## Summary of the New Classification of the NCLs

### Soluble lysosomal enzyme deficiencies

<table>
<thead>
<tr>
<th>Gene Symbol</th>
<th>Protein</th>
<th>Diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTSD CLN10</td>
<td>Cathepsin D</td>
<td>CLN10 disease, congenital</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLN10 disease, late infantile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLN10 disease, juvenile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLN10 disease, adult</td>
</tr>
<tr>
<td>PPT1 CLN1</td>
<td>Palmitoyl Protein Thioesterase 1 (PPT1)</td>
<td>CLN1 disease, infantile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLN1 disease, late infantile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLN1 disease, juvenile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLN1 disease, adult</td>
</tr>
<tr>
<td>TPP1 CLN2</td>
<td>Tripeptidyl Peptidase 1 (TPP1)</td>
<td>CLN2 disease, late infantile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLN2 disease, juvenile</td>
</tr>
<tr>
<td>CTSF CLN13</td>
<td>Cathepsin F</td>
<td>CLN13 disease, adult Kufs type B</td>
</tr>
</tbody>
</table>

### Non-enzyme deficiencies

*functions of identified proteins tend to be poorly understood currently*

<table>
<thead>
<tr>
<th>Gene Symbol</th>
<th>Protein</th>
<th>Diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLN3</td>
<td>Transmembrane protein</td>
<td>CLN3 disease, juvenile</td>
</tr>
<tr>
<td>CLN5</td>
<td>Soluble; lysosomal</td>
<td>CLN5 disease, late infantile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLN5 disease, juvenile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLN5 disease, adult</td>
</tr>
<tr>
<td>CLN6</td>
<td>Transmembrane protein; ER</td>
<td>CLN6 disease, late infantile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLN6 disease, adult Kufs type A</td>
</tr>
<tr>
<td>MFSD8 CLN7</td>
<td>Major facilitator superfamily domain-containing protein 8 Transmembrane protein; Endolysosomal transporter</td>
<td>CLN7 disease, late infantile</td>
</tr>
<tr>
<td>CLN8</td>
<td>Transmembrane protein; ER, ER-Golgi intermediate complex</td>
<td>CLN8 disease, late infantile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLN8 disease, EPMR</td>
</tr>
</tbody>
</table>

Adapted by the BDFA from Dr Sara Mole and Dr Ruth Williams, NCL2012 Abstract Book (2012)
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<tr>
<th>Gene Symbol</th>
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</tr>
</thead>
<tbody>
<tr>
<td>DNAJC5/CLN4</td>
<td>Soluble cysteine string protein α</td>
<td>CLN4 disease, adult autosomal dominant</td>
</tr>
<tr>
<td>GRN/CLN11</td>
<td>Progranulin</td>
<td>CLN11 disease, adult Heterozygous mutations cause frontotemporal lobar dementia</td>
</tr>
<tr>
<td>ATP13A2/CLN12</td>
<td>P-type ATPase</td>
<td>CLN12 disease, juvenile Mutations also cause Kufor-Rakeb syndrome</td>
</tr>
<tr>
<td>KCTD7/CLN14</td>
<td>Potassium channel Tetramerization domain-containing protein 7</td>
<td>CLN14 disease, infantile Mutation also causes progressive myoclonic epilepsy-3</td>
</tr>
</tbody>
</table>

**Others**
*(those whose classification is uncertain because of incomplete diagnostic investigations; absence of a confirmed gene/mutation designation; or where the NCL is of a rare or minor mutation-specific phenotype)*

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<thead>
<tr>
<th>Gene Symbol</th>
<th>Protein</th>
<th>Diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>?</td>
<td>Mutations not yet defined in any gene</td>
<td>Congenital/infantile variants</td>
</tr>
<tr>
<td>?</td>
<td>Mutations not yet defined in any gene</td>
<td>Late infantile variants</td>
</tr>
<tr>
<td>?CLN9?</td>
<td>Mutations not yet defined in any gene</td>
<td>Juvenile variants</td>
</tr>
<tr>
<td>?</td>
<td>Mutations not yet defined in any gene</td>
<td>Late onset/adult variants including some adult Kufs type B</td>
</tr>
<tr>
<td>CLCN6</td>
<td>Mutations not yet found on both disease alleles in human disease</td>
<td>Chloride transport defect, adult onset</td>
</tr>
<tr>
<td>SGSH</td>
<td>Mutations usually cause MPSIIIA</td>
<td>Adult onset</td>
</tr>
</tbody>
</table>