UNIQUE

UNDERSTANDING GENES & CHROMOSOMES

17p11.2 and 17p12 duplications

Potocki-Lupski syndrome (PTLS)
Charcot-Marie-Tooth disease type 1A (CMT1A)
Yuan-Harel-Lupski syndrome (YUHAL syndrome)

rarechromo.org

This guide is designed to help families and healthcare professionals looking after people with PTLS, CMT1A and YUHAL syndrome. It contains information about the causes, the ways in which they can affect people and suggestions about the help and management that can benefit people with these conditions.

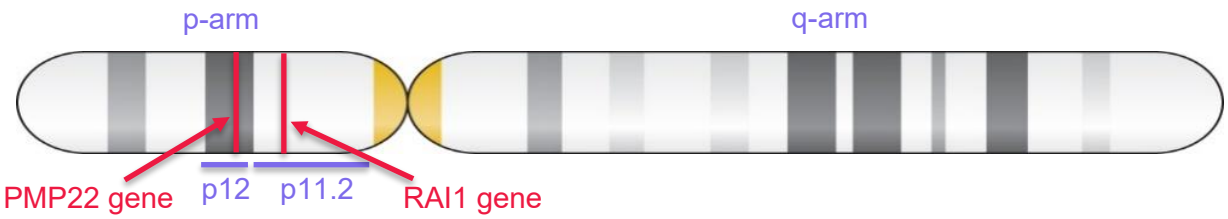
17p duplications

A 17p duplication is caused by the gain of a small but variable amount of genetic material in one of our 46 chromosomes – chromosome 17. For typical development, chromosomes should contain the expected amount of genetic material. A duplication involving chromosome 17 can therefore affect health, development and intellectual abilities. As is common with genetic conditions, each person can be affected differently - even among affected members within the same family.

See the **Chromosomes, genes and DNA** section later in this guide to learn more about the genetics of 17p duplications.

Chromosome 17

There are three main genetic conditions associated with duplications involving a particular region of chromosome 17, called 17p11.2 to 17p12, depending on exactly which part of the region is duplicated:



- When a duplication occurs in the 17p11.2 region and includes a gene called **RAI1** (Retinoic Induced Acid 1), a person will have **Potocki-Lupski syndrome (PTLS)** (also called **17p11.2 duplication syndrome**) (Potocki 2007; Zhang 2010; Carter 2013; Potocki 2017). Having an extra copy of the RAI1 gene affects how the body and brain develop (Lee 2013; Potocki 2017)
- When a duplication occurs in the 17p12 region and includes a gene called **PMP22** (Peripheral Myelin Protein 22), a person will have **Charcot-Marie-Tooth disease type 1A (CMT1A)** (Bi 2003; Zhang 2010; Harel 2014; Salpietro 2018; Tao 2019). Having an extra copy of the PMP22 gene means the protective covering around nerves (myelin) does not form or function properly, causing nerve signals to travel more slowly. This leads to muscle weakness, balance problems and sensory changes (Weterman 2010; Kim 2015; Morena 2019; Tao 2019; Pantera 2020; Boutary 2021; Capodivento 2024)
- When a duplication includes both the 17p11.2 and 17p12 regions and involves both the **RAI1** and **PMP22** genes, a person will have **Yuan-Harel-Lupski syndrome (YUHAL)** and experience a combination of the features of both PTLS and CMT1A (Yuan 2015; Alberto Mendez-Rosado 2017)

Importantly, people can have duplications involving the 17p11.2 and 17p12 region that do not include the RAI1 or PMP22 genes and they will therefore not have PTLS, CMT1A or YUHAL syndrome. This guide only covers PTLS, CMT1A and YUHAL syndrome and does not cover duplications in the 17p11.2 to 17p12 region that do not include RAI1 and PMP22.

How common are PTLS, CMT1A and YUHAL syndrome?

PTLS is very rare, affecting about 1 in every 20,000 to 25,000 live births (Potocki 2007; Popowski 2012; Shuib 2017; Bissell 2018; Ciaccio 2020). Unique has 94 members with PTLS who do not have any other genetic diagnoses (Unique 2026).

Charcot-Marie-Tooth (CMT) is a group of genetic conditions that damage the peripheral nerves and is the most common inherited nerve disorder, affecting roughly 1 in 2,500 people (Patitucci 2005; Tao 2019; Naggapa 2020). About 60 to 70% of people with CMT have Type 1A (CMT1A). Unique has 19 members with CMT1A who do not have any other genetic diagnoses (Unique 2026).

YUHAL syndrome is extremely rare. Its exact frequency is unknown, but more than 20 people with the condition have been described in medical research (MedlinePlus 2018). Unique has eight members with YUHAL syndrome who do not have any other genetic diagnoses (Unique 2026).

What features and symptoms do people with PTLS, CMT1A and YUHAL syndrome have?

As is common with many genetic conditions, children and adults with PTLS, CMT1A and YUHAL syndrome can have a range of symptoms. As more children are diagnosed and information is shared, the range of symptoms, features, abilities, difficulties and the likelihood of a child or adult having these features will become clearer.

Common features

Most children with PTLS have:

- Babies may grow more slowly before and after birth, leading to lower-than-average weight and height
- Feeding difficulties are common
- Constipation can sometimes be seen
- Low muscle tone (hypotonia) is often seen in babies
- Motor milestones, such as sitting, crawling and walking, may be delayed
- Some children may be clumsy or have difficulty with coordination
- Speech and language skills may develop more slowly
- Majority of children have mild to moderate learning (intellectual) disabilities
- Upper respiratory/ear infections, especially in the childhood, are frequent
- Some children may be very active, easily distracted or impulsive
- Repetitive behaviours or other autistic-like features commonly appear
- Some children may have mildly different facial features
- Heart conditions can sometimes be present
- Some children may experience sleep issues, including sleep apnoea

Other possible features include:

- Differences in hearing and vision
- Breathing and respiratory anomalies
- Differences in the way the hands and feet look
- Abnormal spinal curvature
- Seizures (epilepsy) in small percent of children, with varying types and severity
- Susceptibility to kidney or urinary tract conditions
- Hormonal problems such as thyroid problems are occasionally seen
- Occasional changes in the brain, where minor structural or functional anomalies may be seen, although most brain scans are typical

Most children with CMT1A have:

- For most children, learning, development and growth are unaffected
- Muscle weakness may develop over time
- Feet may have differences, such as high arches (pes cavus) or curled toes (hammer toes)
- Walking may be unusual or unsteady
- Some children may trip or get tired more easily when walking
- Hands and feet may sometimes feel numb or tingly
- Some children may notice tremors or muscle cramps

Other possible features include:

- Joint stiffness or reduced flexibility
- Excessive sweating, particularly of the hands and feet
- Mild hearing difficulties in some individuals
- Rare breathing or sleep-related concerns

Most children with YUHAL syndrome have:

- YUHAL syndrome happens when a person has extra copies of both the RAI1 and PMP22 genes, so they are expected to have a combination of the features of PTLS and CMT1A
- Children with YUHAL syndrome may be more likely to develop nerve and muscle problems earlier than they would if they only had CMT1A

Other possible features include:

- Anomalies of the genitals

Pregnancy and Birth

For most families affected by PTLS, CMT1A or YUHAL syndrome, pregnancy and birth are straightforward. Prenatal ultrasounds often raise no concerns, so these duplications are rarely detected before birth unless genetic testing is done for another reason. In most cases, the genetic change is only identified after their baby is born.

Among Unique families with a child who has PTLS, most reported no major concerns during pregnancy. A small number noticed slower growth in the womb, reduced fetal movement or unusual measurements including weight. Most babies were born at full term. Reported birth weights ranged from 1.27 to 3.28 kilograms (2 lb 13 oz to 7 lb 3 oz) (Unique 2026).

In medical literature, PTLS has sometimes been detected before birth using advanced genetic testing, even in pregnancies that did not seem high-risk (Popowski 2012). In other cases, routine ultrasounds have shown unusual features, such as heart anomalies (Yusupov 2011; Sanchez-Valle 2012; Bravo 2013), clenched fists (Yusupov 2011), small jaw (micrognathia) (Yusupov 2011), growth restriction in the womb (IUGR) (Yusupov 2011; Soler-Alfonso 2011) or unusual positioning of organs (Popowski 2012). Rarely, brain or lung anomalies have also been seen, though these are not typical for PTLS (Popowski 2012). Despite these findings, most babies are typically carried to full term and are born within the expected range for height and weight, though about 1 in 10 may be smaller than expected at birth (Soler-Alfonso 2011).

For families affected by CMT1A, most pregnancies and births are unremarkable, with no unusual complications. This genetic change mainly affects the nerves in the arms and legs and usually does not cause any problems at birth (Bird 2025). If there is a known family history of CMT1A, prenatal testing is possible. Otherwise, CMT1A is rarely identified before or at birth.

For pregnancies affected by YUHAL syndrome, most pregnancies have no complications but there are a few reports that describe babies with differences affecting the heart, kidneys or brain that may sometimes be noticed before birth (Yuan 2015, Unique). Around a quarter of Unique families have reported reduced fetal movement or slower growth during pregnancy and in one case, an ultrasound showed an echogenic bowel. However, most diagnoses are made after delivery.

> ***Left foot appeared different on scan. Born via ventouse as she was back-to-back." – PTLS family***

"The pregnancy was not bad. There was a period when I was given medication to tone the uterus and I visited the day hospital to get drips with the drug magnesia. No [anomalies] were detected on the ultrasound…. My daughter was born two weeks ahead of schedule. The labour was natural and quick (I lay down on a chair at 1:25 pm and gave birth at 1:55 pm) … Doctors immediately showed me that my baby's left leg was significantly turned inward. Based on a cardiac ultrasound, they diagnosed a small hole in the heart (patent foramen ovale, PFO). They also diagnosed yellowing of the skin and eyes (jaundice) at the time and the baby was placed under a special lamp. On the fourth day after birth, doctors recorded a sharp rise in my daughter's temperature and noted seizures. She was given medication (Sibazon) to stop the seizure…. My daughter was weak. she didn't breastfeed and she took a very long time to bottle-feed. She gained very little weight." – PTLS family

"Growth slowed at 36 weeks' gestation." – PTLS family

"[She] was born with undiagnosed heart anomaly where the two main blood vessels leaving the heart are switched around (transposition of the great arteries, TGA)." – CMT1A family

"In the last trimester, the baby gained weight more slowly than recommended and the doctor sent my wife to the ward where she was kept until delivery." – YUHAL syndrome family

"Full-term pregnancy. Ultrasound at 20 weeks showed the fluid spaces in the brain (ventricles) were 'the upper limits of normal'. She did not move very much in utero compared to my previous pregnancy with a typically developed baby. Very fast labour and delivery. In ICU for the first few days, as she had a low temperature and low blood sugar. Difficulties feeding, so she was tube-fed during that time. Born with legs turned inward (bilateral talipes, "clubfoot")." – YUHAL syndrome family

Pregnancy in people with CMT1A

Some studies involving animals suggest that progesterone levels, which can be raised during pregnancy, may worsen CMT1A symptoms for those who are affected (Sereda 2003; Itani 2020). Additionally, studies show that pregnant women with CMT1A have a higher risk of complications such as unusual positioning of the fetus, postpartum bleeding and needing emergency interventions during delivery. Regular prenatal checkups are recommended. It is also highlighted that other factors, like certain medications or co-existing neuropathic diseases, can make symptoms worse (Naggapa 2020).

New-born babies

During the newborn period and early infancy, many families of children with PTLS and YUHAL syndrome may become concerned because of differences in feeding and growth.

For babies with PTLS, one of the most common challenges is low muscle tone, also called hypotonia. This can make feeding tiring and difficult for a baby (Soler-Alfonso 2011; Motil 2011; Ercan-Sencicek 2012; Magoulas 2013). Infants may have trouble coordinating sucking and swallowing, take a long time to finish feeds or appear to find the process of swallowing difficult (a problem called oropharyngeal dysphagia) (Soler-Alfonso 2010). As a result, weight gain can be slower than expected and some babies may be diagnosed with “failure to thrive.” About three-quarters of Unique babies required extra medical support, such as feeding therapy or, in more severe cases, temporary tube feeding (Unique 2026). According to published studies, some infants gradually learn to breastfeed, adapt to feeding and grow, though ongoing feeding challenges and slower weight gain are common (Soler-Alfonso 2011; Ercan-Sencicek 2012; Magoulas 2013).

Unique families also report digestive problems such as reflux, constipation or poor appetite (Unique 2026). Less commonly, babies may have a heart condition(s) or brief pauses in breathing (apnoea), sometimes needing supplemental oxygen (Unique 2026). In medical literature, some newborns require short stays in intensive care due to low blood sugar (hypoglycaemia) or breathing difficulties (Magoulas 2013; Shuib 2017). Heart conditions identified after birth may need careful monitoring or surgical repair (Sanchez-Valle 2012) and occasionally surgery is required for other features, such as anomalies affecting the feet (Magoulas 2013).

For babies with CMT1A, the newborn period is often described in medical literature as “typical”, with few obvious concerns at birth (van Paassen 2014). The nerve changes that cause the condition usually affect walking and balance later in childhood rather than feeding difficulties in infancy. That said, some Unique families have reported early feeding challenges in their babies, such as difficulty latching or sucking, trouble swallowing, reflux, constipation or slow weight gain. Several Unique members noted that their child appeared unusually calm or sleepy and one child was diagnosed with jaundice (Unique 2026).

Babies with YUHAL syndrome often have more noticeable challenges early on, like those experienced by babies with PTLS. These infants frequently have low muscle tone, significant feeding difficulties and poor weight gain immediately following birth (Yuan 2015). Nearly all Unique families report their babies struggling with feeding and later being diagnosed with failure to thrive. Digestive issues like reflux, constipation and poor appetite are also common among Unique families and about half of these babies appeared unusually calm or sleepy. One child was also diagnosed with jaundice (Unique 2026).

Overall, across PTLS, CMT1A and YUHAL syndrome, families often share similar early experiences. Feeding can feel harder than expected, babies may be unusually sleepy or calm, gain weight slowly or need extra medical support in the early months. These challenges are not caused by anything parents are doing wrong. Early recognition, careful monitoring of growth and supportive care can make a meaningful difference and help babies grow and thrive.

