Kansas
Department of Health and Environment

Cystic Fibrosis
Information for Health Professionals

Mutations in the *CFTR* gene can alter the structure, function, or production of a cyclic adenosine-5'-monophosphate (AMP)--dependent transmembrane chloride channel protein that is critical for normal functioning of multiple organs. The organs and systems that are affected in CF include the lungs and upper respiratory tract, gastrointestinal tract, pancreas, liver, sweat glands, and genitourinary tract.

✓ Clinical Symptoms

The symptoms and severity of cystic fibrosis (CF) vary between individuals. At birth, most newborns appear healthy, but 15-20% of newborns with CF will have meconium ileus. Abnormal secretions produced by the pancreas gland result in malabsorption of nutrients causing diarrhea, vomiting, dehydration, abdominal distension, poor growth, poor weight gain, and abnormal stools in most children. Respiratory symptoms may not be present for years. Thick mucus secretion in the lungs will cause chronic coughing and wheezing. Individuals are highly susceptible to respiratory infections.

✓ Incidence

In the United States, CF occurs in 1:3,200 Caucasians, 1:9,200 Hispanics, 1:15,000 African Americans, and 1:30,000 Asians.

✓ Genetics of Cystic Fibrosis

Mutations in the CFTR gene cause cystic fibrosis. The CFTR gene provides instructions for making a channel that transports chloride ions in to and out of cells. The flow of chloride ions helps control the movement of water in tissues, which is necessary for the production of thin, freely flowing mucus.

Mutations in the CFTR gene disrupt the function of the chloride channels, preventing them from regulating the flow of chloride ions and water across cell membranes. As a result, cells that line the passageways of the lungs, pancreas, and other organs produce mucus that is unusually thick and sticky. This mucus clogs the airways and glands, causing the characteristic signs and symptoms of cystic fibrosis.

✓ Inheritance Patterns

Cystic fibrosis is inherited in an autosomal recessive pattern. Parents of a child diagnosed with cystic fibrosis are unaffected. These individuals are carriers of the condition and have one normal CFTR gene and one abnormal CFTR gene. Each pregnancy between carrier parents has a 1 in 4 chance of producing a child affected with CF, and 3 in 4 chances of producing an unaffected child. Parents who either have a child with CF or are carriers of a CF mutation should be referred to a medical geneticist or a genetic counselor for further discussion and testing.

✓ Treatment

Newborn screening for CF allows for earlier diagnosis and treatment. Studies have shown that newborns who receive treatment early have an improved nutritional status compared to individuals who were diagnosed later. Infants frequently require pancreatic enzyme supplements and water soluble forms of fat soluble vitamins. Supplemental feedings may be required in breastfed infants to achieve normal growth. Infants should be closely monitored for respiratory symptoms. Special treatments for draining sputum - including physical therapy for the chest, physical exercise, and aerosols - are also important. Dietary therapy, which emphasizes the replacement of deficient digestive enzymes, is also critical.

✓ Screening Methodology

Testing methodology used in newborn screening to detect Cystic Fibrosis is a two-tiered immunoreactive trypsinogen (IRT)/DNA assay. The CFTR DNA panel includes 60 common mutations. A positive newborn screen indicates an elevated immunoreactive trypsinogen level with one or two CFTR mutations.

✓ What to do After Receiving Presumptive Positive Cystic Fibrosis Screening Results

1) **Clinical Evaluation: Common findings include meconium ileus, failure to thrive, recurrent cough, wheezing, and chronic abdominal pain; however, patients are frequently asymptomatic.**
2) **All newborns with one or two CFTR mutations or highly elevated IRT (>170ng/mL) or history of meconium ileus or a positive family history of cystic fibrosis should have a sweat test done at a CF Foundation accredited laboratory.**
3) **An abnormal sweat test is diagnostic for cystic fibrosis.**
4) **Infants with a single mutation and normal initial sweat test should have a repeat sweat test at a CF Foundation accredited laboratory if they develop persistent respiratory or gastro-intestinal symptoms.**
5) **Call KS Newborn Screening Program at 785-291-3366 with questions about results.**
6) **Report Clinical Findings to Newborn Screening Program at 785-291-3366.**

✓ Confirmation of Diagnosis

Sweat testing at a CF Foundation accredited laboratory is required to diagnose or confirm CF. Further DNA testing may be necessary in some cases.

✓ Communication of Results to Parents

If a baby has a presumptive positive cystic fibrosis newborn screening result, additional testing needs to be performed to confirm a diagnosis. In accordance with Kansas Administrative Regulation 28-4-502, it is the responsibility of the attending physician or other birth attendant to obtain repeat specimens when needed to complete the screening process.

If a baby is diagnosed with cystic fibrosis, the following points should be conveyed to parents:

- ***The baby needs to be followed at a CF center.***
- ***Treatment is life-long. Infant does not need urgent treatment; they will receive advice about treatment from a specialist at the CF center.***
- ***Compliance with treatment is necessary for the best outcome.***
- ***Parents who have a child with cystic fibrosis have a 25% chance with each pregnancy of having another affected child.***
- ***Prenatal diagnosis by molecular genetic testing is available from laboratories offering custom prenatal genetic testing.***

For consultation, contact:

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