CHAMP1 DISORDERS

(CHromosome Alignment Maintaining Phosphoprotein 1)

What is CHAMP1?

CHAMP1, short for Chromosome Alignment-Maintaining Phosphoprotein 1, is an ultra-rare genetic neurodevelopmental disorder caused by a mutation in the CHAMP1 gene, part of chromosome 13. CHAMP1 disorders causes a reduction in the level of correctly functioning CHAMP1 protein.

What does CHAMP1 do?

The CHAMP1 gene is important for cell division (mitosis), maintaining DNA and brain development.

When impaired, it causes cognitive problems, physical disabilities and medical complexities.
Research suggests the CHAMP1 protein is vital to early embryonic development.

How rare is CHAMP1?

As of 2024 there are around 160 known CHAMP1 diagnoses worldwide.

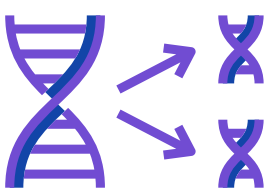
CHAMP1 affects roughly 1 in every 52 million people.
As Whole Exome Sequencing and similar methodology are becoming more available the number of patients is expected to increase dramatically.

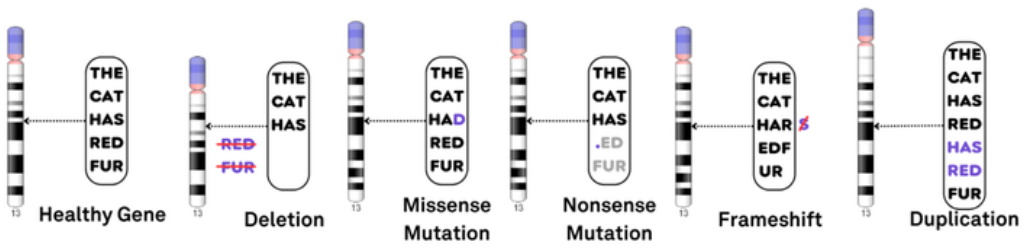
What causes CHAMP1?

CHAMP1 is typically a “de novo” (non-inherited) mutation that occurs in one of the two copies of the CHAMP1 gene. Meaning patients express one healthy copy and one mutated copy or variant of the CHAMP1 gene.

There are multiple variants of the gene mutation which affect individuals differently along a spectrum of severity. The mutations (or variants) that occur in the CHAMP1 gene include missense mutations, nonsense mutations, frameshift, duplication, microdeletions and deletions.

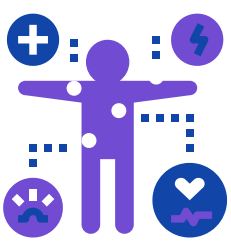
The type of mutation will determine how the CHAMP1 protein is altered.
It can cause a reduction in the amount of functioning CHAMP1 protein, as well as a change to, or gain of protein function.





In the alphabet, different letters can be combined to produce useful and meaningful words – but only if the letters are put together in the “correct” way.
The same goes for DNA. These letters are called nucleotides and are effectively arranged and read as sentences containing multiple 3 letter words. These 3 letter words are called Codons.
Nucleotides are arranged in a specific manner to form a certain gene, which in turn, encodes a specific protein.

Sometimes biology doesn’t stick to the “blueprint plan” when organising the letters and genetic mutations occur. A genetic mutation is a permanent change to the nucleotide sequence of a gene, represented in the diagram above showing the different ways mutations can occur and how it affects the gene.



What are the CHAMP1 signs and symptoms?

Depending on the mutation type, CHAMP1 manifests differently along the spectrum of symptoms and severity. In most cases, features of CHAMP1 appear early in life and can evolve with age.
Symptoms can include:

Neurological symptoms

- **Epilepsy**
- **Seizures**
- **Movement disorders**
- **White matter and brain structural abnormalities**
- **Atypical neurological behaviour**
  (i.e. stereotypy, anxiety, ADHD)
- **Decreased sense of pain**
- **Difficulty falling or staying asleep**
- **Ataxia**
  (impaired muscle control, coordination & movement)

Developmental symptoms

- **Autism spectrum disorders (ASD)**
- **Global developmental delays**
- **Gross motor delays or disabilities**
  (i.e. difficulty or inability to sit or walk)
- **Fine motor delays or disabilities**
  (i.e. difficulty using hands purposefully)
- **Speech and language delays, loss or disabilities**
- **Learning disabilities**
- **Challenges with daily living skills**
  (i.e. dressing, self-feeding, toilet training)

Physical symptoms

- **Hypotonia**
  (decreased muscle tone)
- **Microcephaly**
  (small head size)
- **Plagiocephaly**
  (flat head)
- **Eye abnormalities**
  (i.e. nystagmus, strabismus, hyperopia, myopia, amblyopia, coloboma)
- **High occurrence of respiratory tract infections**
- **Gastroesophageal reflux (GERD)**
- **CVS (Cyclical Vomiting Syndrome)**
- **Incontinence**
- **Constipation**
- **Apnoea**
  (narrowing airway during sleep)
- **Ataxic or hypotonic gait**
  (abnormal walking patterns)
- **Flat nasal bridge**
- **Hearing abnormalities**
- **Low-set ears**
- **Epicanthic fold**
  (skin fold of the upper eyelid covering the inner corner of the eye)
- **Up-slanted palpebral fissures**
  (outer corner of eye higher than inner corner)
- **Eye hypertelorism**
  (increased distance between eyes)
- **Long face**
- **Prognathism**
  (pointy chin)
- **Short philtrum**
  (shorter than normal distance between the upper lip and the nose)
- **Constantly open mouth**
- **Tented upper lip vermilion**
  (Triangular appearance of the upper lip and mouth opening)
- **Lip ptosis**
  (drooping of the lower lip)
- **High palate**
  (unusually high and narrow roof of mouth)
- **Dental issues**
  (small or misaligned teeth, baby teeth stay in too long)
- **Small Stature**
  (height in the 3rd percentile or below)
- **Hypermobility and hyperextensibility**
  (joints have an increased range of motion)
- **Hypoplastic nails**
  (underdeveloped fingernails or toenails)
- **Fifth finger clinodactyly**
  (curved little fingers)

Is there a cure for CHAMP1?

Currently, there is no cure or significant treatment for CHAMP1.
The CHAMP1 Research Foundations have extensive genetic research underway.

Supportive therapies are available to help manage symptoms of CHAMP1.
Depending on symptoms, these can include medications, nutritional support, surgeries, developmental therapies, and assistive devices (including augmentative and alternative communication strategies).

To manage care, CHAMP1 patient care teams may include experts from a variety of specialities, including neurology, epilepsy, genetics, gastroenterology, pulmonology, physiatry, ophthalmology or optometry, and various therapists (physical, occupational, vision, and speech therapists.)

CHAMP1 RESEARCH FOUNDATION
champ1foundation.org

CHAMP1 UK
champ1.uk

CHAMP1 RESEARCH FOUNDATION - EUROPE
champ1foundation.eu