Mucolipidosis Type IIIA: GNPTAB Gene Deletion/Duplication

**Test Code:** LK  
**Turnaround time:** 2 weeks  
**CPT Codes:** 81228 x1

### Condition Description
Mucolipidosis III A (ML III, pseudo-Hurler polydystrophy) is an autosomal recessive lysosomal storage disorder characterized by short stature, skeletal dysplasia, and mild mental retardation and survival up to adulthood.

Fibroblasts from ML III patients have numerous cytoplasmic inclusion bodies. The accumulation of material in the lysosomes results from the inability of the lysosomal enzymes to enter the lysosome for normal degradation. A biochemical marker signal is required for proper trafficking of the lysosomal enzymes, from the site of production in the endoplasmic reticulum to the lysosome itself. This marker was identified as a mannose-6-phosphate residue on the lysosomal enzyme that interacts with a specific receptor on the lysosomal membrane, which then triggers entry into the lysosome. The biochemical defect in ML III disease is due to the deficiency of the enzyme UDP-N-acetylglucosamine- N-acetylglucosamine-1-phosphotransferase (abbreviated GlcNAc phosphotransferase) involved in the addition of the mannose-6-phosphate residue. The genetic defect causing this disorder results in mislocalization of the lysosomal enzymes such that they are, in part, secreted from the cell rather than transported into the lysosomes. Many lysosomal enzymes have decreased intracellular activities but increased activities in the serum and urine. The electrophoretic patterns of a number of lysosomal enzymes also are altered in ML III fibroblasts. The disorder mucolipidosis II (ML II, I-cell disease) is clinically and biochemically very similar to ML III, although with more severe characteristics leading to death by 6 years of age. Lysosomal enzyme activities also are very low in fibroblasts and have abnormal electrophoretic patterns different from ML III.

Mutations to the GNPTAB gene cause deficiency of this enzyme. Diagnostic sequencing analysis of the GNPTAB gene coding region is available for Mucolipidosis III A patients and their at-risk relatives on a clinical basis.

For questions about testing for ML IIIA, call EGL Genetics at (470) 378-2200 or (855) 831-7447. For further clinical information about lysosomal storage diseases, including management and treatment, call the Emory Lysosomal Storage Disease Center at (404) 778-8565 or (800) 200-1524.

### References:

### Genes
**GNPTAB**

### Indications
- Confirmation of clinical diagnosis of ML IIIA disease
- Prenatal testing for known familial mutation(s).
- Assessment of carrier status in high risk family members known mutation analysis.

### 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.

### Detection
Detection is limited to duplications and deletions. Array CGH will not detect point mutations or intronic mutations. Results of molecular analysis must interpreted in the context of the patient's clinical and/or biochemical phenotype.

### Specimen Requirements
**Submit only 1 of the following specimen types**

**Type:** Whole Blood (EDTA)

**Specimen Requirements:**
- EDTA (Purple Top)
- Infants and Young Children (2 years of age to 10 years old): 3-5 ml
- Older Children & Adults: 5-10 ml
- Autopsy: 2-3 ml unclotted cord or cardiac blood

**Specimen Collection and Shipping:**
Ship sample at room temperature for receipt at EGL within 72 hours of collection. Do not freeze.

**Type:** DNA, Isolated

**Specimen Requirements:**
- Microtainer
- 3µg

Isolation using the Perkin Elmer™ Chemagen™ Automated Extraction method or Qiagen™ Puregene kit for DNA extraction is recommended.

**Specimen Collection and Shipping:**
- Refrigerate until time of shipment in 100 ng/µL in TE buffer.
- Ship sample at room temperature with overnight delivery.

**Special Instructions**

Submit copies of diagnostic biochemical test results with the sample. Sequence analysis is required before deletion/duplication analysis by targeted CGH array. If sequencing is performed outside EGL Genetics, please submit a copy of the sequencing report with the test requisition. Contact the laboratory if further information is needed.

**Related Tests**

- Known mutation analysis (Custom Diagnostics) is available to test family members.
- Prenatal testing is available for known familial mutations only. Please call the Laboratory Genetic Counselor for specific requirements for prenatal testing before collecting a fetal sample.