"He was crying, we thought he wanted more milk… He was very tiny." – PTLS family

"She was only 12 lbs at a year old. Luckily, she had good general health and I placed her on solids earlier which did help. She took to solids quickly and really enjoyed her food.
We were always at some sort of appointment: eye specialists, physiotherapy, seeing her consultant, scans (head and back), health visitor turning up unannounced (they didn't think I was feeding her!)." – PTLS family

"As a newborn he had difficulties latching onto the breast. There were no problems with switching to the bottle." – PTLS family

"[He] was diagnosed with failure to thrive. Had several sessions with a lactation consultant to try to get him to latch on properly. Eventually, we got there." – PTLS family

"Born with left foot turned inwards (talipes) and struggled to latch, feed and maintain weight." – PTLS family

"[At] age 1, he weighed 17 lbs." – PTLS family

"Her birth weight was good, but within a couple of months, there was concern regarding her failure to thrive. She struggled to breastfeed. It took ages to give her a bottle of milk and usually shortly afterwards she would projectile vomit it." – PTLS family

"My daughter gained very little weight. She also ate badly. She had to be weighed after each feeding. She weighed a little less than 7 kg at one year." – PTLS family

"Turned blue at 2 weeks of age. Urinary tract infection (UTI) at 1 month old. 102 to 104°F fevers every 6 weeks. Possible twisted bowels at 4 months. Difficulty gaining weight due to throwing up." – PTLS family

"Slept a lot. Had to wake her to feed. Didn't gain weight, so had to top her up with a bottle." – PTLS family

"I was breastfeeding, but he had a weak suck. I used a breast pump for 17 months." – PTLS family

"[She] was not feeding properly and was always bringing feeds up. Was put on specialist milk. When she was a baby at 16 months old, she looked like a 6-month-old." – CMT1A family

"She had lots of trouble latching on and it took a long time to feed her. She was exhausted from sucking, so was falling asleep during breastfeeding. After seeking help at a mother and baby clinic, it was recommended I try bottle feeding. Unfortunately, it wasn't that much better. No one told me about fast-flowing teats or any other equipment that could help, so we just battled on. She was put on medication (Duphalac) to help with reflux and constipation. At a routine baby weighing appointment, I was told rather abruptly that she was a failure to thrive. I had never heard the term, so it was rather upsetting! It was also suggested that she start on solids quite early to help her put on weight. She could only swallow if everything was covered in yoghurt." – YUHAL syndrome family

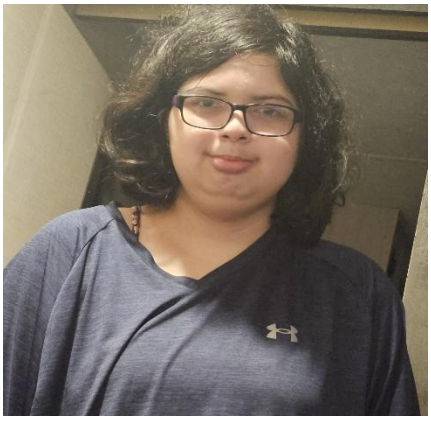
Appearance

Certain facial features are found more often in children with PTLS, CMT1A and YUHAL syndrome than in other children. These features mean that you may see unexpected similarities between your child and others with PTLS, CMT1A or YUHAL syndrome.

Common characteristic features associated with both PTLS and YUHAL syndrome include a broad or prominent forehead; a long, narrow or slightly triangular-shaped face; eyes that may slant slightly up or down; a broad, narrow or flattened nasal bridge; a thin upper lip; and ears that may be set lower or shaped differently (Potocki 2007; Doco-Fenzy 2008; Soler-Alfonso 2011; Sanchez-Valle 2011; Magoulas 2013; Carter 2013; Neira-Fresneda 2015; Yuan 2015; Alberto Mendez-Rosado 2017; Kaplan 2019; Lee 2025; Unique 2026). Some children with these conditions have also been described as having a smaller or larger head size than average (Yuan 2015; Lee 2025; Unique 2026).

Features more commonly described in individuals with PTLS include a smaller lower jaw and a shorter space between the nose and upper lip (philtrum) (Potocki 2007; Soler-Alfonso 2011; Sanchez-Valle 2011; Magoulas 2013; Carter 2013; Neira-Fresneda 2015; Kaplan 2019; Unique 2026).

Features more specifically reported in people with YUHAL syndrome include upward-tilted nostrils, a slightly underdeveloped midface, a broad mouth, horizontal or joined eyebrows, long eyelashes, a pointed chin and in some, a narrow forehead with a low hairline (Doco-Fenzy 2008; Yuan 2015; Alberto Mendez-Rosado 2017; Lee 2025; Unique 2026).



CMT1A mainly affects the nerves and muscles, most children do not have distinctive facial features (Bird 2025). Some families have reported subtle differences such as a slightly smaller head size, a broad nasal bridge, widely spaced eyes and a thin upper lip (Unique 2026).

Overall, facial differences in children with PTLS, CMT1A and YUHAL syndrome are generally subtle and any variations in facial features are often small and easy to miss.

> ***"She has classic Potocki-Lupski syndrome facial features: Elfin face shape and a broader nose." – PTLS family***

"No one looking at him would know that he had a disability." – PTLS family

"At a young age, my daughter was given [a diagnosis of] a slightly small head (microcephaly). Now she has a typical head circumference, but small facial features." – PTLS family

"She has facial symmetry. She was told that her face is identical to the other side of her face and that this was rare." – CMT1A family

Development

Gross and fine motor skills

Developmental delay is a common feature in children with PTLS and YUHAL syndrome, ranging from mild to severe. Milestones such as rolling, sitting, crawling, walking, using cutlery, managing zips and buttons and toilet training are often delayed, though some children reach these skills at typical ages. Toilet training can be a particular challenge for many families. While some children achieve daytime continence within the typical age range, others may require additional support and night-time continence can remain challenging for many years. Families may benefit from practical advice and resources from organisations such as **ERIC**, The Children's Bowel and Bladder Charity, which provides guidance on toilet training, continence and bladder and bowel support.

In terms of motor ability, low muscle tone (hypotonia) and very flexible (hypermobile) joints are frequent, sometimes affecting mobility or causing gait differences (ataxia). For some, independent walking may not be achieved, while others require early interventions such as physiotherapy (PT), occupational therapy (OT), orthotics (insoles, braces, splints, callipers) or walking aids. Families consistently report mild to moderate delays, with abilities varying widely from borderline to more pronounced impairments (Pratico 2018; Potocki 2017; Ciaccio 2020; Unique 2026).

Children with PTLS typically learn to walk between 18 months and five years, averaging around two and a half years. Earlier motor skills, including rolling, sitting and crawling, may also be delayed and some children scoot rather than crawl (Unique 2026). Medical literature reflects this range: one child began walking at two years but required help on stairs (Shuib 2017), while another rolled at six months, sat at 11 months and walked at 18 months (Sanchez-Valle 2011).

In contrast, children with CMT1A generally reach early milestones as expected, but walking often begins after 15 months. Nerve-related issues may appear before age ten (Bird 2025; Yuan 2015) and weakness typically progresses in the legs, affecting calves, knees and thighs. Children may require wheelchairs or walking aids. Low muscle tone, tiptoe walking, tight leg muscles and coordination challenges are common, with supportive footwear or orthotics recommended for mobility (Unique 2026).

Motor development in children with YUHAL syndrome can be more delayed, with rolling typically at four to six months, sitting between six and 12 months (sometimes up to 19 months) and crawling often late or replaced by bottom-scooting. Walking may be delayed until 18 months to six years and is influenced by hypotonia, tiptoe walking, gait difficulties and hypermobile joints. Many children require orthotics or walking aids (Yuan 2015; Unique 2026).

Fine motor skills, such as using hands and fingers for toys, cups, zips, buttons or writing, are often slower to develop across PTLS, CMT1A and YUHAL syndrome. Hypermobile joints can make tasks like using scissors or controlling a pen, particularly challenging. Occupational therapy and adaptive tools like special cups, utensils or touch-screen devices can support independence. Toilet training and personal care often remain delayed and supportive interventions, including PT, OT, orthotics and adaptive equipment, can help maintain mobility and daily living skills (van Paassen 2014; Yuan 2015; Potocki 2017; Ciaccio 2020; Unique 2026).

Early physiotherapy is beneficial for all three conditions and activities such as swimming, horse riding or adapted sports can enhance strength, coordination and confidence. Children enjoy a wide variety of physical activities, including walking, cycling, mountain biking, skiing, snowshoeing, climbing, football and daily exercise routines. Outdoor activities such as wildlife walks, water play and nature time are often calming and regulating (Unique 2026). Due to the possibility of heart conditions in children with a 17p duplication, it is advisable for these children to have a cardiac examination before undertaking any strenuous physical activity (see the **Heart Conditions** section later in this guide for more information) (Paskulin 2008; Roos 2009; Unique).

Unique publishes a separate guide to Therapies

"[He] enjoys physical activity. He was allowed to join the high school football (soccer) team and this really helped him meet other kids and have fun… He enjoys Lego, skiing, cross-country skiing, biking, snowshoeing and going to the pub with his dad [26 years old]." – PTLS family

"All her development is severely delayed. She didn't crawl but bottom-shuffled instead from the age of 18 months. At three years, she used leg splints to aid her walking. She used these for just over a year and then was able to walk unaided as long as she wore supportive (Piedro) boots." – PTLS family

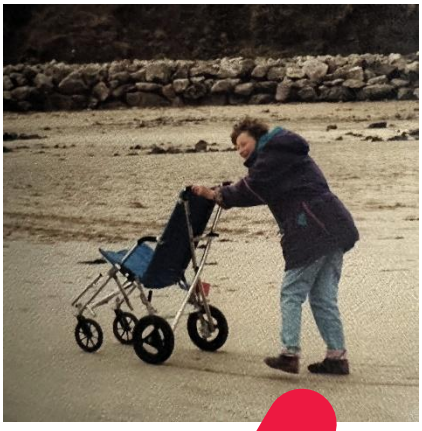
"He is very active and enjoys walking, cycling and does daily exercises [21 years old]. He finds the outdoors calming and it helps him to be regulated." – PTLS family

"His mobility is now very good, although he still has a few problems with balance and so he is careful. He still only uses one hand and it is difficult for him to grasp items between the thumb and forefinger." – PTLS family

"He can run, jump, climb, gallop, ride a bike with training wheels and throw a ball. He still cannot skip or catch a ball.
He can dress himself but still needs help with buttons and zips. He is left-handed and his writing is illegible. He has difficulties with scissors but can type very well." – PTLS family

"She moves around very well. She is still unable to catch a ball very well and needs a little help going down very steep steps. She swims 50 metres, rides a horse and has learned to ride a bike without trainer wheels (stabilisers)." – PTLS family

"Only rolled a few times as a baby. Didn't sit up 'til 13 months old. Never crawled but bottom-shuffled at three years two months. Walked independently at four years six months. Used a variety of equipment—special chair, standing frame, two different walkers, special stroller, wheelchair. Walks independently but uses a wheelchair for distances [31 years old]." – YUHAL syndrome family



Intellectual development and learning

Most children with PTLS and YUHAL syndrome experience learning difficulties or learning (intellectual) disability (LD/ID), typically ranging from mild to moderate, though in some cases it can be more severe (Yuan 2015; Treadwell-Deering 2010). Early intervention and individual assessment are often beneficial, as many children need extra support to reach their learning potential.

Within children with PTLS, abilities vary widely. Some children attend a combination of mainstream and special education classes, can follow multi-step instructions but may need reminders to stay focused (Magoulas 2013). Others show uneven skills, with challenges in expressive and receptive language but stronger visual-spatial abilities; reading, writing and maths may develop at near-average levels despite ongoing language difficulties (Sanchez-Valle 2011; Ercan-Sencicek 2012; Lee 2013).

Children with CMT1A generally have typical intelligence and major learning delays are uncommon (Bird 2025). However, Unique families report that motor or sensory issues can affect school performance, sometimes resulting in mild to moderate learning challenges (Unique 2026).

Across PTLS and YUHAL syndrome, additional neurodevelopmental conditions are common. Autism spectrum disorder (ASD), attention-deficit / hyperactivity disorder (ADHD) and sensory processing difficulties are frequently reported (Unique 2026). Learning challenges can affect reading, writing, spelling, maths, handwriting, coordination and processing of visual or auditory information, with short-term memory and planning skills often impacted. Recent evidence suggests ASD is less universal in PTLS than previously thought, affecting about one in five people. More consistent features are LD / ID and speech-language difficulties (Talantseva 2023).

Regardless of a child's diagnosis, education is most effective when tailored to the individual. Children may attend special schools or mainstream schools with additional support. Children usually benefit from formal education plans addressing both academic and everyday life skills. Families report that structured routines, repetition, play-based learning and visual or hands-on methods work best, while large classrooms can be more challenging (Unique 2026).

Overall, therapies play a key role, especially when started early, often before one or two years of age. Occupational therapy, physiotherapy, speech and language therapy and applied behaviour analysis can all support learning, skill development and independence (Unique 2026).

Unique publishes a separate guide to Education and Further education, training and work

"Reading and writing [are] still poor, with a reading age around six [28 years old]. She has very good understanding of maths. She can use a keyboard and her phone but can't text messages. She loved science, woodwork, physical education (PE) and history. She has a very good memory - she could remember the times table in the written form but didn't actually understand it!" – PTLS family

"He attended public [state] school for Junior Kindergarten (4 – 5 years old), Senior Kindergarten (5 – 6 years old) and Grade 1 (6 – 7 years old). We put him in a medically approved school for Grades 2–8 (7 – 14 years old), where the class size was smaller and the teacher ratio better. In Grade 9 (14 – 15 years old), we moved him back to the public system to a special needs program, as they had better job preparation programs. Unfortunately, he aged out of the system during COVID, so he didn't get a job as we were hoping [26 years old]." – PTLS family

"Holds an associate's degree (two years of college) in Information Technology [22 years old]." – PTLS family

"She still can't read fully, only syllables and doesn't understand basic text [11 years old]. Her curiosity has diminished and she's more interested in entertainment." – PTLS family

"Our daughter needs a more detailed presentation of the educational material." – PTLS family

"He seems to have a good memory and loves music. He has good visual matching skills. He cannot read but can pick his name out from all of his classmates' names." – PTLS family

"He receives minimal assistance (1 hour / day) with writing and maths. His reading is slightly above grade level. He has an excellent memory if it involves his preferred subjects. It requires lots of repetition if it's something he doesn't care about." – PTLS family

"She has an excellent memory. She is interested in history and can remember the Queens of Henry VIII. She enjoys most subjects and remembers facts well. She has poor reading but can read at least 20 key words and is improving each week. At a recent parents evening, the teachers were very pleased with all areas of learning. She is making excellent progress!" – PTLS family

"She is quite good at art and likes to read simple books. She can write and draw." – PTLS family

"Reading and writing are at early stages, but he is 14 years old. They learn from those around them, therefore best with typical children to bring them on." – PTLS family

"Always had additional support and TAs due to her being in between moderate-severe learning needs." – CMT1A family

"Attended a Special School for students with moderate-severe ID. She enjoyed it as long as the routine was kept the same. Struggled with changes in routine, changes in staffing. Left school at age 18." – YUHAL syndrome family

"Diagnosed with Global Development Delay and severe learning difficulties. Non-verbal. Delayed in most areas. Having attended mainstream infant school, he moved to a special school when he was eight years old." – YUHAL syndrome family

Speech and language

Children with PTLS and YUHAL syndrome often experience speech and language delays. Some have difficulty coordinating their lips, jaw and tongue to produce sounds correctly, a condition known as apraxia. The range of outcomes is broad, with some children remaining non-verbal. Those who do develop speech may use single words, short phrases or basic sentences, while others go on to develop conversational skills and a wide vocabulary. Many parents report that their child understands more than they can express (Unique 2026).

In PTLS, speech and language delay is one of the most common and noticeable features, affecting nearly all children with the condition (Treadwell-Deering 2010; Potocki 2017; Ciaccio 2020). First words often emerge later than expected, typically between two and six years of age and some children may not develop spoken language at all (Ciaccio 2020; Unique 2026). Speech may be unclear, have an unusual rhythm or tone or be affected by apraxia, which makes it difficult to plan and coordinate movements needed for speech (Neira-Fresneda 2015; Potocki 2017).

Medical literature reports a wide range of abilities. Some school-aged children may use only a few words and struggle to form short sentences even at six to nine years old (Magoulas 2013; Shuib 2017). Others develop short phrases later in childhood but remain difficult to understand. Others require repeated instructions, particularly for multi-step tasks (Ercan-Sencicek 2012; Lee 2013). A few do not develop spoken language at all (Ciaccio 2020).

Children with YUHAL syndrome also commonly experience speech and language delays (Yuan 2015). All Unique children showed delayed speech and some remained non-verbal for several years. These children often use multiple communication methods, including single words, short phrases, picture systems such as picture exchange communication system (PECS), communication devices, body language and vocalisations (Unique 2026).

