GENETICS AND OSTEOGENESIS IMPERFECTA

Introduction

Osteogenesis Imperfecta (OI) is a genetic condition characterised by bones that break easily, often from little or no apparent cause. The condition can vary quite drastically from person to person so a classification system has been identified to describe the different types of OI. This is commonly used to help explain how severely a person with OI is affected. For example, a person may have just a few or as many as several hundred fractures in a lifetime.

Genetic Mutation

OI is most commonly the result of a mutation in one of the two genes that carry instructions for making type 1 collagen (a major protein in bone and skin). This may result in either a change in the structure of type 1 collagen, or in the amount of collagen made. Either of these changes results in weak bones that fracture easily.

What are genes?

Genes are the unique set of instructions inside our bodies which make each of us an individual. There are many thousands of different genes, each carrying a different instruction. If a gene is altered, it can cause a genetic condition or disease. This gene alteration is sometimes known as a mutation.

Where does OI come from?

Dominant Inheritance

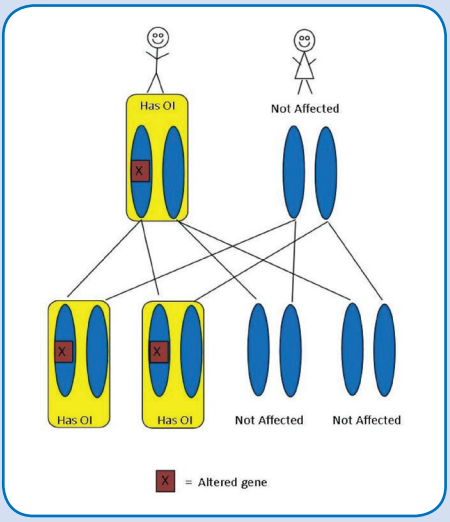
Most cases of OI are inherited in a dominant way. This is caused by an alteration in one copy of a gene and is called dominant because the altered copy of the gene is dominant over the other copy of the gene. A person with OI which has been inherited dominantly will have a 50% or 1 in 2 chance of passing on the altered gene to their children, causing them to also have OI.

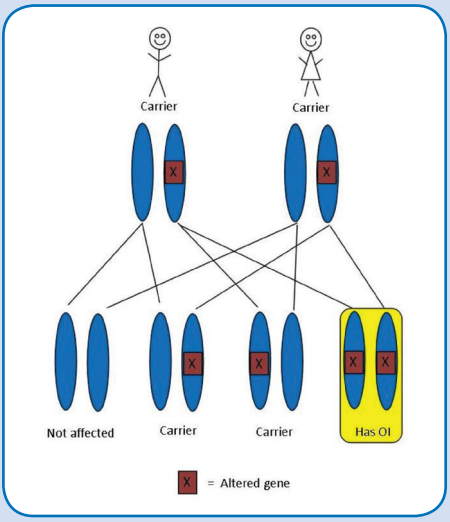
A New Dominant Mutation

Around 25% of children with OI are born into a family where there is no family history of the condition. This occurs when the child has a "new" or "spontaneous" dominant mutation.

In most cases, when a family with no history of OI has a child with OI, they are not at any greater risk than the general population for having a second child with OI.

A person who has OI as a result of a new dominant mutation will have a 50% or 1 in 2 chance of passing on the altered gene to their children, causing them to also have OI.





Recessive Inheritance

Rarely OI is inherited in a recessive way. In recessive conditions, individuals who have only one altered copy of a gene are completely healthy. They are known as carriers, because they carry one altered copy of a gene. Their normal copy of the gene keeps them healthy and compensates for the altered copy of the gene.

If both healthy parents carry the same altered recessive gene, then each child they have has a 25% (1 in 4) risk of inheriting the altered gene from both parents and therefore being affected. For each child, regardless of their sex, the risk is the same = 25%.

Children of couples who are both carriers of the same altered recessive gene have a 50% (1 in 2) chance of inheriting one copy of the altered gene from one of their parents. If this happens, they are healthy carriers themselves. There is also a 25% (1 in 4) chance that a child of a carrier couple will inherit two normal copies of the gene. These children will be completely normal.

If only one parent is a carrier of the altered gene, then each of their children has a 50% chance of being a healthy carrier, but will not be affected.

Further Information and Family Planning

If you or a member of your family have OI and you are concerned about other family members or have questions about family planning, you can access information, counselling and, in appropriate circumstances, genetic testing from your regional Clinical Genetics service.

To access the service go to your GP, tell them your concerns and ask for referral to the Clinical Genetics Service.

A directory of the regional Clinical Genetics Services in the UK can be found on our website.

NOTES

FURTHER INFORMATION

For more information please refer to additional BBS information sheets which can be found on our website – www.brittlebone.org or contact us using the details below.

CONTACT INFORMATION

Compiled by the Brittle Bone Society in collaboration with BBS Medical Advisory Board (MAB) – our special thanks go to the Metabolic Bone Teams at: Birmingham Children's Hospital, Bristol Royal Hospital for Children, Great Ormond Street Hospital, Sheffield Children's Hospital and Northern General Hospital Sheffield, Royal Hospital for Sick Children Yorkhill, Glasgow and Royal Manchester Children's Hospital for the assistance and information they have provided. Healthcare professionals contributing: NJB, FA, CdV, CC, CH, JW, ZM, NS, AC, EW, RD, CB.

The information in this leaflet is correct as at 01 June 2013 but we cannot guarantee that it will be accurate and current at any given time. This leaflet is not intended in any way to replace the advice of your doctor or other medical professional. Leaflets are available online at www.brittlebone.org. This information is available in accessible formats on request.

BRITTLE BONE SOCIETY
Grant-Paterson House, 30 Guthrie Street, Dundee, DD1 5BS
Tel: 01382 204446 Email: bbs@brittlebone.org Web: www.brittlebone.org
Facebook: Brittle Bone Society (Official) Follow us on Twitter: @BrittleBoneUK

Working with People who live with Osteogenesis Imperfecta.

Charity Nos. England & Wales 272100, Scotland SC010951