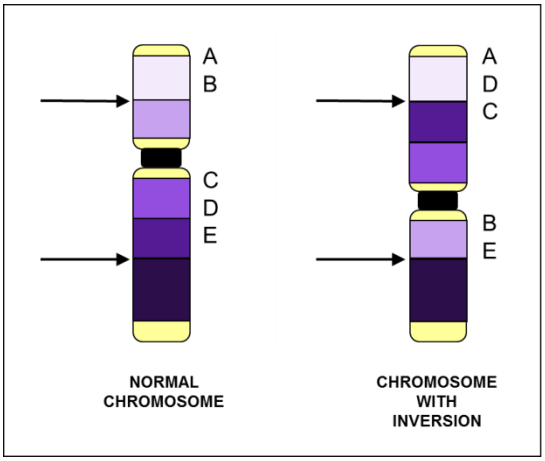
Saint Mary's Hospital
Manchester Centre for Genomic Medicine

Information for Patients

Chromosome Inversions



What happens in an inversion?

Sometimes a chromosome breaks in two places and the broken piece rejoins the same chromosome, but upside down. This is called a chromosome inversion. This diagram shows a pair of chromosomes, one of which is inverted:

Why do inversions happen?

Although about 1 in 500 people has chromosome rearrangement of some sort, we do not really understand why they happen. Chromosomes break and re-join quite often, but it is only sometimes that they re-join in the wrong place.

Chromosome inversions occur in either the egg or the sperm cell before fertilisation or shortly afterwards. These changes are totally out of our control and are unlikely to be caused by anything that happens during pregnancy.

Once an inversion has occurred in a person it can be passed on to future generations. Some people carry an inversion which they have inherited from one of their parents.

How can we find out if a person carries an inversion?

A simple blood test is all that is usually needed. The chromosomes inside the blood cells can be looked at down the microscope to see if they have the usual or a rearranged pattern. This test is offered to people who have a family history of a chromosome inversion or when there is suspicion of a chromosome rearrangement due to family history.

What does it mean to carry an inversion?

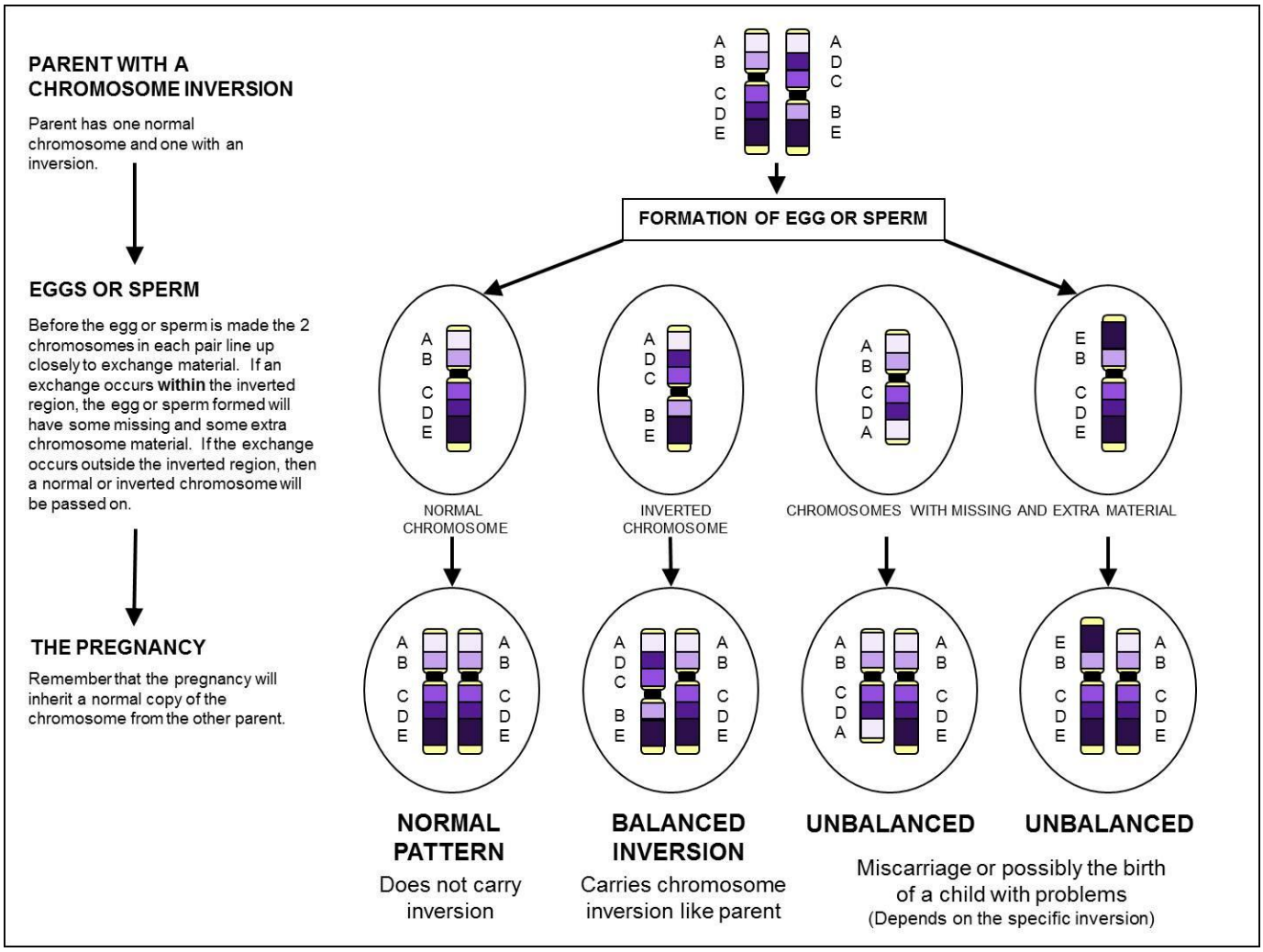
If there is no missing or extra chromosome material, the rearrangement is balanced. People who have a balanced chromosome rearrangement have the right amount of genetic information, even though this is arranged in a different way and there are no health implications for them.