By contrast, speech is usually unaffected in CMT1A, which primarily affects nerves in the arms and legs rather than those controlling speech (van Paassen 2014). Rarely, speech may be impacted if nerve involvement extends to speech-related pathways. Some children with CMT1A experience mild speech delay after 18 months, but overall communication develops well, with most speaking in full sentences. Occasional difficulties with tongue coordination may affect clarity, but this is uncommon (Unique 2026).

Assessment by a speech therapist can identify specific difficulties and guide regular therapy tailored to a child's needs. For those with little or no speech, Augmentative and Alternative Communication (AAC) methods, including pointing, pictograms, gestures, facial expression, simplified sign language and high-tech communication systems, can enable effective communication and may be reduced as speech develops (Potocki 2017; Unique 2026). Communication skills often continue to improve with age and support, but many adolescents and adults continue to face language difficulties, making long-term therapy and support important (Potocki 2017).

Unique publishes a separate guide to Communication

His vocabulary is very extensive and [he] no longer has trouble communicating [26 years old]. Although, I was surprised when he turned to me one day and said, 'pinches are for hurt you.' I was puzzled... After some probing, it turned out he was saying 'Patience is a virtue.' He knew that the phrase was what was said when you were frustrated, but he had the words all wrong. I was mortified that all these years he had thought someone was going to pinch him! It is a funny anecdote now, but it is an example of something that he didn't understand but I didn't know about for many years." – PTLS family

"He has about 80 Makaton signs. His speech started around the age of 4 and has made good progress" – PTLS family

"He uses speech and signing. He speaks in three- or four-word phrases, but his articulation is bad." – PTLS family

"She speaks in long sentences but with a stutter. She has ongoing speech therapy. She did use some signing but found it difficult because of poor fine motor skills." – PTLS family

"Still to this day, some words, especially multi-syllable words, are difficult to pronounce [22 years old]. But he uses techniques learned from speech therapy and he autocorrects himself." – PTLS family

"She developed her own language with only a few words that were recognisable as English. However, she could make her wishes known and at one time we counted 150 different sounds which meant things to her and to us. Sadly, these have now virtually disappeared [50 years old]." – PTLS family

"My daughter began to speak more clearly when she was closer to eight years old. Before that, I had to help her and translate for others what she said. [She] has both trouble saying what she wants to say (expressive speech disorder) and difficulty controlling the muscles used for talking (dysarthria). She has difficulty understanding and communicating due to her speech impediment, but we've been tracking her progress year after year." – PTLS family

"Did not talk until two years of age." – PTLS family

"By her teens [she] had over a 100 communication sounds that could be understood by her immediate family with only about 10 being clear enough for others to comprehend. By her 30's this dramatically dropped and now only has about 6 distinguishable words." – PTLS family

"She used to grunt. She needed special help through a home-visiting educational service for pre-school children (Portage) and kids' charities. Had to have speech and language specialist support in nursery and school. Will only comment or communicate when needed now [19 years old]." – CMT1A family

"Has never developed speech [31 years old]. Uses limited photos, facial expressions and vocalisations to communicate. Despite having no speech, she can have a conversation in her own 'language'. She likes others to respond to her vocalisations." – YUHAL syndrome family

"Singular, appropriate words were used from 18 months to three years, then stopped completely. Nonverbal ever since [11 years old]. Makes lots of humming noises, which is common for his syndrome. There's hope he will eventually speak. We're starting to introduce an iPad communication device, early days." – YUHAL syndrome family

Feeding

Feeding difficulties in the newborn period are common in children with PTLS and YUHAL syndrome. Low muscle tone can make swallowing harder and some babies may suck weakly, requiring high-energy milk to support weight gain. Some babies also suffer from stomach acid or food coming back up into the food pipe (gastro-oesophageal reflux, GERD / GORD). Management may include careful positioning during feeds, medication, nutritional supplements or, in some cases, a nasogastric tube (NGT) or percutaneous endoscopic gastrostomy tube (PEG / G-tube). Other issues that have been reported include fluid, food or saliva entering the airway or lungs (aspiration). Some families have found feeding therapies and clinics helpful, offering assessment and advice to address eating and drinking difficulties.

Feeding problems can also persist beyond infancy and some older children and adults continue to experience difficulties with eating (Franciskovich 2020). Common feeding-related issues in children with PTLS and YUHAL syndrome include difficulty passing stools (constipation); drooling; strong reactions to certain tastes, textures, smells or temperatures in food (oral sensitivities); and selective eating or avoidance of certain textures (Unique 2026). One Unique member has been diagnosed with gastrointestinal dystonia (Unique 2026).

As children grow, many gradually learn to eat more typically and tolerate a wider variety of foods. Practical strategies, such as softening foods, chopping or mincing meals or adding sauces, can make eating easier. Management may involve medications, feeding therapy and dietary modifications (Unique 2026).
By contrast, feeding problems are not typically reported for CMT1A. While some families report minor early feeding challenges, such as reflux, constipation or slow weight gain, most children with CMT1A feed and digest typically, although fussy eating or constipation may still occur (Unique 2026).

Unique publishes a separate guide to Feeding

He started having real food aversions as a toddler. We attended a 12-week feeding program when he was four years of age with no real progress. He still has an extremely limited diet." – PTLS family

"He can't eat certain textures—mashed potato or soup that is too thick. He takes a long time to swallow meat and has complained on occasion about things being hard to swallow." – PTLS family

"She eats well, at least two good meals a day, but is on a soft food diet." – PTLS family

"He had feeding problems as a baby, but by the age of one he was fine. He eats all sorts now and has a good appetite." – PTLS family

"Has always preferred soft textures. Can't tolerate hard or crunchy foods. Uses a special plate and modified cutlery to feed himself. Needs assistance quite often when eating. – YUHAL syndrome family

"Obsessed with eating leaves off trees and bushes (pica)." – YUHAL syndrome family

"My son has had a PEG in situ for nearly 12 years (he required this due to extreme weight loss and continual vomiting but not present as typical vomiting—rather stomach or oesophageal contents spilling out of his mouth). Procedure carried out at 34 years old" – YUHAL syndrome family

Growth and stature

While many babies with PTLS and YUHAL syndrome are born within the typical range, many gain weight more slowly in the first months to year and some may be diagnosed with failure to thrive (Soler-Alfonso 2011, Unique 2026). This is often linked to feeding difficulties, weak mouth muscles, trouble swallowing, reflux or low muscle tone (Soler-Alfonso 2011; Neira-Fresneda 2015; Potocki 2017). Due to this, some babies may need tube feeding or high-calorie formulas to support nutrition, though these do not always fully resolve growth issues (Lee 2013).

As they grow, children with PTLS are often lighter and shorter with a lower body mass index (BMI) than their peers. Some children with PTLS have growth hormone deficiency (GHD). Treatment with growth hormone can improve height, including in children who do not meet strict diagnostic criteria (Franciskovich 2020). Children with YUHAL syndrome also tend to have below-average weight, height and head size (Mendez-Rosado 2017).

With age, some children catch up in height and weight, often reaching between the 5th and 25th percentile. Many achieve an adult height similar to other family members.

Whilst growth is not typically affected in people with CMT1A, scoliosis in older children and adults may make them appear shorter (Unique 2026).

"When she was young, she had slow growth. She grew to 5 foot 2 inches." – PTLS family

"He was underweight for most of his youth. But since he left school, he has filled out." – PTLS family

"Small stature and weight... She appears to be shrinking in height, probably caused by her scoliosis." – PTLS family

"After turning 8, my daughter began gaining weight more frequently. It fluctuates between gaining and losing weight, all while her height increases." – PTLS family

"My daughter is under the care of an endocrinologist because she is developing at the lower end of the growth chart." – YUHAL syndrome family

"Was in the correct weight and height range until around puberty at 12 / 13, then weight and height dropped off." – YUHAL syndrome family

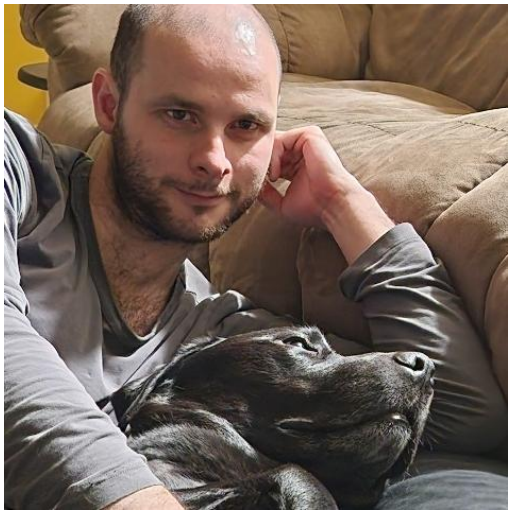
"He's had bone growth X-rays which have shown a slight delay in growth but nothing to worry about. Also blood tests, nutritionist and hormone specialist, but no one has concerns. He's growing in proportion." – YUHAL syndrome family

"Height within the family range." – YUHAL syndrome family

Personality

Unique members with PTLS, CMT1A and YUHAL syndrome are generally happy, friendly and affectionate, often bringing warmth and joy to those around them. Many are sociable and enjoy interacting with people they know, while some may be initially shy or withdrawn until they feel comfortable. They tend to be active, curious and engaged with their environment, though changes in routine or new situations can sometimes cause anxiety (Unique 2026).

> ***Very friendly, lovely, calm and vulnerable." – PTLS family***



"Kind, funny, inquisitive, demanding, anxious, OCD. She is friendly and is sociable with people that she knows. She dislikes large crowds." – PTLS family

"Generally a happy child and adult, although he gets frustrated trying to get his message across, which in turn can lead to bad behaviour. He is an observer who likes to watch, e.g. at dances, parties, etc. He enjoys family and friends' company and also his own company. He doesn't like to be forced to do something he doesn't want to do. He likes routine." – PTLS family

"Bright, fun-loving, great sense of humour. He loves to meet people. He is shy at first but outgoing once he feels comfortable. I do have to push him to engage though. He has no mental health issues. Although he has mentioned lately being upset at having so few friends and 'no one to talk to'. This is a direct result of not being involved in programs since COVID." – PTLS family

"Kind, loving, generous." – PTLS family

"Calm, kind, caring, easy to please, content, considerate, AMAZING! He is friendly and easy to approach but has a hard time carrying on a conversation for long with others. He would answer politely when asked a question. However, he rarely engages in a back-and-forth conversation. He is working hard to open up and truly be himself with other people. He is usually reserved most of the time." – PTLS family

"She had a very loving personality and engaged easily with any adults that she came into contact with. People enjoyed working with her and her company. She was very amenable to anything that we wanted to do with her. From the age of 28, her personality has gradually changed and currently she is very difficult to motivate or make her do anything." – PTLS family

"Our daughter is very kind, sociable, cuddly, responsible but also cunning. She's sensitive to people's emotions and empathetic. She's diligent when she sets her mind to something. Our daughter loves meeting and interacting with other children, but due to speech and comprehension issues, not all children accept her. She finds it easier to connect with adults. She draws people in with her kindness, spontaneity and radiance." – PTLS family

"Happy, sociable, humorous, loveable. He is a joy to have, is liked by all and they tell us he is a celebrity at the secondary school." – PTLS family

"Can get anxious, likes routine, likes to please people, is caring. Likes her own company but enjoys people when she is in a group." – PTLS family

"Happy and content. He wants people to listen to the things he is interested in. His friends are mature adults." – PTLS family

"He is very loving and happy." – PTLS family

"He is a very friendly guy but is lacking in social skills. He can dominate a conversation. He loves attention, so managing his behaviour has always been easy. Negative behaviour was ignored as much as possible (the worst consequence in the world for him!). Positive behaviour got him the attention that he craved. He has more anxieties than anger. He is beginning to see that he's different from his peers and that can also cause anxiety." – PTLS family

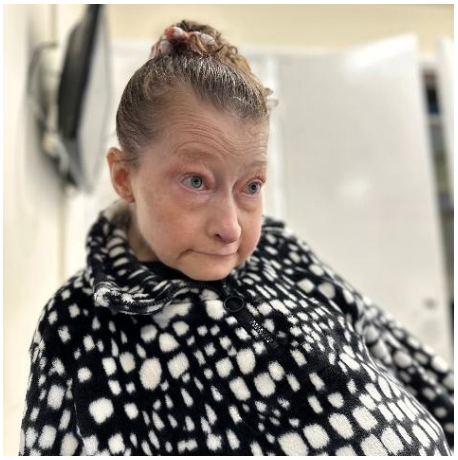
"She is very funny and has a good sense of humour. She has a big personality and is loving and fun. She is generally very good, especially at school. When she is tired, she can be challenging." – PTLS family

"She has a great sense of humour and is a sweet girl who is very good with younger children. She likes routine and it can annoy her if it is changed." – PTLS family

"Happy, friendly, kind, considerate, lights up a room with a smile but can take time to get to know a person and only trusts a limited few with her emotions. Holds back until she knows you." – CMT1A family

"Placid when in control of her environment. Generally happy, except when routines change. Being persistent and consistent is the golden rule! Has been on an anti-depressant since age 16 (currently 30) for anxiety and OCD. Can be withdrawn when first meeting people, but once familiar with others, will engage with them on her terms (i.e. if it suits her). Historically has not really formed relationships with others but has a really lovely relationship with a long-term housemate." – YUHAL syndrome family

"Happy, loving, mostly calm (although he gets very anxious in new or noisy situations). Loves life. Very active, always on the go. Determined / stubborn. Sociable. Comfortable with people he knows. Plays alongside but also loves watching others having fun. He will laugh while watching." – YUHAL syndrome family



Behaviour

Children with PTLS, CMT1A and YUHAL syndrome typically tend to have behaviour in keeping with their overall degree of developmental delay and most have a happy disposition. Children usually benefit from consistent routines, boundaries, rewards and other behaviour management techniques. Efforts to consider and introduce strategies to tackle communication and other difficulties can also be beneficial.

Children with PTLS and YUHAL syndrome often show behavioural differences that overlap with ASD or ADHD. These can include repetitive movements (such as hand flapping, bouncing or pacing), a strong focus on specific interests, difficulties with impulse control or attention, sensory sensitivities (for example to noise), reduced eye contact, difficulties with transitions and challenges in shared attention and play (Nakamine 2008; Treadwell-Deering 2010; Neira-Fresneda 2015; Potocki 2017; Unique 2026). Anxiety is common, affecting nearly half of individuals, while smaller numbers experience depression or obsessive–compulsive behaviours (Ciaccio 2020; Unique 2026). Some children show behaviours such as hyperactivity, withdrawal, aggression or self-injury. However, around two-thirds do not have significant challenging behaviours (Treadwell-Deering 2010; Bissell 2018; Unique 2026).

Behaviour can change with age. In younger children, hyperactivity, attention difficulties and social withdrawal are more common, while older children and adults may experience increasing anxiety or panic attacks (Ciaccio 2020). Challenging behaviours do not always respond reliably to standard medications (Bissell 2018; Ciaccio 2020).

For children with CMT1A, behavioural or neurodevelopmental disorders are generally not a core feature, although coping with chronic physical disability may affect emotional and social wellbeing (Unique 2026). People who are affected with CMT1A tell us that that walking difficulties, balance problems, fatigue and lower-limb weakness have the greatest impact on daily life, while mental health and social functioning are often preserved unless fatigue or depression is present (Tozza 2022; Ivanovic 2022).

Types of social, emotional and anxiety disorders include:

Attention Deficit Hyperactivity Disorder (ADHD): ADHD is usually diagnosed between the ages of six and 12 years. The disorder is characterised by a range of behaviours, including hyperactivity, inattentiveness and impulsiveness that make it difficult for children to concentrate and control their actions and speech. Children are often described as “restless”, are easily distracted and may talk or interrupt a lot.

Autism Spectrum Disorders (ASD): ASDs include autism and are associated with impaired social skills, problems with communicating and a need to carry out restricted repetitive and restrictive behaviours, interests and activities, from which an individual derives comfort.

