

UNIQUE
UNDERSTANDING GENES & CHROMOSOMES

1q duplications

rarechromo.org

This guide is designed to help families and healthcare professionals looking after people with a chromosome 1q microduplication/duplication. It contains information about the cause, the ways in which it can affect people and suggestions about the help and management that can benefit people with this condition.

1q duplications



1q duplications are rare genetic conditions. They are caused by having extra material on one of the body's 46 chromosomes. Generally speaking, having extra chromosome material increases the risk for problems such as birth defects and growth and developmental delay. With 1q duplications the picture depends on what chromosome material is duplicated and whether any material has been lost or duplicated on a different chromosome as well. Four times out of five, another chromosome is also involved. This leaflet tells you about the effects of the duplication from 1q.

Chromosomes are the microscopically small structures in the nucleus of the body's cells that carry genetic information. They come in different sizes, each with a short (p) and a long (q) arm. Apart from the sex chromosomes (two Xs for a girl and an X and a Y for a boy), they are numbered 1 to 22 from largest to smallest, approximately according to size.

Chromosome 1 is the largest chromosome and on its own accounts for about 10 per cent of the human genome. We have two chromosome 1s, one inherited from our father and one from our mother. People with a chromosome 1q duplication have a repeat of some of the material of the long arm of one of their chromosome 1s.

Generally speaking, people who have small duplications of material near the tip of the long arm of chromosome 1 are only mildly affected by their chromosome disorder. People with larger duplications that extend to band 1q32 tend to have greater learning difficulties. Babies born with large duplications of material reaching to near the point where the long arm joins the short arm (the centromere) tend to have more severe birth defects and their life expectancy is affected (Bartsch 2001; Machlitt 2005).

Chromosome 1



"She loves to help, very loving" - dup (1) (q24q31), age 13

"A very sweet and loving child. She has taught us much patience and tolerance for others who are not perfect." - dup(1)(q41q43), age 12

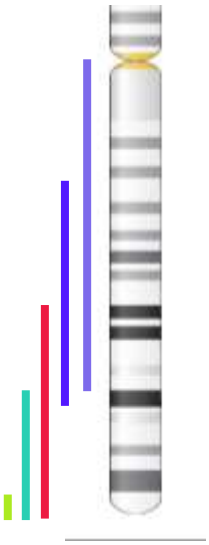
"She is always willing to help and affectionate and wants everyone to be happy." - dup(1)(q32q41), age 9

"She has opened my eyes and heart to a whole new world." - dup(1)(q32qter), age 4

"He always cuddles you and tells you that he loves you." - dup(1)(q32q42), age 4

How rare are 1q duplications?

They are very rare and often no-one else has been described with exactly the same amount of duplicated material. In 2002, only 32 people had been described in the medical literature with a pure trisomy (or duplication) of 1q and no involvement of another chromosome. Even where people have exactly the same chromosome make-up, while they may have similarities, they also have striking differences, making it very difficult for geneticists to make any definite predictions for an individual child (Bartsch 2001; Aboura 2002).



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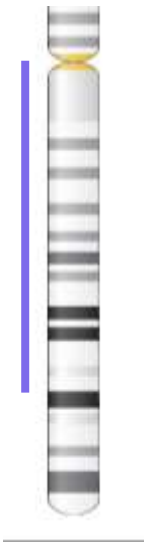


Duplications including material near the centromere (proximal duplications)

In all, sixteen individuals have been described in the medical literature with different duplications of material between bands 1q11 and 1q32. They have some similarities with babies with a duplication of most of the long arm of chromosome 1, in particular that they tend to be severely affected. Very large duplications where the repeated material extends over most of the long arm from the tip to band 1q21 or even closer to the centromere mean that the pregnancy may be lost or the baby may not be able to adapt to independent life. The features below have been found when the repeated segment extends between 1q11 and 1q32.

Common features

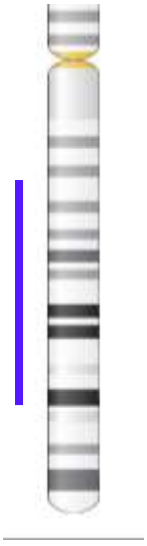
- Pregnancy and delivery are usually uneventful and at term. Babies' weight and size at birth is also usually typical. A low birth weight is unusual
- In babies with a mosaic make-up (where a cell line with the 1q duplication exists alongside a cell line with usual chromosomes), the head is usually very large (90-98th centile on growth charts), the front fontanelle (soft spot) is also very large and late to close. In babies with a pure 1q duplication without involvement of another chromosome, the head is more likely to be small but may be large in proportion to the body. Disproportionate head size may fall over time. Body stature is short and may be very short.
- The lower jaw is very small and typically receding, so the upper lip protrudes.
- The palate (roof of the mouth) is typically high and narrow and may be split (cleft) in the front, bony part or the soft rear part.
- Certain joints may be held in a fixed, bent position. This has been noted for the knees, fingers and feet

