First version: Maya Ballantine, Pamela Bowman, Jonna Männistö, Sarah Dearman, Indi Banerjee, Sarah Flanagan 03-06-2026. Updated: 30-06-2026

Recessive Inheritance of Congenital Hyperinsulinism

This information sheet summarises what we know about **recessive inheritance** of **congenital hyperinsulinism** (shortened to HI). This sheet is intended for information only and should not replace personalised advice or genetic counselling for you or your family. For information on other forms of inheritance, check out our other information sheets here.

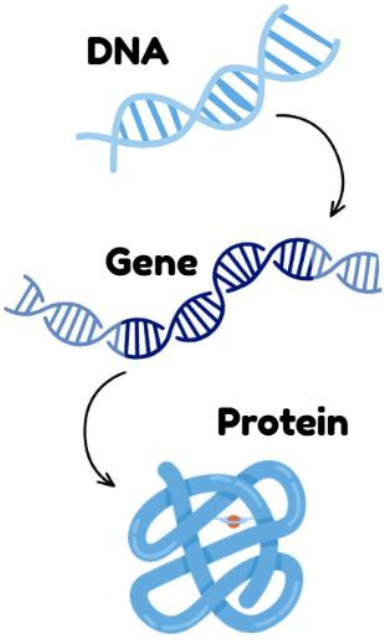
All terms highlighted in **blue** can be found in our glossary, linked here.

Key Points

- **Inheritance** is how an individual's **characteristics are passed from a parent to their child**
- **Congenital HI** is often **caused by genetic variants** that have been passed down from parents
- A **recessive variant** means that **both copies of the gene must have a variant that causes congenital HI**. One copy would be inherited from Mum and one copy from Dad
- If both parents are carriers of recessive congenital HI, each of their **children has a 1 in 4 (25%) chance of inheriting both variants and developing HI**
- Recessive variants cause **diffuse pancreatic disease** where the **whole pancreas releases too much insulin**

What are Genes and Genetic Variation?

We are all **made up of trillions of cells**, and in each cell, there is a very important molecule called **DNA**. DNA is the body's **instruction manual** that tells the cell what it needs to do to function properly. These instructions are contained in **small sections of DNA** called **genes**.



Each person will have **two copies of a gene**, one **inherited** from their **mother**, and one inherited from their **father**. These genes each provide a **unique code** that makes **different proteins**, and these proteins **help the body grow, function and stay healthy**.

It is **normal to have some variation** in this **genetic** code between individuals because that is what makes us all different and unique. Sometimes though a **change (or variant) in a gene** can cause a **protein to not function properly**, leading to **health problems**. These are often called **genetic**, **congenital**, or **inherited conditions**.

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What is Inheritance?

Inheritance is how an individual's **characteristics** **are passed from parents to their children** through variants in their genes.

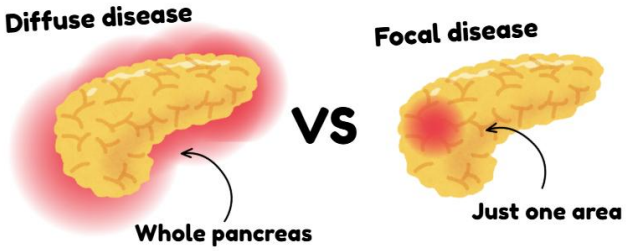
Some variants cause disease when they are in **one copy of a gene inherited from one parent**, these are called **dominant variants**.

Other variants only cause disease when present **in both copies of a gene, one inherited from each parent.** These are called **recessive variants**.

This **inheritance pattern** depends on the **type of variant and the gene** it is in.

How Does This Relate to Congenital HI?

In congenital **hyperinsulinism** the **pancreas releases too much insulin** causing **low blood sugar** (called **hypoglycaemia**). Some people have **diffuse** disease, where the **whole pancreas** releases too much insulin. Others have **focal** disease, where too much insulin is released from a **smaller area of the pancreas**.

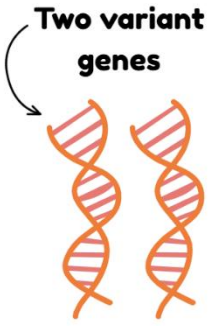


In some, but not all people, **congenital HI is caused by genetic variants**. These variants **affect genes that make proteins that are important for controlling insulin secretion**.

Variants in over 30 different genes can cause congenital HI. How these variants are inherited **differs by gene and between individuals**. These variants can be identified by performing a **genetic test** using **a blood sample** (or rarely from **the pancreatic sample** after an operation).

This information sheet is about **recessive inheritance.**

Recessive Variants



To be affected with a recessive condition, **both copies of the gene must have a variant that causes congenital HI**. One copy would be inherited from Mum and one copy from Dad.

Parents who have **one copy of a recessive variant** in their gene are referred to as a **carrier**. Carriers are **not expected to have congenital HI**, as **one recessive variant is not enough** to cause the disease.

