damage and low lung function. People with CF can have serious and permanent lung problems. CF can also affect the reproductive tract causing men to be unable to get a woman pregnant (infertile) and women having a harder time getting pregnant.

People who have only one gene "mutation" usually do not have symptoms and are called 'carriers'. However, people with CRMS/CFTR Related Disorder also can have a CFTR mutation on one or both genes. It is not understood completely why some people have CRMS/CFTR Related Disorder but it is known that they can develop health problems that can be similar to those seen in CF disease. People with CRMS/CFTR Related Disorder have a sweat test result that is called "intermediate". This means it is higher than in most children but is not high enough to say he or she has cystic fibrosis. However, people with CRMS/CFTR Related Disorder are at higher risk of having problems that occur in cystic fibrosis. CRMS/CFTR Related Disorder can cause digestion problems. CRMS/CFTR Related Disorder can lead to lung and sinus disease. CRMS/CFTR Related Disorder can cause fertility problems.

We cannot predict the future health of your child's health if he or she has CRMS/CFTR Related Disorder. It is likely your child will remain healthy. However, your child could develop health problems that if found early can be treated. Promptly finding problems and treating them can help avoid poor health and lung damage.

It is important that your child have regular check-ups with a CF specialist so that any changes can be found as early as possible and treated. If your child has CRMS/CFTR Related Disorder, in addition to regular check-ups, see the doctor if your child:

- Is not gaining weight
- Has loose stools, bad gass, or constipation that lasts more than 2 weeks
- Has bad stomachaches often
- Has coughing or wheezing that lasts more than 2 weeks.