**BRAF-related Disorders:** **BRAF Gene Sequencing**

**Test Code:** SBRAF  
**Turnaround time:** 4 weeks  
**CPT Codes:** 81406 x1

**Condition Description**

Germline mutations in the *BRAF* gene have been reported to be associated with cardiofaciocutaneous (CFC) syndrome. Somatic mutations in *BRAF* have also been reported at a high frequency in numerous cancers.

**CFC Syndrome**

Cardiofaciocutaneous  
(CFC) syndrome is characterized by features in three primary systems:  
cardiac, craniofacial, and ectodermal; however, other systems may be  
involved as well. Cardiac abnormalities can include pulmonic stenosis  
and other valve dysplasias, septal defects, hypertrophic cardiomyopathy,  
and rhythm disturbances. Individuals with CFC syndrome have a  
distinctive craniofacial appearance. Ectodermal features include skin  
findings, such as xerosis, hyperkeratosis, ichthyosis, keratosis  
plana,  
ulerythema oophorogenes, eczema, pigmented moles, palmoplantar  
hyperkeratosis;  
hair findings such as sparse, curly, fine or thick,  
woolly, or brittle hair, and possible absent eyelashes and eyebrows; and  
the nails may be dystrophic or fast growing. Cognitive delay (ranging  
from mild to severe) is seen in all affected individuals. Neoplasias  
have been reported in some individuals with CFC.

There are four genes known to be associated with CFC. Mutations in the *BRAF* gene account for ~75% of cases, *MAP2K1* and *MAP2K2* account for  
~25% of cases, and *KRAS* accounts for <2% of cases. CFC syndrome is inherited in an autosomal  
dominant manner; however, most cases of CFC syndrome arise  
de novo.

Click here for the GeneTests summary on CFC syndrome.

**Cancer**

Somatic mutations in *BRAF* have been reported at a high frequency in numerous cancers including  
melanoma, thyroid, colorectal, and ovarian. One mutation, p.V600E, which  
results in increased kinase activity, accounts for more than 90% of *BRAF* mutations identified in human cancer. The presence of the p.V600E *BRAF* mutation in microsatellite instability high (MSI-H) colorectal cancers  
provides evidence that the cancer is sporadic and not caused by Lynch  
syndrome.

Testing for the p.V600E *BRAF* mutation can be ordered by marking "Other test" and then test code KM next to it on the test requisition. Do this by writing "p.V600E BRAF, KM."

Please note that this test is for the *BRAF* (7q35) gene only.

**References:**

- Bettstetter, M. et al. Distinction of hereditary  
  nonpolyposis colorectal cancer and sporadic microsatellite-unstable  
  colorectal cancer through quantification of MLH1 methylation by real-time PCR. *Clin Cancer Res.* 2007; 13:3221-3228.  

**Genes**

*BRAF*

**Indications**

This test is indicated for:

- Confirmation of a clinical diagnosis of a CFC syndrome

**Methodology**

PCR amplification of 18 exons of the *BRAF* gene is performed on the patient's genomic DNA. Direct sequencing of amplification products is  
performed in both forward and reverse directions, using automated fluorescence dideoxy sequencing methods. The patient's gene sequences are  
than compared to a normal reference sequence. Sequence variations are classified as mutations, benign variants unrelated to disease, or variations  
of unknown clinical significance. Variants of unknown clinical significance may require further studies of the patient and/or family members. This  
assay does not interrogate the promoter region, deep intronic regions, other regulatory elements, or the remaining 11 exons, and does not detect  
large deletions.

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authorized in writing by an authorized EGL representative.
Detection

Clinical Sensitivity: *BRAF* mutations have been implicated in 75-80% of cases of CFC syndrome. Mutations in the promoter region and some mutations in the introns and other regulatory elements cannot be detected by this analysis. Large deletions will not be detected by this analysis. Results of molecular analysis should be interpreted in the context of the patient's biochemical phenotype.

Analytical Sensitivity: ~99%

**Specimen Requirements**

Submit only 1 of the following specimen types

* Preferred specimen type: Whole Blood

**Type: Whole Blood**

Specimen Requirements:

In EDTA (purple top) or ACD (yellow 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.

**Related Tests**

- Deletion/duplication analysis is available if sequencing is negative.
- Sequence and deletion/duplication analysis of the *KRAS, SOS1, RAF1, MAP2K1, MAP2K2* and *PTPN11* genes are available.
- Custom diagnostic mutation analysis (KM) is available to family members if mutations are identified by targeted mutation testing or sequencing analysis.
- Prenatal testing is available to couples who have had a previously affected child with an identified mutation. Please contact the laboratory genetic counselor to discuss appropriate testing prior to collecting a prenatal specimen.