Obsessive Compulsive Disorder (OCD): A related but distinct disorder, which may co-exist alongside an ASD or manifest separately, those with OCD experience anxiety that can be relieved to some degree by carrying out specific, repetitive rituals e.g. obsessive hand-washing, repetitive counting / checking. Those with OCD don’t derive pleasure from these routine behaviours, but fear that something bad will happen if they don’t complete them.

Anxiety: A child or adult with anxiety will experience regular and overwhelming feelings of intense worry or nervousness that can interfere with daily life. When feeling anxious, they may not be able to concentrate, feel irritable, overthink and try to avoid places, people or situations.

Unique publishes a separate guide to Challenging behaviour.

My daughter may bite her nails, the inside of her cheek or her lip itself (she already has internal scars).” - PTLS family

*“Not officially diagnosed with autism until 19 years of age (but very obvious before then)
Has been on an anti-depressant since age 16 (currently 30) for anxiety and obsessive-compulsive disorder (OCD).” - YUHAL family*

“Will withdraw and avoid things in the hope of coping with certain things. She can scream, especially if in noisy environments or to communicate that she is uncomfortable in certain situations.” - YUHAL family

Sleep

Sleep problems are common in children with PTLS and YUHAL syndrome, with about half of families reporting difficulties (Unique 2026). Children may have trouble falling asleep, wake frequently during the night, need less sleep than usual or be restless. Families often find that adjusting bedtime routines or using medications can help (Unique 2026).

In individuals with PTLS, brain scans often show extra activity during sleep, which can make sleep lighter and more fragmented, causing children to take longer to fall asleep, wake more often or feel less rested in the morning (Kaplan 2019). Some children may snore and periodic limb movements during sleep are also common (Sanchez-Valle 2011).

In children with YUHAL syndrome, sleep is often disrupted and, in some adults, non-invasive ventilation has been needed. Families typically try behavioural strategies, medications or changes to the sleep environment, though sleep can remain challenging (Yuan 2015).

Sleep-disordered breathing, including central or obstructive sleep apnoea, can occur even if parents haven’t noticed symptoms (Neira-Fresneda 2015; Potocki 2017; Kaplan 2019). Children with Chiari malformation type 1 (CM-1) (see the “**Brain Anomalies**” section later on in this guide for more information), which sometimes occur with PTLS, have an even higher risk of sleep apnoea, which can affect growth, thinking and heart health, so brain imaging may be recommended if sleep apnoea is unexplained (Varon 2018).

For children with CMT1A, sleep problems are usually not part of the condition itself but can occur as a side effect of other issues, sometimes causing short or irregular sleep in early childhood (Bird 2025).

Unique publishes a separate guide to Sleep.

He is on medication (Circadin) to help him rest as he can stay awake all night.” – PTLS family

“She would not sleep well until around the age of six. Once she was older, she had a good sleep pattern.” – PTLS family

“No problems with sleep, although he used to wake early (i.e. 4 am) as a toddler. He sleeps a lot at his current age.” – PTLS family

"Tried melatonin but it made her anxious. It takes a long time to go to sleep. She has central sleep apnoea, so her sleep is disturbed. She struggles to wake up and is very tired in the mornings." – PTLS family

"No problem sleeping from day one. Great sleeper." – PTLS family

"Throughout her life, sleeping hasn't been a problem. She likes a regular routine. For a large part of the time between her being eight and 20, her nights were disturbed because she wanted to go to the toilet. Medication for her mental health (Risperidone) caused a lot of sleep problems." – PTLS family

"My daughter has trouble sleeping mostly with falling asleep. To maintain a sleep schedule, we put her to bed and wake her up at roughly the same time, but this doesn't always work. If she's had a stressful day, it can take a long time to fall asleep. Sometimes she wakes up in the middle of the night but falls asleep within an hour, lying quietly. We usually prescribe medication (Teralidzhen) to normalise her sleep. Heartfelt hugs before bed help my daughter relax better." – PTLS family

"Has always been a great sleeper: 12 hours per night since he was a toddler." – PTLS family

"Sleeps well but uses a night light." – PTLS family

"She has no sleep problems—she loves her sleep." – PTLS family

"He has always had a problem falling asleep. His brain is always going a mile a minute. But once he falls asleep, he's out for 12 hours. Melatonin has been a saviour!" – PTLS family

"When she was a baby and for the first several years of her life, she had difficulty sleeping at irregular times and only short periods of time. Tried routines for this." – CMT1A family

"We have tried everything—behavioural interventions, medications etc. She continues to wake several times a night and once awake will wet the bed (refuses to wear nappies). A psychiatrist suggested she have ever-increasing amounts of medication for anxiety (Valium) to keep her asleep (we did not go down that path!). She has trialled melatonin which did nothing. We tried behavioural interventions such as staying in the room until she fell asleep and then slowly over weeks / months exiting the bedroom earlier each night, having a night light on, soft music in the background, using a clock with a sun or moon on the face to try and teach day / night concepts. Nothing has really worked but she continues to have a rigid routine around bedtime to provide comfort and cues that it's nighttime which means sleep. I honestly believe sleep disturbance has been the most significant and difficult aspect of the syndrome. It nearly broke us as a family and was the number one reason she moved out of home into supported accommodation. I think it's important that if your child has a disturbed sleep / wake cycle you accept the fact that it is all part of them just as they have blue eyes or brown hair. You can minimise some of the impact but it's not something they do deliberately to disturb the household." – YUHAL syndrome family

"Since [eight years old] he has been prescribed Slenyto, a version of melatonin which is more effective. He is on 10 mg a night." – YUHAL syndrome family

Puberty

Some evidence from Unique and medical studies suggests that girls with PTLS may show early signs of puberty, such as developing pubic hair or breast growth a little earlier than usual, though full puberty generally occurs at the expected age. Most children with PTLS go through puberty at the usual time, although developmental or cognitive issues may affect social or emotional aspects of puberty (Potocki 2017; Unique 2026).

Some families of children with chromosome disorders and behavioural or learning difficulties can be particularly concerned at their daughter's ability to cope with menstruation and for some, discussing menstrual regulation options with a paediatrician may be beneficial.

Unique publishes a separate guide to Puberty

"She did not cope with her periods at all... We tried everything. She could not go on the pill as she can't swallow tablets, could not have birth control injections as you still get breakthrough bleeding and an intrauterine device (IUD) required yet another general anaesthetic to insert. Due to heavy menstrual bleeding and iron deficiency anaemia, we went to a tribunal to get permission for her to undergo a removal of her uterus without removing her ovaries at age 22." – YUHAL syndrome family

Adulthood and independence

For people with PTLS, independence varies widely. Many children learn to eat, dress and use the toilet independently, although they may require additional time, prompting or support with more complex tasks such as fastening buttons, tying shoelaces or managing personal hygiene. Others continue to need assistance with everyday activities throughout childhood and beyond. Similarly, mobility ranges from independent walking, running and participation in sports to the need for physiotherapy, orthotics (such as insoles, braces or splints), walking aids or wheelchairs. As children grow, many continue to develop new skills and greater independence, while others require more ongoing support. In adulthood, some people continue to need full-time support and many live with family or in supported living arrangements. Opportunities for paid employment may be limited, but many adults participate in day programmes, volunteering, education or creative activities (Unique 2026).

For people with a CMT1A, the condition affects the nerves and muscles and usually progresses over time. Lots of adults can walk for many years, though some eventually need mobility aids. Management focuses on maintaining function and independence as much as possible. Most individuals need some help with personal care, such as dressing or other self-care tasks (Unique 2026).

There is limited information about adults with YUHAL syndrome, but most are expected to experience a combination of those described above. Most Unique children cannot manage daily self-care on their own and some require round-the-clock support. As they grow into adulthood, many transition into day programmes or supported living (Unique 2026).

Unique publishes a separate guide to Transition.

"Post college there is very little for adults particularly if they would like to work. Adulthood has been very hard with the lack of funding, empathy and things to do. No help from social services - she hasn't been given a social worker. She goes to two social groups twice a week for a full day plus a support worker for three hours a week. We have placed her on the local council housing list. We are considering buying a property for her, so she has a home for life." – PTLS family

"He has lost a lot of his mobility and now leads a life a lot more sedentary than when he was younger. He has developed some depression due to limited access to lifestyle activities. He can get very frustrated if he doesn't have his own way. He appears to be a lot older than he is. He is bald, but so was his grandfather." – PTLS family

"He can get dressed, shower, do teeth and his service dog's teeth on his own. I can't remember from what age, but I don't think it was much different from his sister. He is now five years out of school. He is happy but we really don't have any programs for him and he doesn't have a job. Covid really cut out his supports at a crucial time for him. It is going to take a lot of work to get him to where he should be at 26. Adulthood has been mixed. He is happy most of the time but does miss school as it was where his friends were. I am working hard to get him into programs to meet new people. He socialises with his dad and his dad's friends, but he needs to meet people his own age. He really wants a girlfriend." – PTLS family

"He is becoming more responsible. He has a driver's license so drives himself to school. He took college classes with no modification. He has good grades. He tests well. Expressive language is still a challenge. Socialising is still a challenge. He does not initiate socialising unless we remind him or his friends from high school call him. He doesn't seem to understand the need for exercising and importance of nutrition. He still needs to learn to cook and live by himself." – PTLS family

"[She can perform] no aspect of personal care. She goes to the toilet but can't always adjust her pants. It is difficult to define when her adulthood started. Her care needs and emotional needs haven't really changed throughout her entire life. She has always needed 24-hour care. She lived at home until her late 20s. As her behaviour and personality changed, it was agreed that she would benefit from living in a small local care home. To us, they treated her more like an adult whereas we had continued to treat her like a child." – PTLS family

"[Adulthood] has been a challenge. Family has been an important support. [She] doesn't have a lot of friends. She seems to be happy so that is the main thing. Volunteers at a local kindergarten." – PTLS family

"She has grown into a beautiful young lady and tries her best... Lives at home and has her own adapted bedroom: extra widening of door and frame for wheelchair access and her bedroom extended out onto the landing which the council gave us written permission to do." – CMT1A family

"Since leaving school she has been involved in an adult day program. She enjoys some activities but has taken time to settle... She lives in supported accommodation in a group home with two other ladies and has had both good and bad experiences in accommodation and is close to one of her housemates." – YUHAL syndrome family

Medical concerns

The medical concerns that have been found to be associated with PTLS, CMT1A and YUHAL syndrome are outlined below. The medical concerns that a person may have will largely depend on which of these three genetic conditions they are diagnosed with. It is important to note that, as is common with other genetic conditions, there is variability in the medical concerns people have even among those with the same diagnosis.

Nerves

Nerve problems in children with 17p duplications are linked to the PMP22 gene, which means that children with only duplications involving the RAI1 gene (PTLS) rarely have nerve issues. In contrast, children with CMT1A or YUHAL syndrome are more likely to develop nerve-related symptoms.

In these conditions, problems occur because the protective covering around nerves, called myelin, gradually breaks down. Research also suggests that myelin may not form correctly or function properly (Stavrou 2023; Capodivento 2024).

In children with CMT1A, symptoms often appear around age 12, though this can vary (Lupski 1992). About half of children show early signs before the age of ten and most will have symptoms by their twenties (Birouk 1997). Children with YUHAL syndrome may develop nerve and muscle problems earlier than those with CMT1A alone. Studies have shown that nerve changes are present even in children who seem only mildly affected or show no obvious signs, meaning that the condition can exist before physical problems appear (Birouk 1997).

Common signs of nerve problems include weak or thin muscles in the arms and legs, differences in foot shape and reduced or absent ankle reflexes. Some children have difficulty walking, feel pain or have reduced sensation in their feet or legs (OMIM 2026). Experiences amongst Unique members vary widely: one child has difficulty lifting the front part of their feet, causing their feet to drag on the ground when walking (foot drop). This child uses a wheelchair, splints and knee braces. Another child is affected more mildly, but required multiple surgeries on the feet, hips and knees (Unique 2026).

Pain is common in people with CMT1A and can affect daily life, though it is not always clear whether it comes from nerve damage or other causes (Azevedo 2018). In rare cases, enlarged nerves can press on the spinal cord and cause more serious symptoms (Rosen 1989; Butefisch 1999).

> ***"Was diagnosed with CMT at age one. It has been a fairly mild form but is believed to be responsible for the hip, knee and foot differences and surgeries. Talipes was surgically corrected at age one. Hip dislocations were surgically corrected at age seven with surgeries to correct the shape or alignment of the hip and thigh bones (pelvic and femoral osteotomies). Knee dislocations were corrected surgically at ages 12 and 13 with a piece of the hamstring tendon used to create a new support for the kneecap, which helps prevent it from slipping out of place (patella stabilisation using hamstring grafts)." – YUHAL syndrome family***

"Bilateral foot drop. Mobility deteriorated during teenage years. Now uses a wheelchair but can still assist with transfers. Wears splints and knee braces." – YUHAL syndrome family

Feet

Children with PTLS, CMT1A and YUHAL syndrome often have anomalies affecting the feet, although the condition(s) and severity vary. Some children are only mildly affected and many condition(s) do not require treatment. Others may benefit from massage, orthotics and physiotherapy. Treatment is tailored to the individual child. In some cases, surgical correction will best enhance eventual mobility.

In individuals with PTLS specifically, these foot differences are common but not a defining feature. Many children have flat feet (pes planus) or rocker-bottom feet (congenital vertical talus), high arches (pes cavus), curved toes (clinodactyly) or feet turned inwards (clubfoot, talipes). Low muscle tone and coordination difficulties can affect walking and some have twisting of the lower leg (tibial torsion). Orthopaedic assessment is sometimes needed. Some cases of clubfoot need surgery while others improve with casts, splints or supportive shoes. Many children benefit from insoles or orthotics to help with walking and for comfort (Unique 2026).

For people with CMT1A, foot problems are a central feature. High arches (pes cavus), hammer toes (hallux malleus), short or curved toes and ankle weakness are common, which can make walking unsteady (Unique 2026). Excessive sweating of the feet (hyperhidrosis) is also reported amongst Unique members. Muscle weakness and wasting in the lower legs (muscle atrophy) are typical and ankle reflexes are often absent (Unique 2026). Supportive measures like orthotics, ankle-foot orthosis (AFOs) and physiotherapy are key since there is currently no medication to stop or reverse the condition (Morena 2019). Foot anomalies often progress and can require surgery, while pressure points can lead to corns or calluses (clavi).

In people with YUHAL syndrome, foot differences are also common and may appear earlier in life. Around half of Unique members have flat feet (pes planus) or high arches (pes cavus), a quarter have curved toes (clinodactyly) and another quarter have wide gaps between their toes (sandal gap). Sweaty feet (hyperhidrosis) are reported in about half of individuals. Many children need insoles orthotics or specialist footwear to support walking (Unique 2026).

> ***Arched feet but it has caused no real issues." – PTLS family***

"We carried out a treatment for clubfoot that involves carefully stretching and casting the foot in stages (the Ponseti method). She was put on plasters, had two surgeries to lengthen the Achilles tendon (achillotomy), then wore braces and then the adjustable dynamic muscle system (ADM system). There was a relapse and we had to perform an operation to transplant the tibia tendon into the third sphenoid bone (PBBS). Currently, she stands in Dorsi Ramp for 30 minutes twice a day. She also has very thick nails on some of her toes." – PTLS family

"Differences of feet as a result of CMT. Experiences pain in feet. Feet remain very flat. She had surgery to correct her right talipes at one year of age. Left foot was corrected by non-surgical intervention and she wears foot orthoses." – YUHAL syndrome family

"He stood on tip toes and over onto the knuckle of his toes, so podiatry gave special shoes, then leg splints, then special insoles. Now he doesn't need anything - they're great." – YUHAL syndrome family

Hands

For children with PTLS, difficulties with fine motor skills or dyspraxia, which is a condition that affects how the brain plans and coordinates movements, are common. About half of Unique children have differences in their hands or fingers, such as short or tapering fingers (brachydactyly), curved fingers (clinodactyly), very flexible joints or sweaty hands. Some also have long fingers, single or extra palm creases or fingers that don't fully straighten. While these differences usually don't stop children from using their hands, they can make tasks like writing, fastening buttons or using cutlery harder (Unique 2026).