- Within the brain, hydrocephalus (an excess accumulation of fluid) is common and there may be relative shrinkage of the brain tissues.
- Learning ability is expected to be affected.
- Typically, speech does not develop.
- Feeding difficulties are typical in the newborn period. They may be severe and direct feeding through a gastrostomy tube may be needed.
- Heart defects, including a thickening of the heart muscle that disturbs the rhythm of the heart (hypertrophic cardiomyopathy) and an extra pathway between the upper and lower heart chambers causing the attacks of rapid heartbeats known as Wolff-Parkinson-White syndrome, have been observed; also persistent ductus arteriosus and patent foramen ovale, both persisting fetal heart structures; also double outlet right ventricle, where both the aorta and the pulmonary artery lead from the same ventricle; also the complex heart condition tetralogy of Fallot.

Other possible features include:

- Seizures
- Maldevelopment of the intestinal tract. This may produce a variety of disorders, including an omphalocele, when the bowel protrudes into the umbilical cord, malrotation of the gut, or Meckel's diverticulum, where a pouch of stomach-like tissue is left at the join of the small and large intestines.
- Heightened vulnerability to infections caused by a specific immune defect.
- Hands and feet: unusual toe position or joined toes; long slender hands; unusually placed thumbs.
- Vision defects due to structural anomalies of the eyes or optic nerves.

Duplications between bands 1q23-q25 and 1q41



Eleven people have been described in the medical literature with duplications that start between bands 1q23 and 1q25 and end at or before1q41. Among Unique members, one has a duplication between bands 1q24.2 and 1q31.2; a second child has a duplication between 1q25.3 and 1q31.1.

Common features

- Pregnancy was usually apparently uneventful and delivery was near term. However, for a minority of babies, the pregnancy was not risk-free; two babies died during pregnancy.
- Birth weight was usually typical for gestation. One Unique baby weighed over 4000g at birth, in the top 10 per cent for birth weight. The anterior fontanelle (main soft spot on top of the head) was large and late to close.
- Newborn babies' progress depended chiefly on any major birth defects, particularly affecting the heart, and on feeding difficulties. Two babies died in the newborn period, one of unrelated causes, and another baby died at four months.
- The small, receding lower jaw could contribute to feeding difficulties.
- There were two distinct growth patterns: slow, leading to short stature and consistently tall stature. In one family, relatives with the same duplication had a different growth pattern.
- Most babies also had an unusually shaped roof of mouth, with either a high, narrow palate or a cleft (split), typically in the soft tissue at the back of the palate. Additionally, some babies had a small mouth they could not open fully.
- Heart anomalies affected around half of the babies. Most defects were simple, a ventricular septal defect (hole between the lower heart chambers) being most common. Other defects included an atrial septal defect (hole between the upper chambers), pulmonary stenosis (marked narrowing of the blood vessel that takes oxygen-depleted blood to the lungs), persistent ductus arteriosus, a persistence of a

feature of fetal circulation and coarctation of the aorta, a narrowing of the main blood vessel supplying the body.
- Children showed a highly variable degree of learning difficulty. It was most often described as mild but it could be severe and in one family each of three affected relatives had a different degree of learning difficulty.
- Most children had low-set, backwards-rotated ears. Combined with a low nasal bridge, this can make fitting glasses difficult.

Other features

- One child in three had very small eyes and in two, vision was affected.
- Three children had seizures.
- Two children showed a heightened vulnerability to infection.
- Two children had multiple kidney and urinary tract anomalies.
- Two children had fingers that could not be unclenched.
- Two children had very early emergence of milk teeth.

(Garver 1976; Palmer 1977; Pan 1977; Schinzel 1979; Stoll 1984; Pfeiffer 1987; Clark 1989; Sillen 1998; Aboura 2002; U).

1q24.2q31.2 family story

Our daughter is a particularly loving, caring person who likes to help others. Among her interests are her computer, television and DVDs.

She was a big baby at birth, weighing 9lb 10oz (4365g), and the first sign of anything unusual was when we noticed that she could not open out her fingers. Eventually, she was diagnosed with a duplication of 1q between bands 1q24.2 and 1q31.2.

She has always fed well with a healthy appetite and at 13 years old is already 5’11” (180 cm) tall. She is active and trampolining and her bike are among her favourite activities. However, when her feet get sore she uses a wheelchair.

