Neuronal Ceroid Lipofuscinosis (Batten Disease) Genetic Testing

The neuronal ceroid lipofuscinoses (NCLs) are a group of neurodegenerative, lysosomal storage disorders characterized by seizures, progressive cognitive and motor impairment, and vision loss. NCLs are relatively rare individually, but when combined affect approximately 2-4 of every 100,000 live births in the U.S. Ambry is committed to the NCL community through diagnostic testing, education, and support for advocacy groups.

Disease Information
All individuals with an NCL experience a progressive decline in cognition (dementia), accompanied by various motor function impairments. These often include spasticity, myoclonus in children, involuntary movements, and ataxia. Seizures are common and typically difficult to control. Progressive vision loss occurs for most, but not all, individuals with an NCL.

The NCLs are most prevalent in individuals with Scandinavian and/or Northern European ancestry, but occur worldwide. Most NCLs are autosomal recessive, though adult-onset disease can be either autosomal recessive or autosomal dominant.

Testing for NCL
There are 14 types of NCL that have significant clinical overlap; biochemical and genetic testing is often necessary to distinguish between them.

<table>
<thead>
<tr>
<th>NCL Type</th>
<th>Reported Age of Onset</th>
<th>Associated Gene</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLN1</td>
<td>Infantile: 6-24 months Late-Infantile: 3-7.5 years Adult: 15-50 years</td>
<td>PPT1</td>
</tr>
<tr>
<td>CLN2</td>
<td>Late-Infantile: 2-4 years Juvenile: 4-10 years</td>
<td>TPP1</td>
</tr>
<tr>
<td>CLN3</td>
<td>Juvenile: 4-10 years Adult: 15-50 years</td>
<td>CLN3</td>
</tr>
<tr>
<td>CLN4</td>
<td>Adult: 15-50 years</td>
<td>DNAJC5</td>
</tr>
<tr>
<td>CLN5</td>
<td>Late-Infantile: 4-7 years Adult: 15-50 years</td>
<td>CLN5</td>
</tr>
<tr>
<td>CLN6</td>
<td>Late-Infantile: 18 months - 8 years Adult: 15-50 years</td>
<td>CLN6</td>
</tr>
<tr>
<td>CLN7</td>
<td>Late-Infantile</td>
<td>MFSD8</td>
</tr>
<tr>
<td>CLN8</td>
<td>Late-Infantile: 3-7.5 years Northern Epilepsy: 5-10 years</td>
<td>CLN8</td>
</tr>
<tr>
<td>CLN9</td>
<td>Juvenile: 4-10 years</td>
<td>unknown</td>
</tr>
<tr>
<td>CLN10</td>
<td>Congenital: before or around birth Late-Infantile Adult: 15-50 years</td>
<td>CTSD</td>
</tr>
<tr>
<td>CLN11</td>
<td>Adult: 15-50 years</td>
<td>GRN</td>
</tr>
<tr>
<td>CLN12</td>
<td>Juvenile</td>
<td>ATP13A2</td>
</tr>
<tr>
<td>CLN13</td>
<td>Adult: 15-50 years</td>
<td>CTSF</td>
</tr>
<tr>
<td>CLN14</td>
<td>Infantile</td>
<td>KCTD7</td>
</tr>
</tbody>
</table>

Optimized Test Design
Our tests are created to maximize yield, minimize turnaround time, and control costs through step-wise testing when appropriate.

Insurance
We are contracted with the majority of health plans and Medicare. All out-of-network patients are treated as in-network to minimize out-of-pocket costs. Medicaid coverage varies by state and preverification is recommended.

Patient Protection Plan
Ambry’s billing policy is to preverify insurance coverage (with or without patient sample) for genetic testing. We will contact the patient after their sample is received, if their out-of-pocket cost is estimated to exceed $100. We are committed to working with you and your patients to make the genetic testing process as simple and cost-effective as possible, and our Billing Department is available to answer any questions your patient may have. Our Billing Department can be reached by phone at +1-949-900-5795 or billing@ambrygen.com.

Clinical Support
Board-certified physicians and genetic counselors are available to assist with test selection and result interpretation.

Customer Service
Responsive, knowledgeable representatives are always ready to answer your questions. We also offer easy-to-read result reports and complimentary sample submission kits to make the testing process smoother.

About Ambry Genetics
Ambry is a genetics-based healthcare company that is dedicated to open scientific exchange so we can work together to understand and treat all human disease faster.
Neuronal Ceroid Lipofuscinosis (Batten Disease) Genetic Testing

**NEWBORN** with microcephaly and epilepsy

**INFANT (<6 MONTHS)** with epilepsy and developmental plateau or regression

**SCHOOL AGE CHILD** with epilepsy plus visual loss and/or cognitive decline (dementia)

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**TEST CODE** | **TEST NAME** | **TURNAROUND TIME**
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7025 | NCLNext: 13 genes (gene sequencing and deletion/duplication) | 4-6 weeks
7054 | CLN3 gene sequencing and deletion/duplication | 2-4 weeks
7052 | CTSD gene sequencing and deletion/duplication | 2-4 weeks
7050 | PPT1 gene sequencing and deletion/duplication | 2-4 weeks
7051 | TPP1 gene sequencing and deletion/duplication | 2-4 weeks

**SPECIMEN REQUIREMENTS**

**Blood**: Collect 3-5cc from adult or 2cc minimum from child in purple top EDTA tube (preferred) or yellow top citric acetate tube. Store at 2-8°C and DO NOT FREEZE. Ship at room temp for 2-day delivery.

**Blood Spot**: Minimum of one complete spot ~0.5 inches in diameter on S&S 903 collection paper or similar. Store in sterile bag at room temperature. Ship at room temp for 2-day delivery.

**Saliva**: Fill 1 tube (2 tubes for pediatric patients) with saliva up to black line (1cc of saliva) in Oragene Self Collection container. Close tube; 1cc of buffer will mix with saliva for a total volume of 2cc. Store at room temperature in sterile bag. Shipment: Room temperature for two-day delivery.

**DNA**: 20 μg of DNA in TE (10mM Tris-Cl pH 8.0, 1mM EDTA); preferred 200 μl at ~100 ng/μl. DNA OD 260/280 ratio (preferred 1.7-1.9) and send agarose picture with high MW genomic DNA, if available. Store at -20°C. Ship frozen on dry ice (preferred) or ice for next-day delivery.

**Prenatal**: Prenatal testing is available. Please call an Ambry genetic counselor to discuss your case.

**NOTE**: Complete specimen requirements can be found at ambrygen.com/specimen-requirements.

**REFERENCES**