In children with CMT1A, hand weakness and muscle wasting often develop gradually, affecting grip strength and fine hand movements. Short or curved fingers, finger contractures (camptodactyly) and sweaty hands are common, which can make tasks requiring precision challenging (Unique 2026).

For YUHAL syndrome, hand differences can be more pronounced. Some children have small hands, curved or fused fingers (syndactyly), underdeveloped nails or sweaty hands (Unique 2026).

Some children are only mildly affected and do not require treatment. Others may benefit from massage, orthotics and physiotherapy. Treatment is tailored to the individual child and in some cases surgical correction will best enhance eventual mobility.

> ***She was tactile sensitive and had her hands clutched tightly together for at least two years. We worked with Occupational Therapy for several years." – PTLS family***

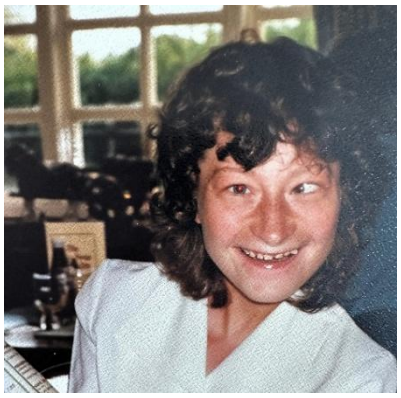
"Three fixed fingers, two on one hand and one on the other. An operation at three years of age cut tendons and released the fingers. Very successful. Beautifully straight now." – YUHAL syndrome family

Eyes / Eyesight

For children with PTLS, vision problems are relatively common, though not every child is affected. Long-sightedness (hyperopia) is the most common issue, though some children also have short-sightedness (myopia), a curved cornea causing blurry vision (astigmatism) or involuntary eye movements (nystagmus). Many children have one or both eyes turned inwards, outwards or upwards (strabismus). Glasses are often needed and regular eye check-ups are recommended (Unique 2026; Lee 2013; Shuib 2017).

For those with CMT1A, eye problems are usually rare, although one Unique member is short-sighted (Unique 2026).

For those with YUHAL syndrome, vision problems are like those of PTLS. Among Unique members, many are long-sighted. Short-sightedness, strabismus, lazy eye (amblyopia) and cataracts have also been reported (Unique 2026).



> ***Regular checks because the cornea is thinner and bulges into a cone shape (keratoconus)." – PTLS family***

"Right pupil does not dilate fully (anisocoria), she has small, rapid circular movements (fine rotary nystagmus) and clouding of the lens in both eyes (bilateral cataracts) detected at age 22." – YUHAL syndrome family

"My daughter has strabismus. She has already had two eye surgeries." – YUHAL syndrome family

Hearing

About a quarter of children with PTLS, CMT1A and YUHAL syndrome may experience some degree of hearing loss, but most children hear well and hearing tests at birth often show a clear response (Unique 2026). The most common concern is “glue ear,” where fluid builds up behind the eardrum. This may be worsened by unusually narrow ear canals or excess earwax. Glue ear is usually treated by inserting tubes (grommets) into the eardrum (Potocki 2017). In some cases, improved hearing is not achieved with grommets and hearing aids may be used temporarily or long-term, though this is uncommon.

In children with CMT1A, hearing problems are rare, though some nerve-related issues have been reported (van Paassen 2014). Emerging research suggests that subtle hearing difficulties, particularly in noisy environments, may occur due to mild disruption of the nerves, even when standard hearing tests appear unchanged (Cassinotti 2024).

Many families also notice that their children are sensitive to sound and may react strongly to loud noises. Some children outgrow this sensitivity, while for others it persists (Unique 2026).

Since children with hearing difficulties are at risk of speech delay, it is important for parental concerns to be addressed early and for home- or school- based therapy provided.

Unique publishes a separate guide to Hearing

Brain anomalies

Occasionally, children with PTLS are found to have minor brain anomalies and, in rare cases, structural anomalies like a Chiari malformation. A Chiari malformation is a condition where part of the cerebellum (the part of the brain that helps control balance and movement) pushes down into the spinal canal. This can sometimes cause headaches, sleep problems, balance issues, neck pain or difficulties with movement, but it can also cause no symptoms at all (Varon 2018; Unique 2026).

Reports in medical literature also show that some children with PTLS have an unusual cluster of blood vessels in the brain (cavernous hemangioma) or a condition where nerves do not connect to the correct location during early development of the brain (nodular heterotopia) (Ciaccio 2020). One child with low muscle tone and balance and coordination problems had a tiny fluid cavity in the spinal cord (Magoulas 2013). In another child, scans showed subtle differences in brain activity in areas related to speech and visual processing (Ercan-Sencicek 2012).

One person with YUHAL syndrome was found to have an underdevelopment (hypoplasia) of the white matter connecting the two halves of the brain (corpus callosum) (Lee 2025). Although there is currently limited data on brain anomalies in individuals with YUHAL syndrome, they may exhibit some of the conditions seen in people with PTLS.

CMT1A is not known to be associated with brain anomalies (2026).

> ***At nine years old [she] had a fusion of two neck bones (C1 and C2) as she had fluid on her spine (syrinx)… and Chiari malformation. This did not make more room, so at the age of 12, she had skull augmentation as her skull was too small.” – PTLS family***

"At five years old, an MRI of the brain revealed that some of the white matter in the brain was not fully developed (moderate diffuse hemispheric white matter deficits). Areas of mild damage (mild residual post-hypoxic leukopathy) were found in the regions around the fluid-filled spaces near the top and sides of the brain (periventricular regions of the parietal lobes).” – PTLS family

Seizures

Seizures are a sudden and unexpected change in the electrical activity in the brain. Depending on the part of the brain affected, symptoms vary, but include temporary loss of consciousness or awareness, uncontrollable jerking movements followed by confusion. Age of onset can vary considerably, while seizures may be isolated to a single incident or occur more regularly. More than one type of seizure may be present in the same individual. Electroencephalograph (EEG) and video telemetry (video EEG) are medical tests that can be used to measure and record the electrical activity of the brain and are tools that, when used alongside other tests, can help diagnose the type of seizure experienced.

For people with PTLS, over half of Unique children have experienced several types of seizures, including absence, tonic–clonic, myoclonic and infantile spasms (**see below**) (Sanchez-Valle 2012; Magoulas 2013; Ciaccio 2020; Unique 2026). However, the frequency of seizures reported in the medical literature is lower, between 10-20% of individuals with PTLS (Coudert 2026). EEG tests sometimes show unusual brain rhythms, even in children who do not have noticeable seizures, so careful neurological monitoring is recommended (Potocki 2017, Coudert 2026).

Around a quarter of Unique children with YUHAL syndrome experience absence seizures and other reports have shown unusual EEG patterns without obvious seizures (Potocki 2007; Magoulas 2013; Praticò 2018; Unique 2026). Notably, there are also many children with PTLS and YUHAL syndrome who never develop seizures (Lee 2013; Alberto Mendez-Rosado 2017).

CMT1A is not known to be linked with seizures and seizures have not been reported by Unique members with CMT1A (Unique 2026).

Infantile spasms are a type of seizure usually occurring in clusters in babies between 3-10 months. They are seen most often when a baby wakes and may be obvious or subtle.

Generalised tonic-clonic seizures are the type of seizure that most people think of as epilepsy. At the onset of a seizure, the electrical activity involves both sides of the brain. The seizure involves a phase of stiffening followed by jerking.

Myoclonic seizures are brief, sudden jerks or twitches of a muscle or group of muscles, often occurring in clusters and sometimes triggered by stress or sleep deprivation.

Absence seizures / Petit mal seizures are short episodes of staring or “blanking out,” usually lasting only a few seconds, during which the person may be unresponsive and unaware of their surroundings.

Seizures can cause a lot of worry for families and can be frightening to observe, but in most cases they self-resolve or resolve with medical treatment. If your child has a seizure for the first time, it is important to remove nearby hazards so they can’t hurt themselves and contact a medical professional.

He had two seizures when he was eight months old and at five years old” – PTLS family

"She had two petit mal seizures when she was small and had a test but luckily had no more." – PTLS family

"Her seizures started when she was four years old. They were tonic-clonic and lasted a long time. After a brief hospital stay where medication (rectum Stesolid) was used... A different medication (Epilim) then became her main seizure drug. When she was 22 years old her seizures ceased, though she was still on an anti-epileptic drug (sodium valproate) … When she was 40 her seizures resumed, though they were very different and short, usually no more than two minutes, occurring two or three times a month. Her sodium valproate has been modified by the expert nurse, resulting in less severe seizures and quicker recovery.” – PTLS family

"On the fourth day after birth she had seizures treated with medication (Sibazon)… An anticonvulsant (Depakine, sodium valproate) was prescribed but discontinued after two months due to lack of symptoms, a normal brain scan and bad side effects… At 18 months she had a prolonged tonic seizure lasting 30 minutes requiring intensive care, with a normal EEG. At five years she spun into a table while running, then experienced vomiting, feeling like she was in space, her smile lines (nasolabial folds) and fingertips turned blue, slight tension in her body, gentle head jerks and lip smacking." – PTLS family

Heart conditions

For people with PTLS and YUHAL syndrome, many children are born with a heart condition, usually affecting the left side of the heart and the flow of blood leaving the heart (Potocki 2007; Yuan 2015). Heart conditions can be present at birth (congenital) or develop later in life. In children for whom heart problems are suspected, these can be diagnosed using tests like an electrocardiogram (ECG) (recording the electrical activity of the heart), echocardiogram (ultrasound scan of the heart) or chest X-ray.

Reported issues include a change in one of the heart valves (bicuspid aortic valve), widening of the main artery of the body (dilated aortic root), a small hole in the heart such as an atrial septal defect (ASD) or ventricular septal defect (VSD) and irregular heartbeat (arrhythmia) (Potocki 2007; Jefferies 2012; Franciskovich 2020; Ciaccio 2020). More serious differences such as part of the heart being very small and underdeveloped called hypoplastic left heart syndrome (HLHS), two main blood vessels leaving the heart switching position (transposition of the great arteries) or narrowing of the main artery of the body (coarctation of the aorta), have also been reported and may require surgery and long-term follow-up (Sanchez-Valle 2011; Yusupov, 2011; Bravo 2013).

Individual medical reports highlight both severe cases, such as a child with PTLS who required a heart transplant as an infant (Sanchez-Valle 2012) and children with PTLS who have a healthy heart (Lee 2013). Because of the range of potential issues, children with PTLS and YUHAL syndrome are advised to have a cardiac assessment, including echocardiogram and ECG and regular follow-up (Jefferies 2012; Carter 2013; Potocki 2017).

CMT1A is not known to be associated with heart conditions and none have been reported by Unique members (2026).

My son has an enlarged aortic root monitored by cardiology every 18 months. – YUHAL syndrome family

Breathing / respiratory issues

Many children with PTLS can have problems with breathing during sleep, including a condition where breathing briefly stops while they sleep (sleep apnoea) (Kaplan 2019). In Unique families, some individuals also have repeated chest infections, asthma, wheezing and in one case, a child needed a ventilator because they were born early (Unique 2026).

For children with CMT1A, breathing problems are uncommon, unless the muscles become very weak (van Paassen 2014). Amongst Unique members, only one person has asthma (Unique 2026). Medical literature indicates that some people may also experience sleep apnoea, especially if their neuropathy is severe (Dematteis 2001) and that treating these issues has been shown to improve both sleep quality and daytime functioning (Massucco 2024).

For children with YUHAL syndrome, breathing issues can happen because of low muscle tone or other related health differences. Some infants may have asthma that improves as they grow, while a few adults have experienced more serious breathing problems (Yuan 2015). One Unique member experienced severe aspiration pneumonia and was diagnosed with hypercapnic respiratory failure, treated with nocturnal non-invasive ventilation (Nippy 3) and supported by the Home Vent Team (Unique 2026). Overall, many Unique members with YUHAL syndrome report some kind of lung or breathing issue, related to asthma, infections or sleep-related problems (Unique 2026).

His breathing was / is erratic and he used to hold his breath and pass out." – PTLS family

"When he was between 6 and 8, he had frequent bouts of sickness that makes a child's throat swell (croup) and a type of breathing fit. Out of nowhere he would have trouble getting a breath. The dip in the collar bone would cave as he tried to breathe. By the time we got him to the hospital it would be gone and no one could tell us what was happening. I started giving him an antihistamine as soon as it started and then would get him to look into my eyes and we would breathe together until it passed. He eventually grew out of this." – PTLS family

"Central sleep apnoea. Has had sleep studies and will need a machine that helps people breathe at night (BiPAP machine)." – PTLS family

"My daughter frequently suffers from upper respiratory infections accompanied by a cough. Sleep studies (Polysomnography) revealed apnoea." – PTLS family

Spine and bones

Some children with PTLS can develop curvature of the spine, including where the spine curves sideways (scoliosis), where the spine curves too far inward (lordosis) or where the spine curves too far outward (kyphosis), though not everyone is affected. Spinal curvature can worsen with age or cause discomfort. Among Unique members, over a third have a condition affecting the spine (Unique 2026). Rare and more severe musculoskeletal problems have also been reported in medical literature including one child who had a teratologic hip dislocation (a severe hip difference present from birth) (Kuo 2013).

For those with CMT1A and YUHAL syndrome, spinal curvature can occur in more severe or long-term cases, particularly when there is muscle weakness or foot anomalies. Children may also experience joint stiffness and sometimes require splints or physiotherapy (Unique 2026).

About half of Unique members with YUHAL syndrome have scoliosis, while the other half have no conditions affecting the spine (Unique 2026). In medical literature, a fluid-filled cyst in the spinal cord (syringomyelia) has also been reported in a child with YUHAL syndrome (Yuan 2015).

He has been in hospital for bone breaks due to osteoporosis." – PTLS family

"Diagnosis of scoliosis at 15 years old. Dormant for several years and then further bending in early 20s. Further bending since then.... The bottom of her spine now seems to bend inwards making sitting very uncomfortable. She stands for 10 hours a day." – PTLS family

"My daughter has lordosis. MRI of the lower part of the spine revealed the discs between the vertebrae had burst." – PTLS family

"Diagnosed with kyphosis of the spine along with a pocket of fluid in the spine (thoracolumbar syrinx) with nerves in the spine pulled tight (cord tethering)." – YUHAL syndrome family

Teeth

For children with PTLS, CMT1A and YUHAL syndrome, serious dental concerns are not a major feature, but minor differences can occur. Children with chromosome conditions often have more dental issues than their peers, so regular dental care is recommended. Unique data suggest over half of children with PTLS may have dental anomalies, such as crooked, crowded, small or irregular teeth. Teething may be earlier or later than is typical and children may have bite differences such as an overbite (Potocki 2017; Unique 2026).

Some children with CMT1A report sore gums or severe tooth decay, occasionally needing teeth to be removed (Unique 2026).

With YUHAL syndrome, about half of children experience issues such as overcrowded teeth, weaker enamel, cavities, teeth grinding or delayed teething. Many benefit from braces or other orthodontic treatments to help align the teeth (Unique 2026).