She received physiotherapy for her fingers and wore splints to straighten them, but this was not successful and her fingers remain bent despite surgery. She has attended a special school to help with her mild learning difficulties. Her level of achievement today is as an 8-year-old. She has a small jaw, a slight spinal curve and by four weeks of age she already had four teeth.

1q25.3q32.1 family story

Our son was found to have a duplication between bands 1q25.3 and 1q32.1 when he was four months old. The pregnancy was problem-free and although his delivery at 41 weeks was complicated by an unusual presentation and distress, his Apgar scores were 8 and 9 and he was born weighing 7lb 4oz (3288g). However, he had great difficulty feeding, lost a significant amount of weight and became seriously dehydrated. After repeatedly aspirating his feeds, causing hospital admissions for respiratory infections at two and three months, his chromosomes were tested.

Factors contributing to his feeding difficulty were his high palate and his small lower jaw which made it difficult for him to open his mouth wide enough to latch on effectively as a baby. He also had marked reflux for which he was prescribed Infant Gaviscon which worked well. He struggled to breastfeed to meet his needs, but coped better with a bottle, initially with an orthodontic teat. By 14 months he was finger feeding himself pieces

of toast and by 2½ he was using a spoon. However, vomiting from reflux and choking on food have remained regular features. At 4, he accepts a reasonable range of tastes and textures but tends to overload his spoon and as his co-ordination is immature, he is a messy eater. He still prefers to play with food than to eat it and while he has a good appetite when well, he quickly loses it in periods of ill health.

His weight gain has stayed steady, putting him in the lowest nine per cent of the population for growth, and his height at age 5 recently caught up from the 2nd to the 9th centile on the growth charts. Facially, he has some of the hallmarks of children with 1q duplications, including small, low set ears and a flat nasal bridge. Additionally, one eyelid droops slightly (more obviously when he is unwell) and his baby teeth, which are small and 'peg-like', came through unusually early. His fontanelles (soft spots on the head) were very large and visible at birth and closed late.

On his brain scan, nothing concerning was detected and x-rays have shown a healthy heart. After repeated urinary tract infections, a renal ultrasound at three months showed a serious anomaly of the right ureter (the tube between the kidney and the bladder) that allowed urine to reflux back and damage the right kidney which was eventually removed. Repeated debilitating urinary infections meant that he spent much of his first two years in hospital. The infections have continued since his kidney was removed but have occurred less often and are less severe and have been attributed to a small anomaly (diverticulum) of the bladder.

He has also had repeated chest infections which developed into pneumonia and still needs regular steroid inhalations to keep night-time cough and choking at bay. His early childhood has been punctuated by acute health crises, each typified by sudden extremely high temperatures and physical tremors. At the end of his worst winter, at the age of 2, he had a seizure but this has not been repeated.

He has usual eyesight in his right eye but the vision of a typical two-month-old in his left eye which makes for some problems in judging distance when walking up steps, for instance, and when using his hands for fine skills. He is supposed to wear patched glasses to develop the vision in his left eye but as this makes him effectively blind, he is understandably resistant. What is more, opticians cannot provide frames that fit his flat nasal bridge and low set ears.

He does not speak yet and as a young child had conductive hearing loss caused by glue ear, relieved by grommet (tube) insertion.

His health crises and frequent spells in hospital must have delayed his development. In gross motor terms, he sat up by a year, crawled by 2 and walked on his own by 3, climbing stairs six months later. His muscle tone is low and his joints are lax so he wears splints and he has real problems with stamina. In terms of learning, he presents complex problems. He is clearly able to learn in a structured and supported environment but his motivation is low and he is in the main reactive in his learning and use of knowledge. At the age of 5, he recognises his name and has started to type it on a keyboard. He has the ability to recognise words but there is uncertainty about his understanding about the value of communication and therefore we infrequently see him use the knowledge we know he has. His strengths are a strong visual recognition and memory and his openness to people.

In terms of communication, he understands up to 3-word requests using familiar concepts and is competent at Makaton signing, although his poor fine motor skills affect his sign formation and he prefers to avoid linking signs. He has no clear speech yet but can approximate his name and other words such as 'blue', 'ball' and 'spoon'. Even with words that he is usually able to say, he will struggle on occasions to repeat the sound. It is thought that his low muscle tone causes a problem in the use of his tongue in speech, along with a possible lack of 'muscle memory'. It is noticeable that the 'words' that he can reproduce are those that rely in the main on the lips to form them.

In terms of behaviour, he is generally willing and compliant but does not respond when told not to do something, particularly if this is contrary to one of his patterns of destructive behaviour. As a result, he has been diagnosed with autistic spectrum disorder and attention deficit hyperactivity disorder.

