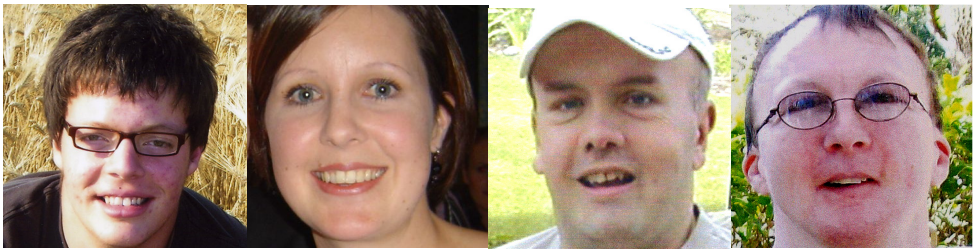
Understanding chromosome disorders

Unique

Trisomy 8 mosaicism in adults



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Trisomy 8 mosaicism in adults

Chromosomes are the structures within the cells of the body that carry the genetic information that tells the body how to develop, grow and function. They come in pairs, one from each parent, and are numbered 1 to 22 from the largest to smallest.
In addition, there are two sex chromosomes (XY or XX). Trisomy 8 mosaicism (T8M) is a chromosome disorder caused by the presence of a complete extra chromosome 8 in some cells of the body. The remaining cells have the usual number of 46 chromosomes, with two copies of chromosome 8 in each cell.

Full trisomy 8 - where all cells have an extra copy of chromosome 8 - is not believed to be compatible with survival, so people in whom an extra chromosome 8 is found are believed to be always mosaic.

The karyotype

Chromosome disorders are usually detected by examining cells prepared from a blood sample. However, in T8M there are usually more cells with the extra chromosome 8 in the skin than in blood, so analysis of a skin sample is a more reliable way to diagnose T8M. A number of cells will be analysed and a report prepared, giving the karyotype, a chromosome description. This usually states in brackets the numbers of normal and trisomic cells. A karyotype for a man with trisomy 8 mosaicism might look like this:

47,XY,+8[28]/46,XY[22]

This means that of 50 cells tested, 22 had the usual number of 46 chromosomes, while 28 had an extra chromosome 8. The number of cells with the extra chromosome 8 does not tell you whether the features of T8M will be mild or severe or whether there will apparently be no effects at all.

How common is trisomy 8 mosaicism?

Full trisomy 8 is extremely uncommon in newborn babies, though it is found more commonly in babies lost by miscarriage. By contrast, mosaic trisomy 8 is compatible with survival, though current estimates suggest that it is also relatively rare, affecting no more than one in every 25,000 to 50,000 people. One reason for uncertainty is that some individuals have few, if any, features typical of T8M. No-one knows how many people there are like this (Maserati 2007).

Unique publishes a separate general leaflet on T8M: **Mosaic Trisomy 8**

Sources and references

The information in this leaflet is drawn from what is known about 50 adolescents and adults with trisomy 8 mosaicism. Some 27 adults have been described 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. If you wish, you can obtain most articles from *Unique*. The leaflet also draws on the experience of *Unique*'s members. When this leaflet was written, *Unique* had 23 adult members with trisomy 8 mosaicism, of whom 13 completed a survey of the effects.

Are there people with trisomy 8 mosaicism who are healthy, have no major medical problems or birth defects and have developed normally?

Yes, there are. People like this are only diagnosed if they have another relevant medical concern, such as a fertility problem or, rarely, a type of cancer or leukaemia. Among *Unique*'s membership of 23 adults with trisomy 8 mosaicism, two were discovered by chance during investigations as adults and two others are entirely healthy, with no birth defects and entirely or virtually normal development.

What is the outlook?

The outlook for any individual with trisomy 8 mosaicism depends chiefly on which body systems, if any, are affected and how severely. It is not possible to predict this from the karyotype but scans and tests of fetal wellbeing before birth and investigations afterwards will show this.