If someone has **two identical variants**, the variant is called a **homozygous variant**. If someone has **two variants in the same gene**, but they are **different**, they are called a

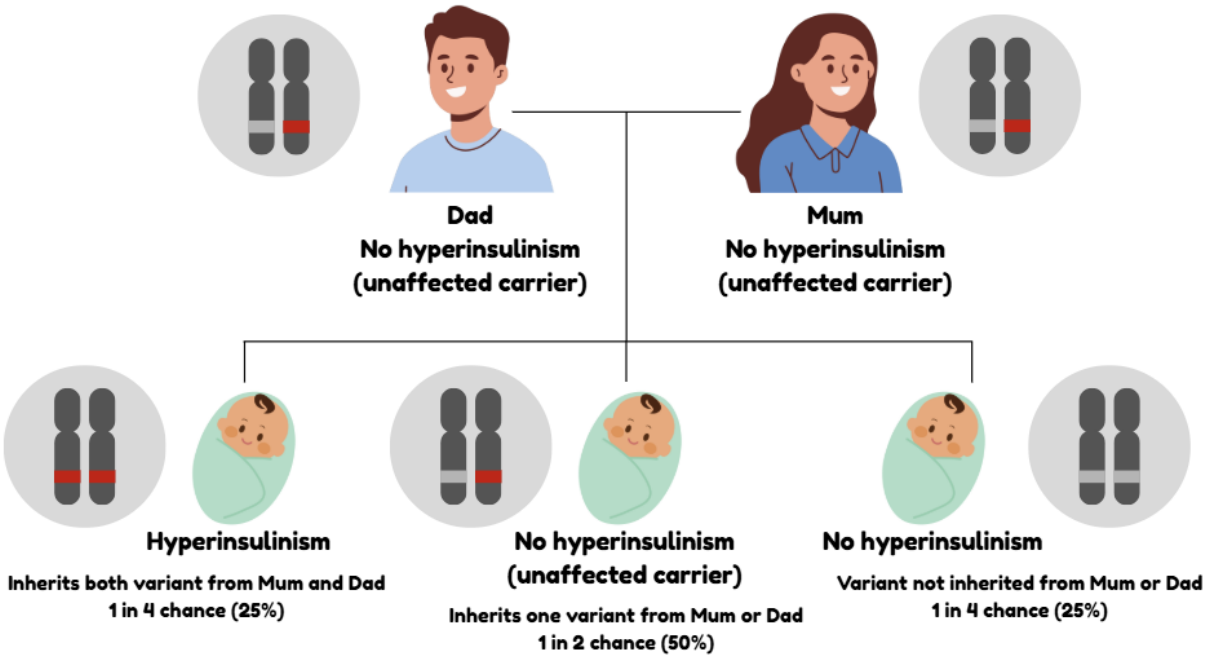
compound homozygous variant. Both homozygous and compound homozygous variants can also be called **biallelic variants** because there is a **variant on both copies of the gene**.

Recessive variants have been seen in the ***ABCC8, KCNJ11, HADH*, and *PMM2*** genes. These cause **diffuse pancreatic disease**.

Inheritance of Recessive Congenital HI

When **both parents are carriers** for a recessive variant in the same gene, for each of their children there is a:

- **1 in 4 (25%) chance** that a child will **inherit one variant from their Mum AND one variant from their Dad**. When this happens, the child is expected to **develop congenital HI**.
- **1 in 2 (50%)** chance that the child will **inherit only one variant** and be an **unaffected carrier**, like their parents.
- **1 in 4 (25%)** chance that the child will **not inherit either variant** and will not have congenital HI or be a carrier.



Each pregnancy is independent. Therefore, the chances described above **apply to each child individually**, and **siblings may be affected differently** within the same family.

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Can a Person with Recessive Congenital HI Have a Child with the Same Condition?

In most cases, the chance that a **person with recessive congenital HI** will have a **child who also has recessive congenital HI** is **generally low**. However, the **likelihood increases** in 2 specific situations:

- The partner and the person with congenital hyperinsulinism are **related by blood**, for example they are cousins

OR

- **Being a carrier** of congenital HI is **particularly common within the population** that the two parents are from

Can a Person with Recessive Congenital HI Have a Child with Focal Hyperinsulinism?

There is a **very small chance** that a **male with congenital HI caused by recessive variants in the *ABCC8* or *KCNJ11*** genes could have a **child with focal congenital HI**. The chance of this happening is **less than 1%.**

To learn more about focal congenital HI and how it is inherited, check out our information sheet on the topic linked here.

Can Other Unaffected Family Members of a Person with Recessive Congenital HI have a Child with Congenital HI?

An **unaffected close family member** (e.g. sibling, aunt, uncle) of a person with recessive congenital HI may be a **carrier of a variant**. The likelihood of this in close relatives in often **50% (1 in 2).**

For most carriers, the **chance of having a child** with congenital HI **is very low**, unless:

- The person and their partner are **related by blood,** for example they are cousins

OR

- **Being a carrier** of congenital HI is **particularly common within the population** that the two parents are from

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Getting Individualised Information and Accessing Genetic Counselling Services

Meeting with a **genetic counsellor** or **clinical geneticist** can be very helpful if you have **a family history of HI**. They can explain how HI might **affect you or your children** and **answer any questions** you have. Because everyone's genetics are unique, the guidance you receive will be **personalised to you**.

This support can help you make **informed decisions** and **plan the future**. To book any appointment you will usually need a **referral from your family doctor** (GP in the UK) or a **specialist doctor**.

Additional Resources

- **Recessive inheritance explained:** https://www.genomicseducation.hee.nhs.uk/genotes/knowledge-hub/autosomal-recessive-inheritance/
- **Genes explained:** https://www.genomicseducation.hee.nhs.uk/genotes/knowledge-hub/gene/
- **The role of the Genetic Counsellor:** https://www.genomicseducation.hee.nhs.uk/genotes/knowledge-hub/roles-in-clinical-genetics/#genetic-counsellors

This leaflet was developed by the Exeter Hyperinsulinism Genes team (www.hyperinsulinismgenes.org) in collaboration with The Children's Hyperinsulinism Charity UK (https://hyperinsulinism.co.uk/). Registered Charity: 1165562, Company Number: CE005407