Managing his needs and behaviour long term in a family is stressful and at 5 he has been assessed for shared family care, allowing us a break from caring for a disabled child, his brothers to have more focused attention and everyone, our son included, to get used to the reality of him living in an environment supported by people other than his immediate family. This will reduce the emotional impact on him when the day comes that we are no longer there. Meanwhile, he attends a mainstream school, with full 1:1 care.

Large duplications between bands 1q31 and the end of the long arm (distal duplications)



Twenty-one people have been described in the medical literature with duplications of varying sizes between band 1q31 and the end of the long arm. The most common duplication is a large one between bands 1q32 and 1q42. The duplication may, however, be much smaller: a duplication between bands 1q31.1 and 1q32.1 was compatible with usual development in two children while an even smaller one between 1q32.3 and 1q32.1 was associated with severe learning difficulties in another. Unique had thirteen members with a duplication within this region when this information was compiled.

Common features

- Pregnancy was usually uneventful although as low birth weight occurred in most of the babies for whom information was given, slow fetal growth may be detected during pregnancy. Delivery was usually at or near term, but there was a tendency towards slightly premature birth from 34 weeks.
- Where information was given, growth was usually delayed and stature was short. Predicted adult height for one child was 5’1” and growth hormone was successfully given to two children, one with anomalies of the pituitary gland.
- One child out of five was tall.
- The very large head seen in the children with proximal duplications was seen only once in this group and three children were diagnosed with microcephaly (an unusually small head). However, both the anterior fontanelle (main soft spot in the skull) and the sagittal suture (the join between the bones running from front to back of the skull) were typically large and wide at birth and the fontanelle closed late. Enlarged ventricles within the brain or hydrocephalus (excessive fluid within the brain) were observed just occasionally. Hydrocephalus can usually be treated if necessary by surgery.
- A very small, receding lower jaw was the most consistent observation and the small chin made the face look triangular.
- Congenital heart defects were especially frequent when the duplication included bands 1q43 and 1q44 close to the tip of the long arm. The defects were varied and not usually complex. They were usually allowed to resolve naturally or were corrected successfully by surgery. They included persistent features of fetal heart structure (persistent ductus arteriosus, patent foramen ovale); defects in the valve between the upper and lower chambers on the right of the heart; narrowing of the artery and valve taking blood to the lungs (pulmonary stenosis); hole between the upper heart chambers (atrial septal defect); and overgrowth of the left ventricle.
- Kidney defects and anomalies of the urinary tract occurred frequently. Anomalies included a single kidney or a second very small kidney, malformed kidneys and blocked ureters.

- Usually, minor anomalies of the urinary and genital systems in boys, such as undescended testicles, hypospadias (the hole usually at the end of the penis is on the underside), small penis and webbing between the penis and scrotum.
- The eyes were small in one child in four; two related children had a development eye defect; one child had a defect of the optic nerve; another was registered blind. The most common error of vision was strabismus (squint).
- Some babies were born with a blockage or marked narrowing of part of the gastrointestinal system, most often the oesophagus (food pipe). In two children there was a stenosis (narrowing) of part of the respiratory system and in one child of the bile duct.
- Toes were typically crowded and overriding. Four children had extra fingers, thumbs or toes. These can be removed by surgery.
- Low, backwards rotated ears were common. This does not affect hearing or need treatment.
- Heightened vulnerability to infections, particularly of the upper and lower respiratory tracts.
- Most children had some level of learning difficulty and speech and developmental delay but the level was variable. While two children with a duplication between bands 1q31.1 and 1q32.1 were apparently unaffected, a child with a 1q31.3q32.1 duplication and a seizure disorder had severe learning disabilities.

Other features

- Hands were typically long and slender and the nails could curve upwards.
- Rib number was variable with one child in six having 11 or 13 pairs of ribs.
- A small number of children had a high palate but only one child had a cleft, with a cleft lip as well. This child had an inverted duplication of 1q32 to 1q44 and had a different facial appearance and particularly marked developmental delay.
- Teeth emerged late in half the Unique sample.
- Six children had seizures, in one febrile fits that were outgrown.

(Palmer 1977; Steffenson 1977; Flatz 1979; Barros-Nunez 1980; Dallapiccola 1980; Lungarotti 1980; Chia 1988; Clark 1994; Verschuuren-Bemelmans 1995; Duba 1997; Lukusa 1998; Schorry 1998; Sillen 1998; Bayani 1999; Bartsch 2001; Kimya 2002; van Haelst 2002; Nowaczyk 2003; Milne 2005; U).