Learning

The effect of trisomy 8 mosaicism on learning is extremely variable and cannot be predicted from the chromosome diagnosis or from the proportion of cells with the extra chromosome 8. Some students complete mainstream education without support and continue to university and postgraduate studies or start work; others receive support throughout their education and continue to need help with basic skills as adults.

Among 23 cases reported in the medical literature, 10 have a normal level of intelligence and education, four have a mild learning difficulty; in three the disability is moderate or severe; and in six it is not characterised. One adult is a college professor; three others are college graduates (Baidas 2004; Kurtyka 1988; Riccardi 1978; Sperber 1975).

Among *Unique*'s membership and those known to *Unique* are a mother with entirely normal development and three children; a primary school teacher with a first degree in psychology and a postgraduate degree in education; and two students, one about to study sound recording, the other to start a degree course in graphic design.
Among those who have benefited from learning support, some common themes emerge.

Out of fourteen adults for whom *Unique* holds detailed information, three have a particular artistic talent (one has worked as a graphic designer); three are skilled at working with a computer (one holds European Computer Driving Licence qualifications); two have areas of specialist 'savant' interest and knowledge and most are cognitively uneven; three note particular weakness with mathematics, time, handling money and spatial relationships. Three note specific difficulties with short term memory (recall can be as short as one minute) and two with attention, a 37-year-old noting a deterioration in attention with age. Handwriting is an area of weakness for three and one has a formal diagnosis of dyspraxia.

> " I am part of a dyspraxic teens online forum, and try to help people on there when I can with advice or support. This resource has also been a huge help to myself.

> " It is only really in my education that I have received, or really needed, support. All this support has been excellent, the teachers/support workers have met my every

need, even offering more for me. In fact I wish I had taken more advantage of this support at college. I am definitely going to when I start university this year.

I am not sure that these are attributed to my chromosome condition, but one thing I struggle with day to day is problem-solving, or finding the best way to achieve a certain goal. This can be anything from everyday domestic jobs to big design projects. Another one is forgetfulness, I have a short memory span.

Last is clumsiness. This is something that however hard I try to prevent always seems to bring me down in the end - *20 years*

Work

Nine out of 13 *Unique* contacts have worked in a variety of occupations while still at school or in adulthood. Four have worked in a local shop or retail outlet; one is a self employed graphic designer; one was in social work before qualifying as a primary school teacher; one has worked as a postman; one is a stay-at-home mother with three young children. From the medical literature, one was a college professor; another graduated from pedagogical college but was not yet working; one was a typesetter; another had been successfully employed for a number of years (Baidas 2004; Kurtyka 1988; Chandley 1980; Riccardi 1978).

This picture may mask difficulties in the workplace. Four adults or teenagers have held down a job for a limited period only; other adults only work for a limited number of hours in a supported environment.

❝ He works 13-15 hours a week and was supported in the first three months by a job coach. He received job coaching throughout school and this was the key to his success in the workplace - *17 years*

Voluntary work

In addition to paid work, *Unique* members with trisomy 8 mosaicism have taken on a variety of unpaid tasks. One takes care of the day to day needs of 12 parrots; another has volunteered at two conventions, one connected with the recording industry, the other with a support group for agenesis of the corpus callosum, a common brain defect in trisomy 8 mosaicism.

Skills and talents

The skills and talents declared by *Unique* contacts with trisomy 8 mosaicism reflect their overall level of cognitive ability and physical skill. While most people reflect the general population in showing an even spread of talent, some individuals have 'savant' areas of interest and knowledge, regardless of cognitive ability. Among those with unimpaired cognitive abilities, one played the piano as a child; another was a gifted painter and a very good juggler, able to juggle 4-5 items including fire; took part in amateur theatrical productions and did street performances; and wrote poetry. Among the group who required learning support, one is computer-expert; another is expert in music; another in different varieties of fish; another in civil and military aircraft; one older teenager won a national Child of Achievement award at the age of 10.

