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CLN2 disease

Fact sheet

What is CLN2 disease?

CLN2 disease is a type of Batten disease. Batten disease is a group of genetic conditions which cause neurodegeneration.[1] CLN2 disease may be referred to as Late infantile Batten disease. Batten disease might also be known as Neuronal Ceroid Lipofuscinosis (NCL).

CLN2 disease is a type of childhood dementia which is autosomal recessive. Autosomal recessive means that individuals need two variants in both copies of the gene. In the case of CLN2 disease, individuals have a variant in each copy of the *TPP1* gene. The *TPP1* gene creates an enzyme called tripeptidyl peptidase 1 (TPP1). The TPP1 enzyme plays an important role for breaking down and recycling waste in the nervous system.

Classic CLN2 disease is the most common form of CLN2 disease. Atypical CLN2 disease often shows a slower disease course than classical CLN2 disease. The information in this guide pertains to classical CLN2 disease.

Speech and Language

The terms 'speech' and 'language' are often used interchangeably; yet, they are categorised differently by a speech pathologist, with has implications for therapy:

Speech is focused on speech sounds. This includes sound accuracy, articulation, voicing, resonance (e.g., nasality), and prosody (e.g., stress and rhythm).

Language involves the understanding and use of words (vocabulary) and sentences (grammar).

Many individuals with CLN2 disease will receive enzyme replacement therapy (ERT) through a port in their head or in their chest. ERT helps replace the missing TPP1 enzyme, which slows disease progression but does not cure CLN2 disease.[2]

What are the associated health and medical conditions seen in CLN2 disease?

- Epilepsy: individuals experience seizures which can become harder to control with medication.[1,2,4]
- Vision: individuals with CLN2 disease gradually lose their vision.[1,2,4]
- Motor disorders: many individuals seek support from occupational and physiotherapists. Individuals lose motor skills and require assistance to move around (e.g., a wheelchair).[1,2,4]
- Feeding difficulties: individuals often requiring enteral feeding (e.g., a G-tube) in the later disease stages.[1,4]
- Intellectual disability: individuals experience cognitive decline.[1,2,4]
- Sleep disturbances and behavioural difficulties.[1,4]

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What are the initial speech and language features in children with CLN2 disease?

Many individuals with CLN2 disease will say their first words at an age like that seen in typical development (12 months).[3,4] However, individuals often exhibit delayed milestones when learning to combine words to create sentences. Some individuals may never learn to combine words to create sentences. Most children with CLN2 disease will exhibit speech and language 'delay' before they receive a genetic diagnosis of CLN2 disease.[3,4]

How do speech and language features change over time in children with CLN2 disease?

As the disease progresses, individuals experience changes in speech and language skills. Speech changes include speech becoming more difficult to understand due to a neuromuscular speech disorder called dysarthria. Language changes include losing symbolic communication skills, such as using words and gestures to commmunicate.[4]

Individuals with CLN2 disease will usually end up losing all speech. Consequently, individuals may need an alternate way to communicate. Alternate ways to communicate are known as augmentative and alternative communication (AAC). AAC can include body movement, facial expression, on-body sign language, touch, and non-electronic (low-tech) and electronic (high-tech) communication aids.[4]

Children who have early access to ERT will likely exhibit a different disease course, including different speech, language and AAC support needs, to children with later access to ERT. For example, children who had early access to ERT may present with slowed speech and language regression than children with later access to ERT.[4]

How can speech pathologists/therapists support children with CLN2 disease?

There is no research on speech and language interventions that are specifically designed for individuals with CLN2 disease. At present, speech pathologists should take an individualised approach to both assessment and intervention, ensuring that therapies are tailored to and optimised for each child.