1q32qter family story

Our daughter has a duplication between band 1q32 and the end of the long arm. The first signs that she might have a chromosome disorder were noticed at her birth. The pregnancy had been uneventful up to six months but the placenta was in the praevia position and she was born prematurely, weighing 5lb 1oz (2296g). She had a cleft palate (surgically repaired) and found both breathing and feeding difficult and became jaundiced. She was given oxygen and fed by nasogastric tube as her sucking was too weak for breastfeeding. Other unusual signs were her overlapping fourth and middle toes, her tiny lower jaw – half the usual size, the dimple at the base of her spine, her large head with wide fontanelles that only closed when she was three, and stork marks on her nose and forehead. Her face was also asymmetrical and she had a small tongue.

In terms of her vital organs, she had a heart murmur and one kidney was undersized. Healthwise, she has had frequent ear and respiratory infections and has been left with some lung damage from pneumonia. She had a lazy eye that was treated by patching her good eye daily. Feeding improved so that by the age of 2, she was taking some food by mouth. However, her growth rate has been slow, she had a moderate growth hormone deficiency and was treated with growth hormone.

Her mobility was affected by her stiff joints, for which she has received physical therapy (physiotherapy). By the age of 6½ she was walking and running but was still a little unstable and had not yet mastered jumping. She had some delay in using her hands and had weekly occupational therapy to improve this. Overall, with her three therapies – speech for articulation, occupational and physiotherapy, she has made steady, rewarding progress. At the age of 6½, she does have considerable care needs for her daily life in terms of dressing, diapers (nappies) and supervision while she is eating.

Her learning difficulties might be described as moderate and her strength is her outgoing, social personality. She is playful and loves being with other people and learns best in a small group. This has helped her to steadily meet her learning goals. At 6½, she can count to 20 although she does not yet write or recognise numbers. She started to use words when she was 2 and is now highly vocal, speaking in short sentences despite a mild hearing loss in her left ear and significant loss in her right ear for which she will have a hearing aid. Occasionally she is hard to understand, but the difficulty is slight. She is a loving child but has a disobedient streak and can be difficult if she is tired or left too long to her own devices. Any behaviour problems have been minor, and she loves to sing, to watch TV, to play with or alongside others, to do craft activities like cutting and colouring and to explore her surroundings.

1q32q41 family story

Our daughter was diagnosed shortly after birth with a duplication between 1q32 and 1q41. Late in the pregnancy, it was noticed that there was very little amniotic fluid and at 42 weeks, the birth was induced. She had respiratory distress and spent her first eight days in intensive care. She had a number of hallmarks of a 1q duplication, including large fontanelles (closed by the age of 2), low set ears, long, skinny fingers and a small lower jaw. Some children with 1q duplications have been found to have birthmarks and our daughter had a large one on her right hand. She also had a dimple at the base of her spine and a hernia in the groin that was repaired when she was four months old. Once beyond the newborn stage, her health improved. Investigations showed that she had no brain anomalies and her heart, kidneys, urinary tract, digestive system and lungs were typically formed. Between the ages of two and four, she had occasional seizures but these were well controlled with medication and had not re-emerged by the age of nine. Healthwise, she gets frequent colds and as a young child had frequent ear infections but she did not have more serious infections. Her baby teeth came through late and as she has difficulty keeping her mouth closed, she drools.

Her mobility was somewhat delayed, influenced both by her low muscle tone and her stiff joints. She sat at 6 months and walked at 18 months with a leg brace to correct the inward turn of her left foot. By the age of 9 her mobility and her hand use and co-ordination were appropriate for her age. She started to speak at 2½ and although vocal had a limited vocabulary but more extensive understanding. Her learning difficulties have been described as moderate, her strengths being her personality and helpfulness. She enjoys dancing, music, computer games and playing with other children.

1q32q43 family story

Our son has a duplication between band 1q32 and 1q42. The pregnancy was uneventful, but the waters broke at 36 weeks and he was born three days later. He was small at birth, weighing 5lb 12oz (2608g), and his growth rate put him in the lowest one per cent of the population, with a predicted adult height of 5’ 1” (155 cm). His mother is also short, measuring 4’ 11” (150 cm).

He was a slow, reluctant feeder and while his appetite was good by the age of 4, he still preferred not to chew. To boost his calorie intake, he had fortified milk. Of the typical 1q duplication features, he has low set ears, a small lower jaw making his face triangular and overlapping toes. In terms of vital body systems, he is healthy,

although he had a persistent heart murmur and his testicles retract readily from the scrotum. His baby teeth came through late at 18 months but were perfectly formed. In early childhood he was prone to night-time coughs but was otherwise healthy.

