### Supplementary Table 1. Diagnostic criteria for AHC, RDP, and CAPOS syndrome

<table>
<thead>
<tr>
<th>Diagnostic criteria for AHC</th>
<th>Diagnostic criteria for RDP</th>
<th>Features supportive of CAPOS syndrome</th>
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</thead>
<tbody>
<tr>
<td>1. Onset of symptoms before 18 months of age</td>
<td>1. Abrupt onset of dystonia with features of parkinsonism lasting from a few minutes to 30 days</td>
<td>1. Cerebellar ataxia</td>
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<tr>
<td>2. Paroxysmal disturbances including tonic or dystonic episodes, oculomotor abnormalities, and autonomic phenomena during hemiplegic episodes or in isolation</td>
<td>2. A clear rostrocaudal gradient of involvement: face &gt; arm &gt; leg</td>
<td>2. Areflexia</td>
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<tr>
<td>3. Repeated attacks of hemiplegia involving either side of the body</td>
<td>3. Prominent bulbar findings</td>
<td>3. Pes cavus (not universally present)</td>
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<tr>
<td>4. Episodes of bilateral hemiplegia or quadriplegia as generalization of a hemiplegic episode or bilateral throughout</td>
<td>4. Absence of response to an adequate trial of L-dopa therapy</td>
<td>4. Optic atrophy</td>
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<tr>
<td>5. Immediate disappearance of symptoms upon sleeping, which may resume after waking</td>
<td>5. Family history consistent with autosomal-dominant inheritance or de novo mutations</td>
<td>5. Sensorineural hearing loss</td>
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<tr>
<td>6. Evidence of developmental delay and neurological abnormalities including choreoathetosis, dystonia, or ataxia</td>
<td>6. Minimal improvement overall, but a small improvement in gait</td>
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#### Additional features supporting an AHC diagnosis

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<tr>
<td>1. Repeated attacks of monocular nystagmus</td>
<td>1. Minimal or no tremor at onset</td>
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<tr>
<td>2. Normal neuroimaging findings in the presence of fluctuating but persistent neurological deficits, especially paresis or dystonia</td>
<td>2. Occasional mild limb dystonia before the abrupt onset of dystonia</td>
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<tr>
<td>3. EEG recording during typical episodes of persistent motor dysfunction fails to show electrographic seizure activity</td>
<td>3. Triggering factors (e.g., running, childbirth, emotional stress, or alcoholic binges) associated with the abrupt onset of symptoms</td>
</tr>
<tr>
<td>4. Stepwise deterioration in motor, cognitive, or speech and language functions following a prolonged episode, in the setting of ongoing paroxysmal motor dystonia and dysarthria</td>
<td>4. Stabilization of symptoms within 1 month</td>
</tr>
<tr>
<td>5. Development of new fixed deficits with a rostrocaudal gradient of severity, resulting in persistent oromotor dystonia and dysarthria</td>
<td>5. Rare recurrence or abrupt worsening of symptoms later in life</td>
</tr>
<tr>
<td>6. Lack of family history (due to high prevalence of de novo mutations) or a family history consistent with dominant inheritance</td>
<td>6. Minimal improvement overall, but with small improvement in gait</td>
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#### Atypical feature

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<tr>
<td>1. Onset at older than 18 months</td>
<td>1. Onset at older than 60 years</td>
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<tr>
<td>2. Seizure onset after the appearance of motor symptoms</td>
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<tr>
<td>3. Rapid-onset ataxia with cerebellar atrophy</td>
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</tbody>
</table>

AHC: alternating hemiplegia of childhood, CAPOS: cerebellar ataxia, areflexia, pes cavus, optic atrophy, and sensorineural hearing loss, RDP: rapid-onset dystonia parkinsonism.