Other activities

The interests and activities of adults with trisomy 8 mosaicism are much as you would expect from any other similar aged group of people in society. A minority pursue activities organised for adults with special needs; most take part in activities for the general population.

Speech and communication

Speech delay has been noted in 16 out of 18 *Unique* contacts, including those with normal cognitive abilities. The extent of the delay is variable but six children who did not start speaking until around the age of five progressed with regular speech therapy to fluent speech, using full sentences, in adolescence and adulthood. This level of progress is not possible for all; some adolescents and teenagers continue to communicate chiefly in one-word phrases. In every case where speech delay is noted, understanding is better than speech. The most extreme case of this is a 29-year-old with no speech - thought to be due to a mixture of apraxia (inability to make accurate skilled movements) and dysarthria (unclear pronunciation) - who communicates via text messages on his mobile phone.

Unclear pronunciation affects some: an 18-year-old finds it 'impossible' to pronounce some words and misses initial consonants (dog becomes og); a 24-year-old 'doesn't enunciate consonants quite right' despite speaking otherwise fluently; as a child, a 37-year-old, speaking in Spanish and English, 'had difficulty forming words'. In some cases, there are anatomical reasons for unclear pronunciation: a high or repaired cleft palate (affecting 5/22) and tongue tie (affecting 4/22).

Among the five *Unique* contacts in their thirties, some increase in difficulties has been noticed in four. In two cases, speech has lessened and simplified over time, with more use of one-word phrases and a deterioration in accuracy (No for Yes); in another, 'difficulties have increased as expectations have increased'; in another, with an unsatisfactory cleft palate repair and no speech therapy as an adult, 'We have to talk to him about using his tongue and lips to talk. He likes the easy way out.'

From the medical literature, information is available on eight individuals. In general, speech and language reflects cognitive abilities; one adult with average intelligence developed a severe stammer as a teenager (Chandley 1980).

❝ Mild but noticeable speech delay. She didn't talk much, and didn't like to pronounce her name at the age of two. By around seven, there was no noticeable delay or problem - *normal cognitive ability*

❝ I did not have the confidence to talk with most people and when I did find the courage, this was mostly in short sentences. My difficulties have got better with time and I speak fluently now but I do understand more than I can say and sometimes find it hard to find words to express myself - *20 years old, normal cognitive ability*

Social activity

While social skills relate to each individual's cognitive abilities, the general picture that emerges is one of easy-going popularity. Out of thirteen *Unique* contacts, all get on well with their family and most with friends, although among those with learning difficulties, there can be difficulties with socialising and this is most apparent in the over-thirties. Initial shyness in some is followed by enjoyment of others' company. There are exceptions: some teenagers have poor social skills and are reluctant to relate to their peer group, with one 18-year-old diagnosed with Asperger syndrome and a woman in her 30s unable to master the communication and personal skills to initiate friendships.

❝ No best friend. Very popular with everybody, keeps in touch with one particular friend from 20 years ago - *24 years*

❝ Very sociable and well liked - *18 years*

Living arrangements

Living arrangements for adults with trisomy 8 mosaicism directly reflect their age, level of cognitive ability and need for help with personal care. Among *Unique* contacts aged 20 and over, three live independently of their parents; three live in supported accommodation; and four live with their family. Among those with learning disabilities, difficulty telling the time and structuring a day are typical, as is a limited ability to handle finances. Among those with physical limitations, restricted movements limit individuals' ability to care for themselves (shaving, toileting). The most severely affected either need constant prompts and help to carry out daily living tasks or depend on others to carry these out. These adults have not achieved daytime dryness.

