Cystic Fibrosis: \textit{CFTR} Gene Deletion/Duplication

\textbf{Test Code:} JL  
\textbf{Turnaround time:} 2 weeks  
\textbf{CPT Codes:} 81222 x1

\section*{Condition Description}

Cystic Fibrosis (CF) is a chronic genetic condition involving multiple organ systems \cite{1}. Classical CF primarily involves the respiratory and digestive systems, and may have a range of clinical severity. Pulmonary symptoms often include lower airway inflammation, chronic cough, chronic sinusitis, and recurrent infections. Digestive symptoms often include meconium ileus, pancreatic insufficiency resulting in malabsorption and/or failure to thrive, diabetes mellitus, and hepatobiliary disease. Congenital bilateral absence of the vas deferens (CBAVD) is seen in men without pulmonary or digestive symptoms of CF, and results in azoospermia \cite{2}. CBAVD is a significant cause of male infertility.

CF is caused by mutations in the cystic fibrosis transmembrane conductance regulator (\textit{CFTR}) gene. Individuals with mutations in the \textit{CFTR} gene may also present with milder or atypical symptoms such as pancreatitis or chronic sinusitis.

The incidence of CF is approximately 1 in 3200 live births among Caucasians and is inherited in an autosomal recessive pattern. The carrier frequency is estimated to be approximately 1 in 22-28 in the Caucasian population, 1 in 29 in the Ashkenazi Jewish population, 1 in 60-65 in the African American population, 1 in 46 in the Hispanic population and 1 in 90 in the Asian population.

Initial evaluation and screening of patients for \textit{CFTR} mutations is accomplished through a panel of 23 common mutations as recommended by the American College of Medical Genetics Subcommittee on Cystic Fibrosis \cite{3} and American College of Obstetrics and Gynecologists \cite{4}. The detection rate of this panel depends on the patient's ethnicity (refer to the Cystic Fibrosis Common Mutation Panel).

When the common mutation panel is negative and mutations to the \textit{CFTR} gene are suspected, sequencing of the entire gene is recommended to detect more rare mutations. Gene sequence analysis is available to test for mutations in the \textit{CFTR} gene (JL).

\begin{center}
\url{Click here} for the GeneReviews summary on this condition.
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Visit \url{www.ThinkGenetic.com} for patient-friendly information on cystic fibrosis.

\section*{References}

1. Moskowitz et al. \textit{CFTR}-related disorders (2005), \url{www.genetests.org}  
7. Chevalier-Porst (2005) Identification and Characterization of Three Large Deletions and a Deletion/Polymorphism in the \textit{CFTR} Gene. Hum Mut Mutation in Brief #806 Online  
8. \url{http://www.genet.sickkids.on.ca/}

\section*{Genes}

\textbf{CFTR}

\section*{Indications}

Testing is indicated for:

- Patients suspected to have a mutation to the \textit{CFTR} gene and who tested negative for mutation by the common mutation panel.
- Family members of an affected individual at risk to be carriers of CF.

\section*{Methodology}

DNA isolated from peripheral blood is hybridized to a CGH array to detect deletions and duplications. The targeted CGH array has overlapping probes which cover the entire genomic region.

Please note that a "backbone" of probes across the entire genome are included on the array for analytical and quality control purposes. Rarely, off-target copy number variants causative of disease may be identified that may or may not be related to the patient's phenotype. Only known pathogenic off-target copy number variants will be reported. Off-target copy number variants of unknown clinical significance will not be reported.

\section*{Detection}

Detection is limited to duplications and deletions. Array CGH will not detect point mutations or intronic mutations. Results of molecular analysis must be interpreted in the context of the patient's clinical phenotype.
Submit only 1 of the following specimen types

* Preferred specimen type: Whole Blood

**Type: Whole Blood**

Specimen Requirements:

In EDTA (purple top) tube:
- Infants (2 years): 3-5 ml
- Older Children & Adults: 5-10 ml

Specimen Collection and Shipping: Refrigerate until time of shipment. Ship sample within 5 days of collection at room temperature with overnight delivery.

**Type: Saliva**

Specimen Requirements:

Oragene™ Saliva Collection kit (available through EGL) used according to manufacturer instructions.

Specimen Collection and Shipping: Store sample at room temperature. Ship sample within 5 days of collection at room temperature with overnight delivery.

### Special Instructions

Completion of the cystic fibrosis common mutation panel should be completed PRIOR to CFTR gene sequence analysis.

### Related Tests

- CF common mutation panel (CF).
- Ashkenazi Jewish Carrier Panel is available to screen for the panel of 9 autosomal recessive conditions common in individuals of Ashkenazi Jewish background
- Custom diagnostic mutation analysis (KM) is available to family members if mutations are identified by sequencing.
- Prenatal testing is available for known familial mutations only. Please call the Laboratory Genetic Counselor before collecting a fetal sample.