He has been able to walk since he was two but his feet are flat and point inwards, making him walk stiffly. He does not need to wear splints or supports and dislikes wearing shoes as they make his feet ache and he complains of aches in his legs and feet if expected to walk any distance. However, he moves with confidence, pedalling a tricycle, riding a scooter, climbing and sliding. His poor balance has resulted in frequent falls, bumping his head when he did not save himself with his hands. His hand use and co-ordination was only mildly delayed, and by the age of 5 he could hold a pencil and draw circles.

In terms of learning, he showed a moderate level of difficulty, with particular difficulties in spatial skills including perception and understanding shapes and patterns. He needed individual support in a mainstream school and while enjoying the social experience, found the expectations in his first year stressful.

His speech was delayed and initially he learned some signing but by the age of 5 he was talking in short sentences with an appropriate choice of words.

1q32.1q43 family story

Our son was found to have a duplication between bands 1q32.1 and 1q43 shortly after birth. His birth weight (6lb 9oz, 2976g) was low but his Apgar scores were 8 and 9. However, he developed jaundice and had feeding difficulties and spent four days in neonatal care. The feeding difficulties persisted, influenced by his high palate, narrow oesophagus (food pipe), gastro oesophageal reflux and, later, difficulty in swallowing textured foods. Studies showed that his stomach contents emptied slowly and he also had moderate constipation. His digestive problems were managed with medication and by spacing feeding and giving small amounts. Growth was slow and he was in the lowest five per cent of the population for height but by 5 years after growth hormone treatment both height and weight had increased to the 50th centile (average).

He showed certain features typical of 1q duplications. His second and fourth toes overlapped the toes next to them, his jaw was small and his face triangular with a prominent forehead, his ears were low set and he had a hairy dimple at the base of the spine. His fontanelles were large but closed by the age of 2 and imaging showed that the ventricles in the brain were enlarged and in addition the corpus callosum linking the two sides of the brain was missing and he had several cysts in the choroid plexus, the spongy tissue in the brain's ventricles. His heart showed a small hole between the upper chambers (atrial septal defect) that was still present at the age of 5. His kidneys and urinary tract were typical but he had minor genital anomalies including webbing between the penis and scrotum and testicles that were late to descend.

His respiratory health has been affected by his tendency to aspirate feeds and he has had a history of reactive airway disease. He is long sighted, had strabismus (squint) that was surgically corrected and is acutely sensitive to noise. His milk teeth were late to come through and one tooth is missing in the lower jaw.

His development has been severely delayed, influenced by his low muscle tone. He was able to walk at 25 months, wearing ankle foot orthoses (supports) for the first five months of mobility, and his walk remained somewhat unsteady. He could climb stairs with help by the age of 4 but a suspected difficulty with depth perception delayed this skill. His hand use and co-ordination were significantly delayed but by the age of 5 he could use both hands to hold a bottle or toy but could not hold a spoon or a pen.

In terms of learning, his difficulties are increased by his short attention span. He is motivated by cause-and-effect toys and loves music and lights. In speech, he started verbal play at 2 years and by the age of 5 was using two-word verbal approximations, inconsistently, but understanding at a somewhat higher level. He has been diagnosed with verbal apraxia.

He has made slow progress with his therapies and has a sweet disposition. He craves movement (swinging, tossing in the air) and touch, especially oral stimulation, and has some hyperactive and autistic tendencies.

1q32.12q42.1 family story

Our son has a duplication between 1q32.12 and 1q42.1. After an uneventful pregnancy, the first sign of anything unusual was crossed toes at birth and the fact that he was cold. He fed reasonably well but at 10 weeks was found to have severe urinary reflux (the urine flushes back towards the kidneys instead of draining into the bladder). Investigations revealed that one kidney was functioning at 10 per cent of usual capacity and he has continued to have frequent kidney infections. Otherwise, he was healthy, although when his teeth came through, they were ‘all over the place’ and some were missing. During childhood, he has had various surgical procedures - to correct overlapping toes, circumcision, and three times to correct strabismus (squint).

As for development, he reached his mobility milestones a little late, sitting at 10 months, crawling at 12 months and walking at the age of 2. He had low muscle tone, which held him back and also poor balance, which has not been helped by his reduced vision in one eye. He has difficulties in using both hands but at 13 can feed himself well with a spoon. Today, he becomes constipated easily and a good diet with ample drinks and fruit is crucial.

He attended a mainstream school until he was 12, when he switched to the special system. At the age of 8, he started a very early puberty and shortly afterwards he developed seizures. These have been controlled with anti-epileptic medication and as, at 13, he seems to be coming out of puberty and his growth is slowing off, the seizures too seem to be reducing. From the age of 8, he made little developmental progress and even lost the words that he had used from the age of 2, but by 13 some words were coming back. Usually, however, he communicates by gesture or by taking a person’s hand.