❝ I benefit from encouragement from my family. This is all I need really - *20 years old, normal cognitive ability*

Mobility and travel

Adults with trisomy 8 mosaicism show a range of mobility, from entirely normal to wheelchair use. Among those with restricted mobility, joint stiffness and to a lesser extent spinal curvature (scoliosis) are typical limiting factors. Among thirteen *Unique* contacts, three drive a car, one of these only on local roads; six are able and confident to use public transport alone; seven can walk as far as they want, indoors and out; three need someone with them when they are outdoors, in one case to guide the

wheelchair; and one is entirely wheelchair-dependent. Seven walk for pleasure; seven swim regularly; two go dancing; two go to the gym and two garden for pleasure. Among the four oldest members, aged 35 or older, three have experienced a loss of mobility over time; no-one younger than this has experienced any loss of mobility. In one case from the medical literature there was muscle atrophy by age 33 and reduced mobility over time (Hoovers 1989).

One skeletal anomaly typical of mosaic trisomy 8 is small, partly or entirely undeveloped kneecaps. This usually has little effect but in one girl, the kneecaps would become displaced while she was active. As her activity levels lessened with the years, the kneecaps remained in place. In one case from the medical literature, the kneecaps became repeatedly displaced despite a surgical operation to tether them in place (Wisniewska 2002).

> " She can walk slowly with a lop-sided gait but tires easily and does not walk very far - *36 years*

> " He has a continuing problem with balance but copes well. He has difficulty judging the depth of a step and can lose balance if travelling on a shaky bus - *29 years*

> " Normal mobility: he swims, walks for pleasure, dances, trampolines, toboggans and snowboards in winter. He walks to the mall or stores or restaurants; these are short walks in a small town - *18 years*

Growth and adult stature

The stereotype of someone with trisomy 8 mosaicism is 'tall and skinny'. The *Unique* survey shows a more nuanced picture. Adult males range in height from 5'2" (1.57 metres) to 6'2" (1.88 metres) and their body build is individual, from slim to well built. Adult females range from 4'10" (1.47 metres) (parental heights 5'9" and 5'2" – 1.75 and 1.57m) to 5'5" (1.64 metres) and build is petite. The 'typical' trisomy 8 mosaicism build of a long slender torso with a narrow chest, shoulders and pelvis is seen in only six of thirteen *Unique* contacts. Others are 'well built', 'of medium build', 'overweight', 'solid' or show a thick waist due to loss of muscle tone. Growth continues in certain individuals for longer than is typical: out of nine males, three stopped growing by 17 years but growth continued for two into their early 20s.

Asymmetry

Uneven leg lengths and foot sizes are part of a picture of asymmetry that is commonly seen in mosaic chromosome disorders. This affects five out of fourteen *Unique* contacts: one has different length legs, the others different-sized feet (right foot size 11½, left foot size 13; feet two sizes different). Asymmetry can affect any part of the body, including the chest (also affected by spinal curvature) and in girls and women, the breasts.

Food and diet

Food and diet in most cases is entirely normal, with a normal range of food preferences and dislikes. Three adults show a dislike of or difficulty with chewing meat or foods that need a lot of chewing such as corn on the cob, preferring dishes made with minced meats or nuts; one avoids sticky foods such as peanut butter and one avoids spicy

foods. Families make extensive use of food processors and choppers and at least one family has introduced a variety of fruit into the diet as smoothies. Stiff hand and finger joints can make handling cutlery difficult and a number of people need meat cutting up, fish filleting and foods such as sandwiches cut into mouthful-sized pieces. Soups are more easily drunk from a cup than a spoon. At least one adult finds it easier to eat with fingers than cutlery and needs to be constantly reminded to eat or to be fed. One late adolescent remains dependent on a gastrostomy for direct feeding to the stomach as he previously suffered from frequent aspiration pneumonias.

