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My46 Trait Profile

Cystic fibrosis

Other Names: CFTR-related disorder, mucoviscidosis

Cystic fibrosis is a genetic condition that affects the lungs, pancreas and digestive (stomach and intestines) system. It is caused by mutations in the CFTR gene that makes the protein called cystic fibrosis transmembrane conductance regulator.

Characteristics of Cystic fibrosis

Cystic fibrosis (CF) is a common genetic condition that affects many body systems including the lungs (respiratory tract) and the body's ability to break down and use food. Individuals who have CF are likely to develop swelling (inflammation) and ongoing infection of the lining of the lungs' air passages. This leads to severe lung disease with airway damage, and scarring of the lungs (fibrosis). Many people who have CF have difficulty making the enzymes that help to break down food in their bodies (pancreatic insufficiency). This can cause problems with digestion that lead to diarrhea, poor growth, and weight loss. Individuals with CF can also have blockage of the passages that carry digestive fluid (bile) from the liver to the small intestine (biliary sludging or blockage).

Approximately 15%-20% of newborns with CF have a blockage in the intestine (ileus) caused by overly thick meconium (the earliest stools passed by a newborn). A minority of individuals with CF develop a form of diabetes called CF-related diabetes mellitus. More than 95% of males with CF are infertile as a result of azoospermia (lack of measurable sperm in the semen.) This is caused by differences in the structures that sperm pass through (Wolffian duct structures and vas deferens). Lung disease is the major cause of illness and death in CF. Intelligence is typically not affected by CF.

Diagnosis/Testing

Most people with CF have two changes or mutations in a gene called CFTR. This name is short for the "cystic fibrosis transmembrane conductance regulator" gene. The CFTR gene makes a protein that works in the walls of the body's cells. It helps a substance called chloride move in and out of the cells. If this is not working well, this causes problems with water flow in and out of the cells, and the mucus that is normally around the cells becomes thick and sticky. This leads to the lung, pancreas, and other symptoms of CF.

A diagnosis of CF can be made if a person has one or more of the CF symptoms described above, and at least one of the following test results:

a) Two CF-causing mutations in the CFTR gene. Gene testing is done by a few different test methods. Usually blood or spit (saliva) is tested. The chance for the test to find a person's CFTR gene mutations depends on the type of test and the person's ethnicity because some gene changes are very rare and some are more common in specific ethnicities.

b) Two sweat chloride tests that show a high level of sweat chloride (more than 60mEq/L). A sweat chloride test is a painless test that measures the level of salt in a person's sweat. This test should be done at a CF Foundation-accredited care center by a specific test method called quantitative pilocarpine iontophoresis.

c) Transepithelial nasal potential difference (NPD) measurements that are consistent with CF. The NPD test measures the voltage across the cells inside the nose.

Newborn screening for CF is performed in all of the states within the United States. This is done on a blood sample

from the baby. The Newborn Screening test for CF usually measures a substance called immunoreactive trypsinogen (IRT). Sometimes the Newborn screening test involves CFTR gene testing. It is important to know that screening tests typically do not confirm a diagnosis, they usually tell if a baby has a high or low chance to have CF.

Management/Surveillance

Management of CF often includes therapies to prevent or treat lung issues; pancreatic enzyme replacement; nutritional therapy; vitamin and mineral supplements; screening for liver disease; treatment for bile duct blockages; and diabetes screening or treatment. Newer therapies are being developed to help the cells make more CFTR protein or make abnormal CFTR protein work better. Each individual's management is based on his symptoms. Individuals with CF are vulnerable to germs that can cause serious infection. One of the best ways to keep from catching germs is through proper hand-washing. It is very important that individuals with CF have regular visits to a CF Foundation-accredited care center.

Mode of inheritance

CF is inherited in an autosomal recessive pattern. This means that an individual has to inherit two CFTR mutations (i.e., one from each parent) to be affected with CF. If both parents are carriers of a CFTR mutation, they have a 1 in 4 (25%) chance with each pregnancy of having a child with CF. Babies born in the United States are screened for CF by newborn screening.

Risk to family members

Parents of a child with CF are carriers of CF. If a sibling of a child with CF is unaffected, he/she has a 2 in 3 (or 66%) chance of being a carrier of CF.

Special considerations

More is being learned about the variability of CF. Some people have a milder form of CF referred to as "non-classic CF" with fewer symptoms and some people have a more significant form referred to as "classic CF". Genetic testing cannc always tell if a person will have milder form of CF or more significant medical issues from CFTR mutations.

The term "CFTR-related disorders" refers to conditions that are not clearly classic or non-classic CF, but are caused by changes in the CFTR gene. For instance, some males with CFTR gene mutations do not have any symptoms of CF other than infertility due to being born without the vas deferens (Congenital Absence of the Vas Deferens). The term "CFTR-related Metabolic Syndrome" (CRMS) was only recently described. CRMS describes individuals who have an elevated newborn screening IRT level, but additional testing cannot clearly confirm or exclude the diagnosis of CF.

Resources

The Cystic Fibrosis Foundation
http://www.cff.org
CF Living
http://www.cfliving.com
Cystic Fibrosis Canada
http://www.cysticfibrosis.ca
Genetics Home Reference: Cystic fibrosis
http://ghr.nlm.nih.gov/condition/cystic-fibrosis
Learn.Genetics: Cystic fibrosis
http://learn.genetics.utah.edu/content/disorders/whataregd/cf/
Medical Home Portal: Cystic fibrosis
http://www.medicalhomeportal.org/newborn/cystic-fibrosis

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