Medical literature emphasises the need for careful planning during dental procedures, sometimes using intravenous sedation, with particular attention to airway safety and breathing risks (Wakita 2024). Holistic and multidisciplinary approaches, involving dentists, physicians, geneticists and therapists, are often recommended to address both medical and functional dental needs (Morawala 2022).

A high standard of dental care is important to minimise damage by decay and erosion (by grinding). Children and adults may also benefit from specialist hospital dental services and may require treatment under general anaesthetic.

Unique publishes a separate guide to Looking after your child's teeth and Teeth common concerns

"[He] teethed early and lost his teeth early. But he didn't like how the teeth felt in his mouth when they were loose. So, he pulled all his teeth as soon as they wiggled." – PTLS family

"Braces done and has a beautiful smile now." – PTLS family

"Throughout her life she has ground her teeth and they are now virtually flat. Therefore, she requires a soft food diet. To our knowledge, she has never lost a tooth that's come out of her mouth. She must have swallowed them. She needed an anaesthetic for a dentist to examine her and undertake any remedial work." – PTLS family

"The first teeth, two of the lower ones at the same time, appeared at 4 months. The baby teeth grew faster. The bite also began to shift more quickly. The lower front teeth are somewhat crowded. The enamel is weak, so we use toothpaste with a higher fluoride content of 1300-1500 ppm." – PTLS family

"Has had multiple dental general anaesthetics - for check-ups (can't tolerate any examinations), root canal, fissures as enamel is almost non-existent, fractures in dentine." – YUHAL syndrome family

Palate

For people with PTLS, CMT1A and YUHAL syndrome, obvious problems with the roof of the mouth (palate) are not common. Notably, while over half of Unique members with PTLS do not have any problems with their palate, about a third of Unique members have a high-arched palate. This is slightly more common in children with YUHAL syndrome, where a high-arched palate is reported by about half of Unique families.

> ***The doctors only discovered that she had a high palate when she was about two. They never checked her when she was failing to gain weight and was having difficulties sucking." – PTLS family***

"Palate expander at 10 years of age." – PTLS family

Kidney / urinary tract anomalies

For individuals with PTLS, CMT1A and YUHAL syndrome, anomalies of the kidney are uncommon, but they are present in some children. The type and severity of issues can vary. Since kidney anomalies can sometimes be hidden without obvious symptoms, regular kidney ultrasounds are recommended to catch any issues early (Goh 2012).

Unique has one child member with PTLS who had an underdeveloped kidney and a child with CMT1A who has an overactive bladder and sometimes has accidents (Unique 2026). Other studies into PTLS have found rare problems like kidneys that are too small, kidneys with multiple cysts or swelling from urine not draining properly (Potocki 2017; Ciaccio 2020, Coudert 2026).

Serious kidney problems associated with PTLS are rare, affecting less than 10% (1 in 10) of individuals.

> ***Bladder retention… needs to urinate twice to make sure the bladder is completely empty." – PTLS family***

"My daughter has kidney problems, but they started when she was 9. Ultrasound shows signs that the kidneys are holding more fluid than usual (renal volume expansion). The nephrologist also diagnosed the following: Kidneys are not working typically (abnormal renal function), bladder problems due to nerve changes (neurogenic bladder), bedwetting (nocturnal enuresis) and kidneys not filtering uric acid well (hyperuricemia). No treatment is currently required, we are monitoring her." – PTLS family

Skin and Hair

For children with PTLS, skin and hair differences are quite common, although the type and severity vary. Among Unique members, over half of children have differences in their hair, which may be fine or thin, coarse, patchy or involve excess body hair (hirsutism or hypertrichosis). Skin differences are reported in around two out of three Unique children, including easy bruising, eczema, excessive sweating (hyperhidrosis) and stretch marks (Unique 2026).

For people with CMT1A, hair is often described as fine or thin and some children experience excessive sweating. Other skin problems are not commonly reported (Unique 2026).

For children with YUHAL syndrome, skin and hair differences are also frequent. About half have excess body hair and a quarter have thick or coarse hair. The remaining children have no hair differences at all. Skin issues include eczema, easy bruising and excessive sweating (Unique 2026).

Fine head hair and excessive body hair. [Hair] being dark as well has caused body confidence problems, particularly once she became a teenager. It's only in the past two years that we have paid for her to have laser hair removal as we couldn't get this on the NHS. This has helped, but the treatment will be ongoing. It's very expensive." – PTLS family

"[He] has always had thin hair at the back. I always assumed the thin hair at the back was because he spent so much time on his back. As he grew up, he had thick curly hair and so the thin part was not very noticeable. As he has aged, he now has a pronounced "monk's tonsure" bald spot. It was not very evident until the last five years or so. He started shaving his head about seven years ago and when he decided to regrow his "curly" hair, we discovered that he could no longer grow curly hair on the top! Stretch marks on his back from (I assume) quick growth spurts." – PTLS family

"Has very thick hair on the head, but so does grandmother. Has lots of hair on arms and legs." – YUHAL syndrome family

Genitals

In people with PTLS, there are reports of boys undergoing surgical repair because the opening of the urethra was slightly misplaced (hypospadias) early in life (Magoulas 2013).

For people with CMT1A, fertility is generally unaffected. Adults with severe nerve problems may sometimes experience trouble with sexual activity (sexual dysfunction), but typically fertility is not affected (Bird 2025).

Information relating to YUHAL syndrome is limited. One boy was reported with an undescended testicle (cryptorchidism) and a mild form of hypospadias (Unique 2026).

Undescended testicle surgery when a small child." – YUHAL syndrome

This section includes some more complicated scientific terms and concepts - don't worry if it's a lot to take in, you can always come back to this section later if you want to.

Are there people with PTLS, CMT1A and YUHAL syndrome who are unaffected?

For people with PTLS, the condition is **fully penetrant**, meaning everyone with an RAI1 gene duplication shows at least some signs of the syndrome, though severity ranges from mild to more noticeable (Potocki 2017; Ciaccio 2020). Some children have developmental delay, learning difficulties or social challenges, while others are only mildly affected and can grow up with few concerns.

For children with CMT1A, most people with a PMP22 duplication also show signs of the condition, making it generally **highly penetrant**, but there is more variability. Some may have subtle nerve changes without obvious symptoms, while others develop muscle weakness, foot differences or more complex complications (Kulkarni 2015; Naggapa 2020). Differences in severity, onset and progression are influenced by genetic modifiers, environmental factors and other health conditions (Watila 2015; Tao 2019; Pipis 2019; Boutary 2021).

Roussy–Levy syndrome is considered a more severe form of CMT1A. In addition to the usual symptoms of CMT1A, children with Roussy–Levy syndrome often develop symptoms earlier in life, such as delayed walking, frequent falls, clumsiness, shaking in the arms and balance problems. Even with these added features, nerve tests and genetic findings are the same as in classic CMT1A, showing that Roussy–Levy syndrome is part of the same condition rather than a separate disease (Watila 2015).

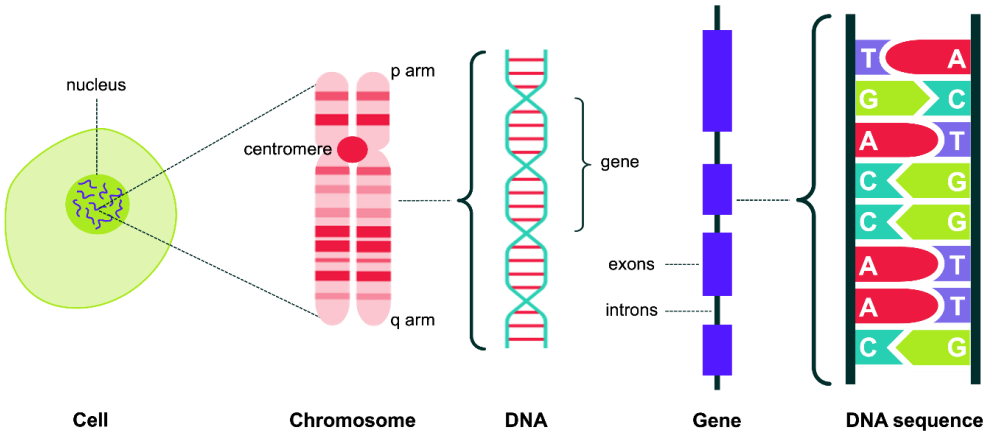
Overall, while a few individuals with an RAI1 or PMP22 gene may be only mildly affected, most show at least some medical, developmental or neurological differences.

What causes PTLS, CMT1A or YUHAL syndrome?

For typical development, chromosomes should contain the expected amount of genetic material. PTLS, CMT1A and YUHAL syndrome are most often caused by the gain of a small piece of genetic material from one of the body's chromosomes – chromosome 17.

Chromosomes, genes and DNA

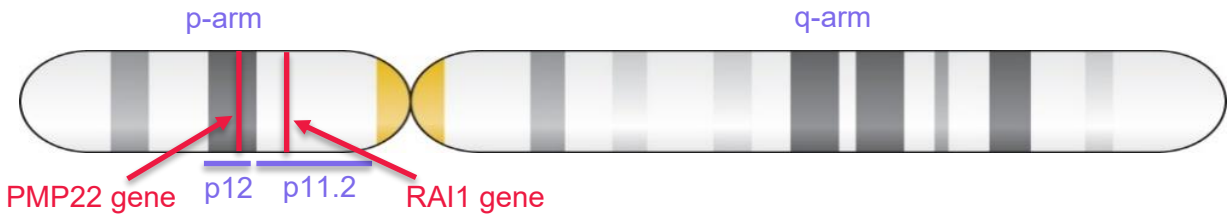
Our bodies are made up of many different types of **cells** and almost all of them contain the same set of **chromosomes**. Chromosomes are made of **DNA**, which carries our **genes**. Chromosomes could be thought of as our set of instructional manuals and genes could be thought of as separate instructions in each manual. DNA is made up of building blocks called **bases** or **nucleotides**. There are four DNA bases which can be abbreviated to the letters **A**, **C**, **G** and **T**. These DNA bases are paired up in the DNA structure into **base pairs**.



Chromosomes also come in pairs with one member of each pair being inherited from each parent. Most of our cells have 23 pairs of chromosomes (a total of 46). Chromosome pairs are numbered 1 to 22, roughly according to decreasing size. The 23rd pair comprises the sex chromosomes that determine biological sex. Males usually have one X chromosome and one Y chromosome (XY) and females usually have two X chromosomes (XX).

Chromosomes can't be seen with the naked eye but if cells are prepared in a specific way, the chromosomes can be stained and viewed under a microscope. Each chromosome can be seen to have a specific **banding pattern** made of light and dark bands. You can see the typical banding pattern for chromosome 17 in the image below. Each chromosome has a **short (p) arm** and a **long (q) arm** and the point at which the arms meet is called the **centromere** (coloured yellow in the image below). Bands are numbered outwards starting from the centromere.

Chromosome 17



In the past, chromosome duplications were routinely identified by the basic band staining procedure mentioned above. However, many duplications are too small to be seen using this technique. Genetic testing has improved enormously over the years and there are now more precise and detailed tests available such as a **chromosome microarray test** (CMA) (for example an **array CGH** or **SNP array**) and **sequencing,** for example **whole genome sequencing** (WGS) or **whole exome sequencing** (WES). These types of tests can detect very small duplications even when a specific diagnosis is not suspected. Array and sequencing results provide more precise details of which piece of chromosome is missing and which genes are involved.

Unique publishes a separate guide to ArrayCGH, SNParrary and DNA sequencing

Low-Copy Repeats (LCRs)

Some parts of our chromosomes have DNA that looks almost the same, like repeated sentences in a book. These repeats are called **low-copy repeats** (**LCRs**). They are not extra copies of the chromosome, just similar stretches of DNA. The repeated DNA sequences in LCRs can confuse the cell during the complex process of cell divisions that lead to the creation of egg or sperm cells. Normally, chromosomes line up carefully during cell division to exchange genetic material correctly. However, when repeated sequences are present, the chromosomes may align incorrectly. This can lead to a piece of DNA being duplicated or deleted.

Certain areas of the genome, like 17p11.2 to 17p12, have lots of these LCRs, which makes them fragile and prone to rearrangements. Because these repeats occur in the same places in many people, the same sections of DNA are often affected in the same way. These are called recurrent changes. This is why most cases of PTLS involve the same duplication in chromosome 17p11.2 and why most cases of CMT1A involve the same duplication in 17p12.

LCRs can also cause less predictable changes. Sometimes they confuse the DNA copying machinery itself, leading to unique duplications that vary from person to person. This happens in rarer conditions, like YUHAL syndrome, where the duplicated DNA sections are different sizes and have different breakpoints in each person.

Genetic Report

A clinical geneticist or genetic counsellor may have given you detailed information about the piece of chromosome 17 that has been duplicated in your child. The information you are given will include any significant genetic changes that are identified and which significant genes are included in the changes.

You may have been given a **karyotype**, which is a shorthand way of showing your child's chromosomes. For a 17p duplication, the results might look something like this:

46,XY,dup(17)(p11.2p12)dn

46	The total number of chromosomes in your child's cells (most human cells have 46 chromosomes)
XY	The sex chromosomes (XY for a male, XX for a female)
dup	There is a duplication, meaning extra DNA
(17)	The duplication is in chromosome 17
(p11.2p12)	The chromosome has broken at two points: p11.2 and p12. The DNA between these points is duplicated
dn	"De novo," meaning the duplication is new in your child and was not inherited from either parent

In addition to karyotyping, you may receive results from more detailed tests, like **whole genome sequencing (WGS)** or **whole exome sequencing (WES)**, which can detect smaller duplications. With a 17p duplication, the results may look something like this:

46,XX,dup(17)(p11.2p11.2). seq[GRCh38] dup(17)(p11.2p11.2) (chr17:17,666,735_20,482,998)x3

46	The total number of chromosomes in your child's cells (most human cells have 46 chromosomes)
XX	The sex chromosomes (XY for a male, XX for a female)
dup	There is a duplication, meaning extra DNA
(17)	The duplication is in chromosome 17
(p11.2p11.2)	The chromosome has broken at two points: p11.2 and p11.2. The DNA between these points is duplicated
.seq	The test was done using genome sequencing.
[GRCh38]	Genome Reference Consortium Human Build 38 (GRCh38), also known as the Human Genome build 38 **(see Genome Assemblies below)**. This is the reference DNA sequence that the base pair numbers refer to.
(chr17:17,666,735_20,482,998)	The base pairs involved are between 17,666,735 and 20,482,998. Take the bigger number from the smaller number and you get 2,816,263 base pairs, also known as 2.816 megabases (Mb). This is the number of base pairs that are duplicated
x3	There are three copies of these base pairs, instead of the usual two, so this a duplication

The result of a chromosome **microarray** test is shown below:

arr[hg19] 17p12 (13,745,632-14,876,827)x3 dn

arr	The analysis was using microarray technology (arr)
hg19	Human Genome build 19 (also known as Genome Reference Consortium Human Build 37 (GRCh37) (see **Genome Assemblies** below). This is the reference DNA sequence that the base pair numbers refer to.
17p12	The chromosome involved is chromosome 17 and the position of the duplication is in band p12
13,745,632-14,876,827	The base pairs involved are between 13,745,632 and 14,876,827. Take the bigger number from the smaller number and you get 1,131,195 base pairs, also known as 1.131 megabases (Mb). This is the number of base pairs that are duplicated
x3	There are three copies of these base pairs, instead of the usual two, so this a duplication
dn	The duplication occurred de novo (dn) meaning the duplication is new in your child and was not inherited from either parent

Unique publishes a separate guide to Interpreting genetic test results

Genome Assemblies

The Human Genome Project was an international scientific effort that aimed to map all the DNA in human cells. This gave scientists a reference map showing where genes are located along our DNA. However, the first version was not perfect. Some parts of the map were missing or unclear. Since then, scientists have continued to improve this map by filling in gaps and correcting details.