Health matters

Urinary and kidney conditions

Urinary and kidney conditions are common in people with trisomy 8 mosaicism. *Unique* has already shown that in most cases problems are mild, limited to urinary reflux (where urine flushes back from the bladder towards the kidneys) and/or frequent urinary tract infections, usually only requiring regular monitoring and protective antibiotic treatment, and occasionally surgery to reimplant the tubes that connect the kidneys with the bladder. In this group, seven out of 22 adults or adolescents had experience of kidney disorders but this remained a concern only for two over-thirties who were both taking a medication to reduce high blood pressure secondary to kidney disease. No new kidney problems emerged over time. From the medical literature, there is one case of horseshoe kidney (where the bottom points of the two usually separate kidneys are joined, creating a U (horseshoe) shape); two of enlarged kidneys, for which there can be many causes; two cases of frequent urinary tract infections and one with anomalies of the tube that leads from the bladder to the outside world (Ando 2005; Hoovers 1989; Beemer 1984; Gafter 1976; Sperber 1975; Caspersson 1972).

Heart and circulation

One baby in four with trisomy 8 mosaicism is born with a heart condition. In the *Unique* group, a condition was found in two/22 which resolved or was corrected surgically by the age of one. Additionally, a 33-year-old had a heart attack which damaged the structure supporting the valves through which blood flows from the heart to the aorta and thence to the rest of the body and from the heart to the lungs. It is not known whether this was related to his trisomy 8 mosaicism.

From the medical literature, three adults had a thrombosis, two in their twenties and one in his forties (Maserati 2007; Ando 2005; Theilgaard 1977).

Joints

Stiff and sometimes twisted joints are typical of trisomy 8 mosaicism. Knees, hips, neck, wrists, ankles, elbows, shoulders, toes and fingers can be affected and older adolescents and young adults may complain of chronic arthritic pain. Joints may be imperfectly formed, the bones fused together or hips and knees may not be sufficiently moulded to create a stable working joint. Hands and feet typically have hooked or bent fingers and toes (hammer toes), sometimes with fused bones or an otherwise abnormal bone structure.

Fifteeen/22 *Unique* youngsters or adults were affected, more or less extensively, and major joint contractures were reported in three cases in the medical literature, in two of them affecting the hips (Ando 2005; Wisniewska 2002; Kosztolanyi 1976). Of these, one adult has continuous orthopaedic follow-up; another has regular chiropody and semi-regular physiotherapy; one had a Jones procedure (a small surgical procedure to straighten the big toe) as it was becoming uncomfortably bent; one had repeated surgery on her hammer toes which left her with one foot longer than the other. In four adolescents or adults the stiffness and pain worsened over time, sometimes affecting one side of the body only; this deterioration was not usually seen in teenagers, some of whom reported less stiffness with time. Splinting, casting and surgery to loosen or lengthen tendons have had varying success rates. Pain relief was important and *Unique* families reported success with injectable pain killers or steroids, TENS machines (transcutaneous electrical nerve stimulation, as in childbirth) and prescribed analgesics.

Spinal curvature (scoliosis)

Unique has already shown that a spinal curvature is common in those with trisomy 8 mosaicism, affecting almost a quarter of its members regardless of age. Among this older group, 10/22 were affected, raising the possibility that the curvature may become evident or more pronounced over time. Seven/27 cases in the medical literature had a spinal curvature (Maserati 2007; Ando 2005; Rauen 2003; Wisniewska 2002; Jordan 1998; Theilgaard 1977; Kosztolanyi 1976). The effects of the curvature included contributing to overall stiffness; causing asymmetry of chest and upper body; creating a misalignment of the hips and contributing to toe-walking; causing difficulty in bending. While in some cases the curvature was slight and required monitoring but no treatment yet, one adult wore a corrective body jacket for two years and three required fusion surgery to keep the spine straight. One family reported that while the fusion surgery was successful, their daughter's sense of balance was affected.

Undescended testicles

While *Unique* has previously shown that around one quarter of boys with trisomy 8 mosaicism are born with undescended testicles, this is reported much less often in this older age group. Three/18 young men were affected. In two cases surgery was successful in lowering the testicle into the scrotal sac and anchoring it there; in one case both testicles were removed as one was abnormal and the other became strangulated and gangrenous. Two men are reported in the medical literature, of whom one had surgery at 19 years to bring the testes down and fix them in the scrotum (Jordan 1998; Chandley 1980).