At 13, he has a gorgeous nature, his family says. He is placid and compliant and others say that he exerts a calming influence. His care and supervision need, however, remain intensive, although he was toilet trained from the age of 6.


One week old


11.5 months old


17 months old




3 years old


4.5 years old

Small duplications from band 1q4



Only six children have been described in the medical literature including three with a pure duplication from 1q42. Unique also has experience of five cases, but without a more detailed analysis using molecular technology to make the breakpoints clearer, it is very likely that each individual has a slightly different duplication. The findings are extremely variable, ranging from people who are short but otherwise typical to people with many of the features typical of a 1q duplication. Overall, some degree of learning difficulty appears to be common but it may be minor, and many people have no major health concerns.

Common features

- Birth weight tends to be low and slow growth continues. Where height has been measured, it falls between the third and tenth centiles on a growth chart.
- Large head in proportion to body size, with a prominent forehead. Typically, head growth follows the 97th centile or above on the growth chart. The large head may be visible before birth on ultrasound scan and persist into adulthood. The large head is not typically associated with hydrocephalus (a build-up of the fluid within the ventricles, the fluid-filled cavities of the brain).
- Large soft spot (anterior fontanelle) at birth, which closes late. The sutures between the plates of the skull may also be open at birth.
- Initial feeding difficulties and failure to thrive.
- A highly variable degree of learning difficulty. A mother and son with a duplication between 1q42.11 and 1q42.12 had no learning difficulty. People with larger duplications in bands 1q41 to 1q43 had mild to moderate difficulties.
- Mild speech delay.
- Slight delay in mobility. Children walked on average by the age of 2. Initially at least they might have a clumsy or unusual gait.
- In half of the cases, heart defects. These have included pulmonary stenosis (narrowing of the blood vessel taking oxygen-depleted blood from the heart to the lungs), an enlarged left ventricle and patent foramen ovale (persistence of an opening between the two upper chambers), which closed naturally. One child had Ebstein's anomaly, in which the tricuspid valve that controls blood flow from the top chamber (atrium) to the bottom (ventricle) is too low down. This makes the top chamber too big and the bottom chamber too small. The valve may also be leaky, letting blood that should be in the ventricle (the lower chamber) leak back into the atrium (the upper chamber).

Other features

These include an unusual thumb formation, described as 'finger-like thumbs' or 'unusual thumbs with a large joint'; a high palate (roof of the mouth); a minor degree of short sight, described in two children; and a Chiari type 1 formation of the brain, in which the cerebellum part of the hindbrain protrudes into the spinal canal.
(Chia 1988; Bortotto 1990; Verschuuren-Bemelmans 1995; De Brasi 2001; U).

1q41q43 family story

Our daughter did not immediately show signs that might suggest a chromosome disorder. She was born after an uneventful, full-term pregnancy, had an Apgar score of 10 at birth and a smooth course as a newborn. Her duplication of bands 1q41 to 1q43 was discovered only after a genetic referral at six months because of low muscle tone, delayed development and weak muscles around the mouth.

Her weak mouth muscles and high palate made it hard for her to feed from the breast or bottle and she initially lost weight and was considered to be a baby who was failing to thrive. Once she moved to solid

foods, she ate well. Her growth rate put her in the lowest quarter of the population for height until a growth spurt at the age of 11 took her to an average height.

She had none of the features typically associated with a 1q duplication. She had repeated urinary tract infections which eventually resolved and was born with a patent foramen ovale, an opening between the upper chambers of the heart that closed naturally. Her head was small in proportion to her body, and she was found to have an anomaly in the brain in which the cerebellum part of the hindbrain protrudes into the spinal canal. At the age of 12 this had not needed treatment. She had a very minor degree of near sightedness. Puberty appeared to progress typically.

In terms of development, her mobility was somewhat delayed, so she sat at 9 months, walked without help at 2 and climbed the stairs at 3. Her hand use and co-ordination were very good and early tremor when performing some activities had resolved by the age of 12.

In terms of learning, she has attended a mainstream school but functioned at a level some grades below her peers. She can read, write and do mathematics. After initial delay, her speech blossomed and she became highly verbal. She retained difficulty with the 's' sound, making it with the sides of her tongue.

Her strength is her personality. She is a very sweet and loving child, very witty and makes people laugh. She loves TV, the computer and videos. She enjoys playing with other kids but sometimes prefers to play by herself. She also loves puzzles and arts and crafts and rides horses with Special Equestrians.