Due to the progressive nature of CLN2 disease, AAC should be implemented as early as possible alongside maintaining current speech and language skills for as long as possible. Due to the progressive loss of vision and motor skills, individuals may need to access communication aids via 'auditory partner-assisted scanning'. Auditory partner-assisted scanning refers to a communication partner reading the vocabulary options via the communication aid out loud, and the person with CLN2 disease indicating a 'yes' or a 'no' (e.g., via vocalising, gesture, body movement) if they want this vocabulary to be selected.[4,5]

To support families as communication changes overtime, caregivers and support people around the child should be provided with communication partner training.[6] Communication partner training may include strategies such as using simple language, breaking down instructions and tasks, using reminders and cues, providing choices, and using active listening strategies. Likewise, environmental supports should be considered to support an individual's understanding (receptive language), reduce disorientation, and support social connection with others.[7] Environmental supports should also consider vision impairment as a core feature of CLN2 disease. For instance, using auditory cues (e.g., songs and sounds) to communicate changes to routine, rather than visual cues.

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Assessment/evaluation

Important domains for a speech pathology assessment include:

- Speech production skills: to evaluate for specific speech diagnoses (e.g., dysarthria)
- Expressive, receptive and pragmatic language skills
- Feeding and swallowing abilities
- Augmentative and alternative communication (AAC), e.g., communication aids
- Assessment of appropriate environmental supports and practical communication needs of the child and their support people

The types of assessment tools used will vary depending on the child's individual profile and developmental age. Assessment may be required at an initial diagnosis and throughout childhood and adolescence. The goal of assessment will be to understand the nature and severity of speech and language challenges, then make recommendations for appropriate therapies. Speech and language therapies should be tailored to an individual's communication support needs and consider the progressive nature of the disease.

Further information and support:

- For more information on speech and language research in CLN2 disease: Plain Language Summary
- More information on dysarthria: Dysarthria Fact Sheet
- More information on AAC: AAC Fact Sheet
- Batten disease support groups: https://bdsraaustralia.org/ https://bdsrafoundation.org/ http://www.bdfa-uk.org.uk/ https://canadiancln2.org/ https://www.battendisease.ca/

References:

1. Mole, S. E., Schulz, A., Badoe, E., Berkovic, S. F., de Los Reyes, E. C., Dulz, S., ... & Williams, R. E. (2021). Guidelines on the diagnosis, clinical assessments, treatment and management for CLN2 disease patients. *Orphanet journal of rare diseases*, *16*, 1-19.
2. Schulz, A., Ajayi, T., Specchio, N., de Los Reyes, E., Gissen, P., Ballon, D., ... & Kohlschütter, A. (2018). Study of intraventricular cerliponase alfa for CLN2 disease. *New England Journal of Medicine*, *378*(20), 1898-1907.
3. Nickel, M., Gissen, P., Greenaway, R., Cappelletti, S., Hamborg, C., Ragni, B., ... & Specchio, N. (2023). Language Delay in Patients with CLN2 Disease: Could It Support Earlier Diagnosis?. *Neuropediatrics*, *54*(06), 402-406.
4. Morison, L. D., Whiteman, I. T., Vogel, A. P., Tilbrook, L., Fahey, M. C., Braden, R., Bredebusch, J., Hildebrand, M. S., Scheffer, I. E., & Morgan, A. T. (2025). Speech, Language and Non-verbal Communication in CLN2 and CLN3 Batten Disease. *Journal of inherited metabolic disease*, *48*(1), e12838. https://doi.org/10.1002/jimd.12838
5. Burkhart, L. J., & Porter, G. (2006, December). Partner-assisted communication strategies for children who face multiple challenges. In *Comunicación presentada en el Congreso de la ISAAC: Düsseldorf, Germany*.
6. Folder, N., Power, E., Rietdijk, R., Christensen, I., Togher, L., & Parker, D. (2024). The effectiveness and characteristics of communication partner training programs for families of people with dementia: A systematic review. *The Gerontologist*, *64*(4), gnad095.
7. de Azevedo, M. C. D., Charchat-Fichman, H., & Damazio, V. M. M. (2021). Environmental interventions to support orientation and social engagement of people with Alzheimer's disease. *Dementia & neuropsychologia*, *15*(4), 510–523. https://doi.org/10.1590/1980-57642021dn15-040012

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