A balanced chromosome arrangement can cause problems when people come to have children, because there is a risk of passing on an unbalanced amount of genetic information. Having too little or too much chromosome material can result in disability. An **unbalanced** chromosome rearrangement may cause miscarriage or serious problems in the growth and development of the baby.

It is quite possible for a person who carries an inversion to have healthy children and many do. However, the risk for someone with an inversion to have a child with disabilities is higher than average. The possible outcomes in pregnancy for a balanced chromosome carrier are described below.

Possible chromosome patterns in a pregnancy

The diagram below shows some of the chromosome arrangements that can be passed on in pregnancy and the possible outcome. The chance of having a miscarriage or a child born with significant problems depends on the exact chromosome rearrangement and can be discussed but your Genetics Health Professional.



Can we tell which chromosome pattern will be passed on?

Unfortunately, it is impossible to predict how often a certain pattern will be passed on and often we are not able to detect any problems with a baby on early pregnancy scans.

It is possible to have invasive prenatal testing in pregnancy to detect the chromosome pattern. There are two types of test; chorionic villus sampling (CVS) and amniocentesis. There is a small risk of miscarriage after both tests. Separate information leaflets are available about both CVS and amniocentesis. The choice to have these tests is individual and the exact risks of your specific inversion should be discussed in your genetic counselling appointment.

If an unbalanced chromosome pattern is found, this could lead to a miscarriage or to the birth of a baby with serious disability. In these circumstances a couple may consider whether to continue with the pregnancy. If, however, the pregnancy was found to have the 'usual' or the 'balanced' chromosome pattern, we would not expect there to be any increased risk of problems for the baby.

Are there any other reproductive options?

In some families where the risk of having a child born with significant problems is high, a process called Pre-implantation Genetic Diagnosis (PGD) can be an option. This is an assisted reproductive technique and has some similarities to In Vitro Fertilisation (IVF) but involves testing of the embryos before they are transferred to the womb. The aim of this process is to avoid using any embryos that have an unbalanced chromosome inversion. While this can sound appealing, it is not a straightforward technique and needs to be considered carefully for each couple. If this is something you are interested in it can be discussed in more detail with you genetic health professional. A separate leaflet is available.

People with genetic conditions in the family can also choose to have no children, adopt or have natural pregnancies with no testing involved.

When should we talk about the inversion with children?

There is no one time when children should be told about the family inversion since all children are different.

Children who carry a balanced inversion have no increased risk of health problems themselves. However, when they grow up, they will have an increased risk of experiencing problems in their own pregnancies. It is usually best for young people to learn about the inversion before they are considering having a family of their own. If any parent would like to talk more about this with us, we would be very happy to do so.

Should other family members be told about the inversion?

If anyone in the family has children, or is likely to have children, then it is important that they are told about the inversion in the family. This gives them the opportunity to consider having a blood test to find out if they carry the inversion.

Sometimes, for many reasons, people find it difficult to tell family members about the inversion. If you would like to talk to someone about the best way to approach family members and which relatives may need to know, our Genetic Counsellors have a lot of experience with families in these situations.

Some important points to remember:

- We would not expect a balanced inversion to affect the health of anyone who carries it. The only time it is important is when there is a pregnancy.
- A carrier of a balanced inversion **can** have healthy children.
- It is important that other family members are told about the inversion. Children who could carry the inversion should be told about it before they plan to have children of their own.
- People often feel guilty about something like a balanced inversion that runs in the family. It is important to remember that it is no-one's fault and that no-one has done anything to cause it to happen.

For more information

Please refer to our separate leaflet '*An Introduction to Chromosomes'*. If you need more advice about any aspect of chromosome inversions, you are welcome to contact:

Manchester Centre for Genomic Medicine
Sixth Floor
Saint Mary's Hospital
Oxford Road Manchester M13 9WL

Telephone: (0161) 276 6506 (Reception)
Facsimile: (0161) 276 6145

Department staffed Monday–Friday, 9.00 am to 5.00 pm.

Website: www.mangen.co.uk

Please let us know if you would like this leaflet in another format (e.g. large print, Braille, audio).

We would like to acknowledge our Clinical Genetics colleagues at Guy's and St Thomas' Hospital NHS Trust who originally designed and wrote this leaflet.