Small terminal duplication: breakpoint in or near band 1q44

A single case has been described. After an uneventful pregnancy, the girl was born at 39 weeks, weighing 7lb 13 oz (3550g), her weight putting her in the top quarter of the population. Her development, learning and growth were usual. She had a ventricular septal defect (a hole between the lower chambers of the heart) that closed naturally. At 5 years of age, she was still in the top quarter of the population for height but her head size was in the top three per cent and she had a prominent forehead, both typical findings in 1q duplications (Villa 2000).

Families say ...

"She loves to help, very loving." – dup(1)(q24q31), age 13

"A very sweet and loving child. She has taught us much patience and tolerance for others who are not perfect." – dup(1)(q41q43), age 12

"She is always willing to help and affectionate and wants everyone to be happy." – dup(1)(q32q41), age 9

"She has opened my eyes and heart to a whole new world." – dup(1)(q32qter), age 4

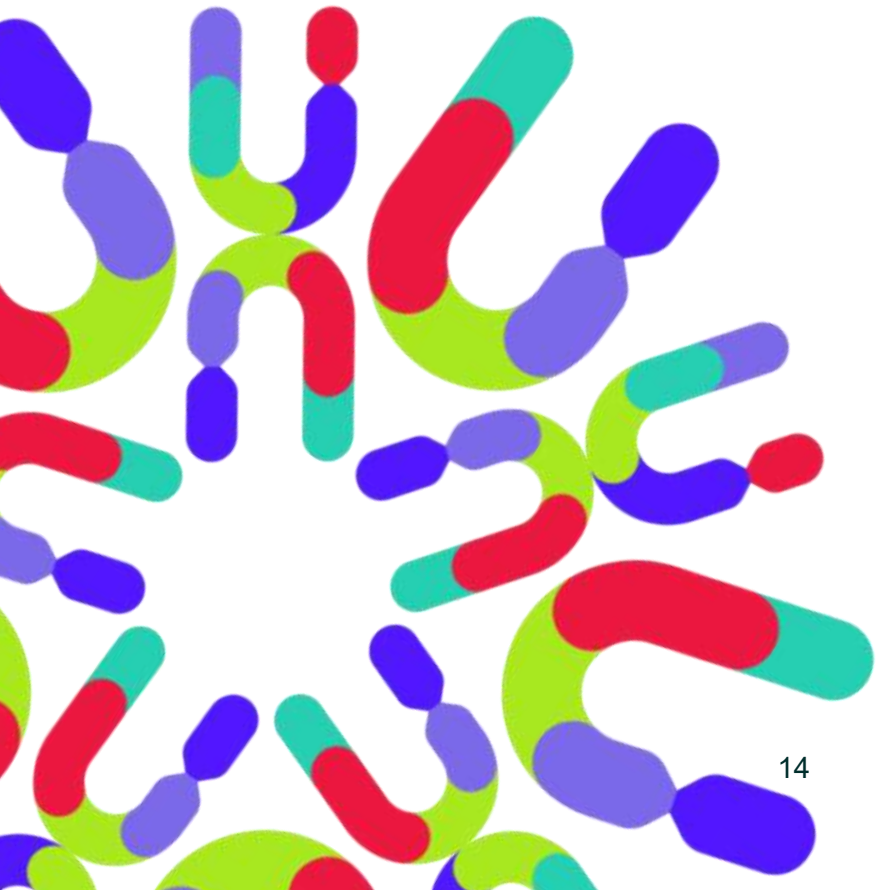
"He always cuddles you and tells you that he loves you." – dup(1)(q32q42), age 4



Sources

The information in this leaflet is drawn from the medical literature and also draws on Unique's database. At publication, Unique had 53 members with a 1q duplication, of whom 19 had a pure 1q duplication that did not involve any other chromosome.

Eight families completed a detailed questionnaire in 2005. References to information from the Unique database and the questionnaire are marked U. For references to articles in the medical literature, the first-named author and publication date are given to allow you to look for the abstracts or original articles on the internet in PubMed.



Inform Network Support

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This information guide is not a substitute for personal medical advice. Families should consult a medically qualified clinician in all matters relating to genetic diagnosis, management and health. Information on genetic changes is a very fast-moving field and while the information in this guide is believed to be the best available at the time of publication, some facts may later change. Unique does its best to keep abreast of changing information and to review its published guides as needed. It was compiled by Unique and reviewed by Dr med Christine Bartsch, Institut für Rechtsmedizin, Giessen, Germany and by Professor Maj Hulten, Professor of Medical Genetics, University of Warwick, UK 2005. Rebranded 2026.

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