Seizures

Seizures are reported to affect around one person in six with trisomy 8 mosaicism, usually where there is also a brain malformation. Among this group, seizures have been reported in four/22 *Unique* members and there is no evidence that they are not well controlled with medication. Of these four, one has the brain malformation known as agenesis of the corpus callosum (ACC), where the band of nerve fibres that connect the two hemispheres of the brain are not present. In this case, seizures started during adolescence, according to the family report in response to taking foods sweetened with aspartame. In four other adults or adolescents with ACC or other significant brain anomaly, no seizures were reported.

Among cases reported in the medical literature, seizures are reported only once and not in the presence of ACC (Maserati 2007; Ando 2005; Lessick 1990; Kosztolanyi 1976).

Tongue tie

Unique has previously observed a high rate of tongue tie in an all-age group with trisomy 8 mosaicism. Overall, it was reported in 4/22 *Unique* members and two/27 cases in the medical literature (Rauen 2003; Theilgaard 1977). Tongue tie can cause problems with breastfeeding and with speech but does not always do so and opinions vary about whether and when to treat (by snipping, known as frenulotomy, often without anaesthetic).

> “ The way her gums are attached to the cheek is odd and her lips are shaped differently (less muscle tone maybe in the lips).

Are adults with trisomy 8 mosaicism liable to develop any other illnesses?

The only illnesses that have been found repeatedly in adults with trisomy 8 mosaicism are Behçet’s disease and leukaemia.

Behçet’s disease

Behçet’s disease is a rare autoimmune disorder that causes ulcers and skin lesions. Small blood vessels around the body become inflamed, causing a condition known as vasculitis. Recurrent painful mouth ulcers make eating very difficult and genital ulceration, eye inflammation (known as uveitis) and a rash like acne and red bumps also occur. Behçet’s disease can affect the joints, causing painful arthritis.

People with Behçet’s disease have flare-ups, sometimes every few weeks, while others can go for years without problems. There is no cure but treatment keeps inflammation and other symptoms at bay. Steroids can be used for the ulcers and in more severe

cases immunosuppressant drugs as well.

The link between trisomy 8 mosaicism and Behçet's disease is the subject of current research. Four/22 adults known to *Unique* with mosaic trisomy 8 have confirmed or suspected Behçet's disease.

Association with neoplasia

Certain people with trisomy 8 mosaicism run a very slightly increased risk of developing leukaemia or another type of cancer. This specifically affects those people in whom the extra chromosome 8 is found in cells in the blood and who have cells with the extra chromosome in their bone marrow. No-one knows just how great the risk is, but it is almost certainly small. Reported cases in the medical literature amounted to 13 by 2005, but it is possible that this underestimates the total (Maserati 2007; Ando 2005). Within *Unique*'s contacts, just one adult developed acute myeloid leukaemia and died at 29 years.

The association with malignancy means that some adults with trisomy 8 mosaicism are monitored by an oncologist or haematologist.

Do any of the features of trisomy 8 mosaicism get worse with time?

The joint contractures may become increasingly obvious, with additional stiffness and soreness. Pain relief and regular physiotherapy under orthopaedic surpervision are important to maintain mobility and function. The spinal curvature also tends to become more pronounced with time (*see* Spinal curvature).

Do any of the features of trisomy 8 mosaicism get better with time?

Children with trisomy 8 mosaicism appear to catch more infections than other children and to suffer worse when they have them. This tendency lessens with age and most adults report good or excellent general health.

> " He's in good general health but only so long as he maintains a healthy lifestyle with a good diet, a good sleep pattern and low stress - *29 years*

What about the effects of trisomy 8 mosaicism on mood?

There is no evidence that the condition has any direct effect on mood, psychological or psychiatric disorders. All the same, five out of six adults over 30 have shown temper outbursts of varying severity but in each case serious enough to warrant psychological help or medication. These 'inappropriate tantrums' occurred in both people with and without a learning disability. However, we cannot be certain that they are part of the trisomy 8 mosaicism syndrome (*Unique*).