As new information is discovered, updated versions of the reference map are released. These are called "**genome builds**" or "**assemblies**."

For example, a widely used newer version is **hg38** (**GRCh38**). An older version is **hg19** (**GRCh37**). Both versions are sometimes used in some genetic reports.

Because each version is slightly different, the exact position of a duplication can appear to change depending on which genome build is used. This is why it is important to know which version was used when looking at genetic results.

Why did this happen?

When children are conceived, their parents' chromosomes are copied in the egg and sperm that makes a new child. The biological copying method is not perfect and random changes occur in the DNA of all children, which are not seen the DNA of their parents. This happens naturally and is not due to the parents' diet, environment or lifestyle. Most of these DNA changes have no obvious effect. But in rare instances these random DNA changes can lead to health issues or affect development.

To understand why a child has PTLS, CMT1A or YUHAL syndrome, doctors often recommend a blood test to look at both parents' chromosomes. This testing helps determine whether the genetic change was inherited or whether it happened for the first time in the affected child (OMIM; Yusupov 2011; Potocki 2017).

In most people, PTLS and YUHAL syndrome happen completely by chance. In genetics, this is called **de novo**, which means the duplication is new in the child and was not passed down from either parent. When this happens, both parents usually have unchanged chromosomes. A de novo duplication most often occurs while the egg or sperm is being formed or very early after fertilisation when the embryo's cells are copying their DNA. Research shows that most cases of PTLS and many cases of YUHAL syndrome are de novo, with no genetic changes found in either parent (OMIM; Shchelochkov 2010; Yuan 2015).

Sometimes, however, a duplication involving chromosome 17 is inherited. This is more common in people with CMT1A. Studies show that only about one in five instances of CMT1A are de novo, meaning most people with CMT1A inherit the duplication from a parent (Hoyle 2015; Naggapa 2020). Children with de novo CMT1A often have slightly milder symptoms than those who inherit it, although nerve testing usually looks very similar in both groups. This means the underlying nerve changes are alike, even if physical symptoms differ somewhat (Morena 2019; Naggapa 2020).

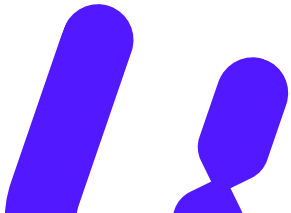
In some families, PTLS, CMT1A or YUHAL syndrome can be linked to a chromosome rearrangement in one parent called a **balanced translocation**. In a balanced translocation, pieces of chromosomes have swapped places, but no genetic material is lost or gained. Because of this, the parent is usually healthy and unaware of the rearrangement. However, when chromosomes are passed on to a child, this rearrangement can sometimes lead to extra genetic material. Balanced translocations are not rare and about one in 560 people carry one, which means more than 12 million people worldwide are carriers (OMIM; Yuan 2015). Most carriers have no health concerns, although some may experience fertility issues or pregnancy losses.

Unique publishes a separate guide to Balanced translocations and Unbalanced translocations

In a small number of individuals, only some of the child's cells carry the duplication while other cells do not. This is called **mosaicism** and usually happens after fertilisation. Because not all cells are affected, mosaicism often leads to milder features than when every cell has the duplication (Zhang 2010; Potocki 2017).

Unique publishes a separate guide to Mosaicism

It is very important for parents to know that nothing they did caused this duplication. There are no known environmental, lifestyle or dietary factors that lead to PTLS, CMT1A or YUHAL syndrome (Zhang 2010; Shuib 2017).



Can PTLS, CMT1A or YUHAL syndrome happen again?

Whether PTLS, CMT1A or YUHAL syndrome happens again in a family mostly depends on the parents' chromosomes. If the duplication has been found to be de novo, meaning both parents have unchanged chromosomes, it is very unlikely that another child will be affected (around 1%). However, if a parent carries a rearrangement of chromosome 17p or has mosaicism (meaning only some of their cells carry the change), the chance of having another child with the duplication is much higher.

There isn't much information about people with PTLS, CMT1A or YUHAL syndrome having children. However, if an affected individual does have a child, there is a 50% chance that a child will inherit the condition. However, the severity of the condition and the symptoms they have can vary a lot, even within the same family.

For people with CMT1A, some individuals in the same family may have very mild nerve changes that may go unnoticed for years, while others develop more obvious weakness or disability (van Paassen 2014). Some people with CMT1A can be nearly symptom-free even as adults, though nerve testing still shows differences (Berciano 1994). Even identical twins with the same gene change can show different severity, suggesting other factors affect symptoms (Garcia 1995).

For PTLS, one family in the medical literature reported a child with heart anomalies, feeding difficulties, developmental delays, low muscle tone and joint flexibility, while his mother, who also had PTLS, had mild developmental and learning challenges along with seizures and mood issues. In another family, a woman was diagnosed when her unborn baby showed foot anomalies. She had a history of developmental delay and mild physical differences. Her baby had early feeding difficulties but was otherwise developing typically. These examples show that the symptoms of PTLS, CMT1A and YUHAL syndrome can vary widely, even within the same family and that parents may not know they are affected until their child is diagnosed (Yusupov 2011; Magoulas 2013).

Parents may therefore wish to be tested to see if they also have PTLS, CMT1A or YUHAL. Based on these results, parents may want to meet with a genetic counsellor to understand the chances of having another affected child and the testing options available. One option is preimplantation genetic diagnosis (PGD), which is carried out in conjunction with in vitro fertilisation (IVF). In this process, embryos are tested for the duplication and only embryos without a duplication are implanted. Another option is prenatal testing during a natural pregnancy, such as chorionic villus sampling (CVS) or amniocentesis, which checks the baby's chromosomes before birth. These tests are usually very accurate, though availability can vary by country (Potocki 2017).

Unique publishes a separate guide to Planning your next child, Prenatal genetic testing and diagnosis and A clinical genetics appointment

Can PTLS, CMT1A or YUHAL syndrome be cured?

At present, there is no cure for PTLS, CMT1A or YUHAL syndrome because the genetic change happens very early, during the formation and development of the baby. This means the extra DNA has already influenced how the body and brain develop and it cannot be removed or reversed.

However, knowing the diagnosis is still very important. It allows doctors and families to plan the right care and support. Children can be monitored closely for issues with growth, heart function, muscles, nerves, learning and behaviour. Early interventions, such as physiotherapy, occupational therapy, speech therapy or special education, can help improve development and quality of life. In addition, regular check-ups with specialists can catch potential medical problems early, giving families the best chance to manage symptoms effectively.

Management recommendations

No clinical practice guidelines for PTLS, CMT1A or YUHAL syndrome have been published (2026). The following suggestions have been provided by clinicians, who have personal experience of managing / treating individuals with the condition, to improve quality of life and reduce complications.

As there is no cure for PTLS, CMT1A or YUHAL syndrome, treatment and management focus on managing symptoms, supporting development and improving quality of life. Since the severity and combination of symptoms vary widely from person to person, care is most effective when it is individualised and coordinated by a multidisciplinary team that may include medical geneticists, paediatricians, neurologists, cardiologists, speech and occupational therapists, psychologists and dentists (Kolbasin 2024; Deginet 2024).

Immediately following diagnosis

When not carried out as part of the diagnostic process, an evaluation of the features of PTLS, CMT1A and YUHAL syndrome is recommended. This can determine which of the features are present and how severe they are.

The following assessments are recommended for children with PTLS, CMT1A and YUHAL syndrome:

- **Physical examination** to check for growth delay, low muscle tone, joint flexibility, scoliosis, high-arched feet or other structural differences
- **Cardiac assessment** to detect heart conditions, which may sometimes be present from birth
- **Audiological (hearing) assessment** to determine whether there is any hearing loss and ensure early intervention
- **Ophthalmologic (eye) assessment** to identify vision problems such as strabismus, long- or short-sightedness or other visual differences
- **Neurologic assessment** to evaluate motor skills, balance, coordination, peripheral neuropathy, ataxia and learning (intellectual) disability. Brain imaging such as **magnetic resonance imaging** (**MRI**) may be recommended, particularly in PTLS or YUHAL syndrome when Chiari malformations, corpus callosum differences or white matter changes are suspected
- **Sleep assessment** if children show difficulty falling asleep, frequent night wakings, snoring or other signs of sleep-disordered breathing, including obstructive or central sleep apnoea
- **Hormonal assessment** to monitor for growth hormone (GH) deficiency, especially if growth is slower than expected
- **Feeding and nutritional assessment** to address difficulties with sucking, swallowing, reflux, selective eating or failure to thrive

Genetic counselling should be offered to affected individuals and their families, along with guidance and signposting to family support services and relevant resources.

Unique publishes a separate guide to After Diagnosis: What Happens Next (UK resident version)

Unique publishes a separate guide to After Diagnosis: What Happens Next (United States of America Resident)

Unique publishes a separate guide to After Diagnosis: What Happens Next? (General guide)

Supportive care

Children with PTLS, CMT1A and YUHAL syndrome are likely to be under the care of a multidisciplinary team. The team should include a community or hospital paediatrician who can oversee care, monitor growth, development and behaviour and link in with affiliated services.

Paediatricians - doctors specialising in the physical, mental and social health of children from birth to young adulthood (PTLS, CMT1A, YUHAL).
Gastroenterologists - doctors dealing with conditions of the stomach and intestines (PTLS, YUHAL).
Neurologists - doctors dealing with conditions of the brain, spinal cord and nervous system, including seizures. This can include some musculoskeletal conditions (PTLS, CMT1A, YUHAL).
Orthopaediatricians - doctors specialising in bones and muscles (CMT1A, YUHAL).
Endocrinologists - doctors dealing with hormones and their effects on the body (PTLS, YUHAL).
Urologists - doctors who specialise in diagnosing and treating conditions affecting the urinary system (PTLS, YUHAL).
Ophthalmologists - doctors who specialise in conditions affecting the eyes (PTLS, YUHAL).
Podiatrists - doctors dealing with the foot, ankle and lower limbs (PTLS, CMT1A, YUHAL).
Audiologist - a health professional who diagnoses, treats and helps manage a hearing or balance condition (PTLS, YUHAL).
Otorhinolaryngologists - doctors specialising in conditions of the ear, nose and throat (ENT) (PTLS, YUHAL).
Dermatologists - doctors dealing with conditions of the skin (PTLS, CMT1A, YUHAL).
Cardiologists - doctors specialising in conditions of the heart (PTLS, YUHAL).
Geneticists - doctors dealing with diagnosis and management of genetic conditions (PTLS, CMT1A, YUHAL).
Specialist nurses and / or other healthcare professionals may need to plan an affected child's treatment systematically and comprehensively.

Treatments and therapies

Early intervention can prove particularly beneficial and formal testing to assess specific, individual needs is recommended. An **education, health and care plan** (**EHCP**) in the UK, **individualized education plan** (**IEP**) in the US or equivalent document in other countries, may be issued after a child has undergone an assessment, to help ensure that the educational, health and social provisions deemed necessary to support the child's needs are delivered.

Physiotherapy (PT) for low muscle tone (hypotonia) and gross motor delays, which usually includes exercises to build core strength, improve balance and enhance coordination to help children achieve motor milestones like sitting, crawling, walking and to improve overall mobility.
Occupational Therapy (OT) for fine motor skill delays and sensory sensitivities, which can include activities to improve hand strength and coordination for daily tasks (e.g. feeding and dressing) and sensory integration therapy to help individuals better process and respond to sensory information from their environment.
Speech and Language Therapy for a range of speech and language delays or difficulties and feeding / swallowing difficulties. For children with moderate to severe difficulties, this can include regular sessions focusing on Augmentative and Alternative Communication (AAC) methods (e.g. sign language, picture exchange systems and high-tech communication devices) and provides a functional means of communication for individuals who are non-verbal or have very limited speech.
Behavioural therapy for features of autism, ADHD and anxiety, which can include structured therapies like Applied Behaviour Analysis (ABA) for / to help manage challenging behaviours, improve social skills and develop coping strategies.

Surveillance

It is recommended that the following evaluations are considered to monitor an individual's existing symptoms, how they respond to care and treatment and whether any new symptoms emerge over time:

- Monitor for growth and nutrition
- Neuropsychiatric and learning assessments every few years to optimise the EHCP / IEP
- Regular dental check-ups
- Consider a palate review (particularly if there are feeding difficulties or speech concerns)
- Consider an annual cardiac review
- Consider annual audiologic assessments
- Consider a neurologic review (including MRI and EEG, if indicated by seizures)
- Consider a skeletal review
- On-going (likely annual) examinations by an ophthalmologist
- Kidney function should be monitored as per the recommendations of a nephrologist, particularly in the setting of ultrasound findings or recurrent urinary tract infections
- Consider regular meetings with an endocrinologist
- Monitor for constipation and treatment as directed by the primary care provider or gastroenterologist
- Consider need for sleep study
- Assessment of the need for social support, such as respite care and home nursing care or genetic counselling and family planning advice

"Her eyesight is checked annually as her eyes move or shake on their own (nystagmus), wears specialised glasses and is registered partially sighted. [She] has an annual health check with her GP (which used to be easy to have but now I have to battle to get). We are now waiting for a heart scan as she has never had one and I felt she should." – PTLS family

"[She] is reviewed six-monthly by a specialist epileptic nurse. She also has annual appointments with a clinical psychiatrist. The local GP practice monitors other issues." – PTLS family

"Ophthalmologists for the eyes and dentists for the teeth. Neurologists for the Charcot Marie Tooth. Has had physiotherapy (PT), occupational therapy (OT), speech and behavioural support off and on her whole life (not all necessarily at the same time) including periods of rehabilitation following orthopaedic surgeries. Since moving to supported accommodation (group home) eight years ago, has had regular OT, speech and behavioural support, current to this day." – YUHAL syndrome family

"Neurologists (absence seizures), respiratory (Home Vent Team), gastroenterology (ongoing gastric issues, gut inflammation (raised faecal calprotectin), excessive stomach gas, monitoring of PEG), ENT (chronic ear canal infections and burst eardrum), cardiology." – YUHAL syndrome family

"She is under the care of endocrinology, immunologists, genetics and orthopaedic clinics. Generally, my daughter's health is very good". – YUHAL syndrome family

Ongoing Research

Researchers are increasingly focusing on the RAI1 gene because of how this gene helps control other genes in the brain and affects things like sleep, behaviour and body weight. When there is an extra copy of the RAI1 gene, as seen in conditions like PTLS and YUHAL syndrome, it can impact these normal processes (Yang 2025; Covarelli 2025). Scientists are now trying to understand how the body responds to having this extra gene copy, which may help guide future treatments, although this research is still in its early stages.

Studies using animals and cells suggest that RAI1 helps organise DNA and control which genes are switched on or off. This means that, in the future, medicines might be able to adjust how genes behave and reduce the effects of having an extra RAI1 gene (Covarelli 2025). Researchers have also found that people with PTLS have unique modifications to how their DNA is packaged, but doesn't change the sequence itself, called methylation patterns. In the future, treatments might aim to partly correct these patterns (van der Laan 2026). At the moment, though, this information is mainly used to help diagnose PTLS.

Right now, there is no way to directly reduce RAI1 levels in people. However, scientists are looking at safer ways to manage symptoms, such as improving brain signalling, sleep or metabolism (Yang 2025). Any future treatment would need to be managed very carefully, because even small changes in this gene can have large effects.

For CMT1A, research has moved further ahead. In the past, treatment mainly focused on managing symptoms. Now, scientists are working on ways to tackle the underlying cause; the PMP22 gene (Stavrou 2023). When there are additional copies of the PMP22 gene, the body makes too much PMP22 protein. Some of this PMP22 protein is made incorrectly and these faulty proteins clump together, impacting usual functioning. One approach aims to reduce the amount of a PMP22 protein produced by the PMP22 gene. In animal studies, new treatments have been able to lower PMP22 levels, repair the protective covering around nerves and improve movement (Zhao 2018; Stavrou 2022). Importantly, these treatments reduce the protein without removing it completely, as the body still needs some of it. These treatments are not yet available for people, but progress is being made.