Eyesight

Vision problems are common in people of every age with trisomy 8 mosaicism, with errors of refraction (short or long sight), strabismus (a squint) and opaque areas on the cornea (the front of the eyeball) or cataracts the most frequently reported problems (Taban 2006; Ando 2005; Jordan 1998). One adolescent is registered blind. Four/13 adults or adolescents known to *Unique* reported a noticeable deterioration in their vision with age: in one adult this occurred despite removal of cataracts and use of thin lenses; another adult with short sight experienced a marked worsening of his vision in his late 20s; a teenager with short sight and keratoconus (a condition where the cornea

thins and is pushed outwards usually by internal pressure within the eye) also experienced worsening of his vision.

Regular eye checks are recommended, especially where there is any concern about vision.

Hearing

Six adults or adolescents from *Unique* reported some degree of hearing loss. In three this was temporary and resulted from frequent ear infections in childhood; in two the cause was not known and in one the ears were not correctly formed, with missing eardrums and bones in the inner ear. Reconstruction of one ear restored hearing on that side. In the medical literature there is one report of progressive hearing loss of a mixed type (Rauen 2003).

Teeth

In most *Unique* contacts, good care including fluoride treatment and sealant application is all that is needed to maintain dental health. Four/13 adults or adolescents needed extractions or braces to straighten their teeth; in one case bracing was unsuccessful in correcting the crooked position of the teeth. Among the adults, one has overbite (the upper teeth protrude forward from the lower jaw); and one had two extra teeth in the upper jaw and had one front tooth removed as it fused with an additional tooth. Among the teenagers, one retains two milk teeth while also showing gaps in the adult teeth at 19 years.

> “ Her mother brushes and flosses her teeth daily; she has only ever had one cavity - *36 years*

Puberty

Among 14 reports of the onset and progress of puberty (11 males, three females) puberty started at the expected time and proceeded normally in all females; among the males, it started late in six but proceeded normally in all, bar one man who is reported to be still developing at 37.

In the medical literature, both normal and delayed puberty have been reported, as well as failure to develop secondary sexual characteristics and a premature menopause (Kurtyka 1988; Riccardi 1977; Theilgaard 1977; Kosztolanyi 1976; Sperber 1975).

Fertility and reproduction

It’s natural to wonder whether your child with trisomy 8

mosaicism will ever be able to have children of their own, especially if they seem to be quite mildly affected by the chromosome disorder. There is only a very limited amount of information available and while there have been a few reports of pregnancy in women, men with T8M appear to have fertility problems.

Women

One of *Unique*'s members has three children of her own, all with normal chromosomes, but has also had miscarriages. There are two reports in the medical literature of women with T8M having a baby, in both cases with normal chromosomes. One of these women also had a series of miscarriages and there are two other reports of women having repeated pregnancy losses. One of the women who had a baby with normal chromosomes had developmental delay herself, but the other women who became pregnant were developmentally normal or only had very minor typical signs, such as incurving little fingers or recurrent mouth ulcers.

When a woman with T8M becomes pregnant, the baby's chromosomes can be checked before birth by chorionic villus sampling or amniocentesis. Before planning a pregnancy, people with T8M are recommended to have a discussion if possible with their clinical geneticist or genetic counsellor about the options for testing in pregnancy.

There are no reports of women with T8M having difficulties in pregnancy or childbirth caused by the typical narrow pelvis associated with the disorder.

Men

Some men with T8M have sought help for infertility but so far there have been no reports in the medical literature where a man has fathered a child. However, one man with T8M has described on an e-group message board the successful birth of a healthy baby at the third attempt. Tests are available during pregnancy to check the baby's chromosome pattern if the parents wish (Rauen 2003; Habecker-Green 1998; Mercier 1997; Chandley 1980; *Unique*).

Could my child with trisomy 8 mosaicism have similarly affected children?

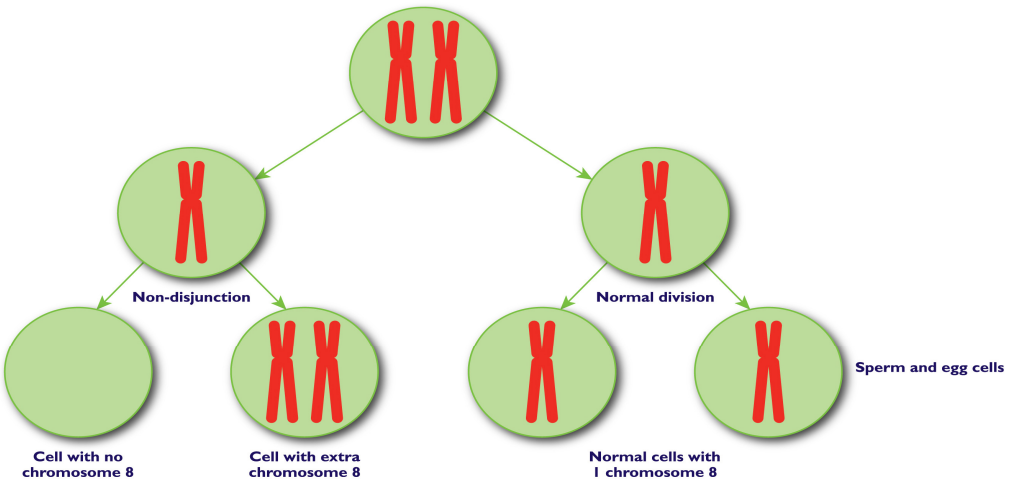
There is no known case where a parent with trisomy 8 mosaicism has had a child with trisomy 8 mosaicism. If, as is possible, some of the eggs or sperm of an adult with T8M include the extra chromosome 8, this would give rise to a fetus with full trisomy 8. Sadly, full trisomy 8 is not thought to be compatible with survival outside the womb and such a pregnancy is likely to end in miscarriage or stillbirth. Other eggs or sperm may not include the extra chromosome 8, in which case a normal pregnancy and fetus would be expected. This has been seen repeatedly in women, but not yet in men.

How did this happen?

The reason for an individual having an extra chromosome in some cells of their body is not yet perfectly understood. What is known is that the presence of three copies of a chromosome may arise in two main ways.

It can be due to a process called non-disjunction. Instead of cells dividing and duplicating themselves evenly, keeping the same chromosome number in all of the duplicated cells, one pair of chromosomes does not divide evenly. This can lead to an extra chromosome (in this case, an extra chromosome 8) in the fertilised egg, leading to full trisomy 8. At an early stage of development, one chromosome 8 is lost in a process called trisomy rescue. Two different cell lines, one with the extra chromosome 8 and the other without, develop at the same time, leading to mosaic trisomy 8.

How non-disjunction can arise



Non-disjunction can also happen during mitosis, the process of cell division after fertilisation. In this case, the fertilised egg starts with the correct number of 46 chromosomes but following the mistake in cell division, a cell line with trisomy 8 (so with 47 chromosomes in all) develops at the same time as a cell line with the correct number of 46 chromosomes.

Cells with trisomy 8 continue to duplicate themselves in certain organs and tissues. At the same time, cells with the normal number of chromosomes duplicate themselves in other organs and tissues. Depending on when the non-disjunction happened, the person may have few or many cells with trisomy 8.

Why did this happen?

There is a lot more to be learned about why non-disjunction occurs but current understanding is that it occurs by chance. No parent has control over the process or can influence the number of chromosomes their child receives.

Can it happen again?

Mosaic trisomy 8 is held to be a chance event that typically carries a very low recurrence risk for the individual's parents and family. Unlike other conditions involving non-disjunction, like Down's syndrome, trisomy 8 mosaicism is not linked with a mother's or father's age at conception.

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Support and Information

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