Another area of research looks at the cells that support nerves. More product produced by the PMP22 gene puts pressure on these cells, leading to nerve damage. Some studies in mice show that certain drugs can help these cells cope better, improving nerve function (Bai 2022, Stavrou 2023). There is also research into using electrical stimulation to support nerve health. Early studies suggest that certain patterns of electrical signals may help nerve-supporting cells function better and maintain myelin (Stavrou 2022). Although still experimental, this could become part of future treatment options.

Scientists are also studying the makeup of myelin. In people with CMT1A, myelin not only gradually breaks down, but is also not fully developed. Treatments that improve myelin's chemical balance, especially its fat content, may help nerves work better, even without directly changing PMP22 levels (Capodivento 2024). Scientists are also testing ways to reduce the effects of having an extra copy of the PMP22 gene. In lab studies, they've tried using specially engineered viruses (called AAV vectors) to deliver treatments that "turn down" the extra gene (McCoy, 2026), as well as a technology called microRNA that can also help reduce its activity (Stavrou, 2026).

Alongside these new promising studies, everyday support remains very important. Gentle exercise and physiotherapy can improve balance, strength and walking without causing harm (Bottoni 2024). Modern braces and supports are also lighter and more comfortable, helping people move more safely, even if they do not treat the underlying condition (Tozza 2022).

Overall, future treatments will likely combine different approaches. Some will aim to address the root cause, while others will focus on protecting nerves and improving daily function. Although these treatments are not yet widely available, ongoing research offers hope for better options in the future (Stavrou 2023; Capodivento 2024; De Grado 2025).

Impact of a diagnosis on Unique families

Receiving a diagnosis has a profound and mixed impact on families. Parents often feel relief and validation in understanding the cause of their child's developmental challenges, which can help them to access support, plan care and explain past behaviours. At the same time, families may experience worry, sadness and a sense of loss for the child they expected, as well as practical and emotional challenges including financial strain, balancing work and family and navigating limited professional support. Some parents describe the experience as life-changing, requiring constant attention and care, but also as an opportunity to develop resilience, empathy and a deeper appreciation for life's simpler moments. While difficult, families emphasise the importance of mutual support, accessing resources and connecting with others who understand the condition (Unique 2026).

A study examining sibling relationships found that healthy siblings may experience sadness, guilt or embarrassment related to their brother or sister's condition, even when they appear outwardly well adjusted. This highlights the importance of psychological support and family-centred care (Antunes 2023).

Unique publishes a separate guide to Carers wellbeing, Mental health and wellbeing and Supporting siblings of children with a rare genetic condition

"I was in shock and couldn't believe it, as a week before his consultant confirmed that the blood test was fine. Then she called me back and asked me to come alone to let me know about the news and give me Unique's details so that they can explain to me about his genetic testing." – PTLS family

"Mixed feelings: relief that there was a reason behind her development delay but also sadness. I felt a sense of loss for a child that we wouldn't have. We love her so much, but it is hard work at times, especially now we are getting older and she is 28 but like a ten-year-old. She can be demanding, asks lots of questions and likes to be very organised. Life changing more than having a mainstream child. I have been lucky that my husband has a good job as I have always worked part time as I've been unable to take on a full-time job. This got harder once she left education. I now only work ten hours a week plus keeping an eye on an elderly parent as well." – PTLS family

"As he was 42 years old [when he was diagnosed], it made little difference to our outlook on his future, but it did provide a reason for why he was like he was. It also provided answers to some of his past behaviour. It gave us peace of mind as we were under the impression for 42 years that his condition was the result of 'lack of oxygen at birth'." – PTLS family

"It was nice to have a label but because there were so few diagnoses at the time we had no idea what this really meant. It has severely impacted our finances. Sending him to a medical school was funded by us and we had to remortgage our home. Our mortgage now is greater than when we first bought our home. We have less money to help our older daughter. And my husband doesn't quite understand all that is involved with my son, so it is a strain on the relationship." – PTLS family

"[The diagnosis] helped because the doctors kept saying I was inexperienced and that's why my daughter was not eating, so it was a relief to have an answer, but I felt very alone and worried after." – PTLS family

"Confused, lost. We have to do a lot of extra supplementing to help him reach his potential. Sadly, our state does not recognise PTLS, so he doesn't get any government support once he turns 22, so our family is under a lot of stress trying to figure out his future. Once you hit 22, you are on your own. All the support system through school ends." – PTLS family

"She was one of the first to have this problem so there were no other children with whom to make comparisons. Diagnosis explained her problem but didn't help us deal with her day to day. The medical professionals we dealt with were mostly unaware of how the diagnosis affected [her]: 'We're not aware of this condition.' Probably there has been an impact on our family. We have always had a disabled child in our family so we don't know what it would be like if there weren't one. In her younger years we had 24 hours a day involvement. In later years, as she has experienced more problems and even though not at home, she is still in our head 24 hours a day." – PTLS family

"We were worried as the diagnosis is rare, but the detection of the syndrome helped to provide high-quality timely diagnosis and assistance to the child. The moments that happened to the child in early childhood became clear. We only learned about our daughter's genetic disorder when she was five years old. Before then we had struggled with acceptance. Of course, it was a very difficult experience psychologically, but my husband and I supported each other and that helped us become stronger. After receiving an accurate diagnosis, brochures and a checklist, it became easier for us to monitor our daughter's condition and better care for her health." – PTLS family

"Good to have a label to access support but upset to hear about limitations in future life. Challenging to balance other family commitments and work etc. It was a relief to know there was a medical reason and then maybe we could get more support at school." – PTLS family

"Made us all better people, more understanding and very tolerant." – PTLS family

"Felt relieved to know why she was like she was. [The diagnosis] was hard at first, seeing it is genetic and comes from myself. I blamed myself for putting this on her and made it a bit harder due to the heart condition, the auditory processing disorder (APD), autism spectrum. But when you get told she won't amount to much and then you see all the hard work we have put in to help her as a family, I'm so proud. I love her so much I would not change her for anyone else." – CMT1A family

"We were upset and worried at first. We worried what it would mean for his life and future. We wanted to find out as much as we could about Potocki-Lupski syndrome before telling other family and friends. Our life had changed dramatically. He needs help with everything. We have to think about how he will cope with every situation. Massive impact on us." – YUHAL syndrome family

"Our first child was a typically developing child, so it was a relief to get an answer to our questions about her developmental delays. A diagnosis also meant we could get treatment from the various experts. It has been mixed blessings. It was very hard receiving a diagnosis and it was difficult for her sibling, especially in the teenage years, but having a child with an intellectual disability gives you the opportunity to see the world in a very different light. You get to experience the simplicities of life that you wouldn't normally do with a typically developing child. There is no doubt there have been very difficult and heartbreaking moments, but the resilience and courage of our daughter is inspiring." – YUHAL syndrome family

Families say…

"Don't give up. Fight for what your child deserves. Yes, it's stressful, but involve as many professionals as possible. Stay calm but assertive in meetings. Seek advice from other parents in your area, as every county works differently. Get all the help you can and connect with other parents who have children with disabilities. Try to make time for yourself and your partner. Life will be challenging at times, but every milestone is worth celebrating. Your child can and will achieve more than you imagine and will continue to surprise you. Stay positive if you can. Cry, get angry, but don't pretend you're fine if you're struggling. Seek support." – PTLS family

"Always treat your child as you would the others whenever possible. Include your child in family activities and engage with disability organisations to understand how others cope, gain advice and receive support." – PTLS family

"Reach out for help early and often." – PTLS family

"Slow down and enjoy the small moments. Don't compare your child with others. Love them dearly." – PTLS family

"Get as much help as you can from school but also supplement at home too. Follow your child's interests as much as possible, but don't be reluctant to introduce new things. Advocate with your local elected officials for more support at a local and federal level for PTLS. Bring awareness as much as you can." – PTLS family

"Look for peer support but remember the balance between nurture and nature. The greater the input, the greater the outcome." – PTLS family

"Be involved in the educational process. Be an active parent - organise joint activities with the class to bring children closer together. Don't give up. Find support in family and friends. Take time to rest from time to time. Everything will be fine." – PTLS family

"Keep strong and positive. Fight for the best for your child." – PTLS family

"50 years ago, there was no real knowledge about this condition, so we had to explore as many health channels as possible. This continues throughout her life. She was always involved in all family activities, outings and events and we aimed to keep her engaged. Her sisters were supportive and actively played a role in stimulating her senses. If Unique had existed then, the information and contact would have been so welcome. It is important to have peer support especially as one can talk more freely with those in a similar position. 45 years on some of us still meet for lunch and sharing!" – PTLS family

"Early intervention. Support is essential to avoid stress and depression." – PTLS family

"Be an advocate for your child. Try to support each other. Have a routine if possible. It's good to talk with other parents if possible. Not everyone understands what it's like" – PTLS family

"Treat it as a heavenly gift." – PTLS family

"Try and get has much support as your child needs. We had to fight for the support for our child when she needed it and always keep school / college up to date with everything. Get has much help has you can. Talk as a family, don't hide or put your feelings aside. Talk is the thing that helped us as a family.
It can be hard, but so very rewarding too. Make sure you talk and take everyone's feelings into consideration and get the help you need even if you have to fight for it." – CMT1A family

"I think Special Schools still have a place in society. Students at Special Schools have very small classes with a teacher's aide and therefore the possibility of extra care and intervention. I can only recommend them, but parents have to decide what is best for their child and family. They will develop to the best of their abilities. There is a lot of information out there now, compared to 30 years ago when I started out, so use the wonderful resources available like Unique and connect with other families. There will be heartbreak along the way, but the small achievements will amaze you. You'll see life in a totally different way and meet some amazing people on the same journey, but most importantly your child will bring great joy." – YUHAL syndrome family

"You're not alone. Find out as much as you can about the disorder. Make contact with other families who have a child with the same condition. Find the positives in your child's uniqueness. Keep going, you're doing great. Your life changes. It's hard but finding support from others going through a similar situation makes a big difference." – YUHAL syndrome family

Sources

The information in this guide is drawn from published medical literature, databases and Unique members. The first-named author and publication date from articles are given to allow you to look for the abstracts or free access articles on the internet in PubMed. Information gathered from DECIPHER (Database of genomic variation and phenotype in Humans using Ensembl Resources) is open access.

Unique currently [2026] has 94 members with a 17p11.2 duplication (PTLS), eight members with a 17p12 duplication (CMT1A) and 19 members with a 17p11.2p12 duplication (YUHAL syndrome) who live world-wide. Several other members have an additional genetic change(s). For these families, their child's symptoms and features may also be due at least in part to the additional genetic change(s). This guide is still of use in relation to features and symptoms related to the 17p duplication they have that causes PTLS, CMTT1A or YUHAL syndrome.

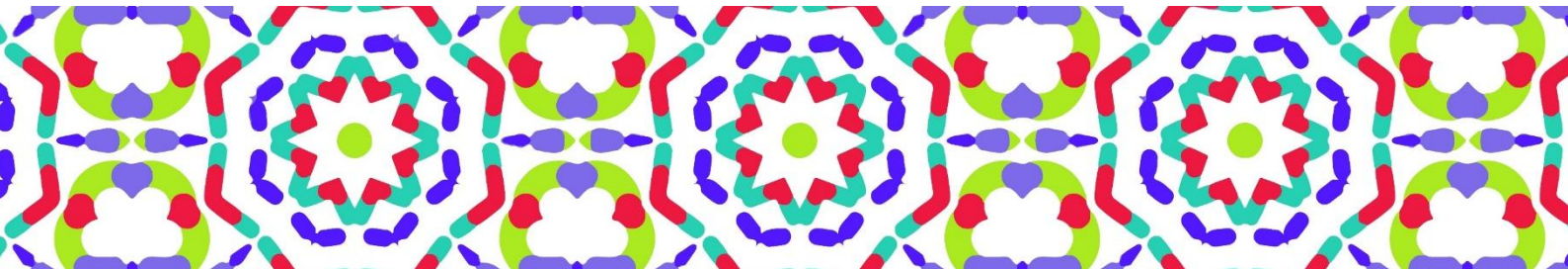
Reference

- *Dini G. et al. (2023) NFIA haploinsufficiency: case series and literature review. Front Pediatr. Oct 17; 11:1292654. Link to article
- *Potocki L. et al. (2007) Characterization of Potocki-Lupski syndrome dup (17)(p11.2p11.2) and delineation of a dosage-sensitive critical interval that can convey an autism phenotype. Am J Hum Genet. Apr;80(4):633–649. Link to article
- *Zhang F. et al. (2010) Identification of uncommon recurrent Potocki-Lupski syndrome-associated duplications and the distribution of rearrangement types and mechanisms in PTLS. Am J Hum Genet. Mar;86(3):462–470. Link to article
- *Soler-Alfonso C. et al. (2011) Potocki-Lupski syndrome: a microduplication syndrome associated with oropharyngeal dysphagia and failure to thrive. J Pediatr. Apr;158(4):655–659.e2. Link to article
- *Treadwell-Deering D. et al. (2010) Cognitive and behavioural characterization of Potocki-Lupski syndrome (duplication 17p11.2). J Dev Behav Pediatr. Mar;31(2):137–143. Link to article
- *Bissell S. et al. (2018) The behavioural phenotype of Potocki-Lupski syndrome: a cross-syndrome comparison. J Neurodev Disord. Jan;10:2. Link to article
- *Harel T., Lupski J.R. (2014) Charcot-Marie-Tooth disease and pathways to molecular-based therapies. Clin Genet. Nov;86(5):422–431. Link to article
- *Yuan B. et al. (2015) Nonrecurrent 17p11.2p12 rearrangement events that result in two concomitant genomic disorders: The PMP22-RAI1 contiguous gene duplication syndrome. Am J Hum Genet. Nov;97(5):691–707. Link to article
- *Potocki-Lupski Syndrome GeneReview (2017) Potocki-Lupski Syndrome. GeneReviews®. University of Washington, Seattle. Link to article
- *MedlinePlus Genetics (2018) Potocki-Lupski Syndrome. MedlinePlus Genetics overview. Link to article

All references with a '*' mean that the report is freely available to read online.

You can usually find the references used in this guide by searching in PubMed by using the following format: Author surname + year + key word (i.e. "Potocki Lupski" OR "17p11.2" OR "PMP22" OR "YUHAL").

Alternatively, you can contact us at Unique and we will be able to help locate the article for you.



Inform Network Support

Rare Chromosome Disorder Support Group
The Stables, Station Road West, Oxted, Surrey, RH8, 9EE, UK
Tel: +44(0)1883 723356
help@rarechromo.org I rarechromo.org

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Websites, Facebook groups and other links

- **PTLS Hope Research Foundation** – US-based patient-led organisation dedicated to accelerating research, advancing treatment development and supporting families affected by PTLS
- **CMT Research Foundation** - An organisation dedicated to accelerating treatments and cures for Charcot-Marie-Tooth disease (CMT) through research and partnerships
- **PTLS Foundation** - Provides education, resources and community support for individuals and families living with PTLS
- **Charcot-Marie-Tooth Association** - One of the largest organisations supporting people with CMT, offering information, advocacy and funding for research
- **Treat NMD – Neuromuscular Network** - An international network that works to improve diagnosis, care and treatment development for neuromuscular diseases (like CMT1A)
- **Inherited Neuropathy Consortium** - A research network focused on improving understanding and treatment of inherited neuropathies (like CMT1A)

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