IDENTICAL TWINS ALWAYS HAVE IDENTICAL DNA… OR DO THEY?

MUTATIONS DURING EARLY DEVELOPMENT MAY CAUSE SLIGHT GENETIC DIFFERENCES IN THE DNA OF IDENTICAL TWINS

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New research has found that not all identical twins have the exact same DNA.
Image from pexels

Identical twins are monozygotic, which means that they come from the same zygote (fertilised egg). The zygote undergoes cell division to form an embryo. The embryo splits into two separate cell **clusters**, which then continue the process of cell division separately. These two embryos go on to form two babies, which should be genetically identical because they came from the same zygote, so contain genetic information from the same sperm and egg.

Non-identical twins, or fraternal twins, are dizygotic. This means they are from two separate zygotes. They are not genetically identical because they are from different sperm and egg cells, so contain different mixtures of chromosomes.
Identical twins have traditionally been in high demand in scientific research, being **recruited** so that scientists can determine whether characteristics are genetic or due to

the environment. As they have the same genes, any differences between them can be attributed to the environment.

A group of scientists in Iceland decided to determine whether or not identical twins truly were genetically identical, and their findings were surprising. They **deciphered** the genes of 381 pairs of twins and found that only 38 pairs of these twins had exactly the same genes. The average number of genetic differences between the twins was 5.2, but some pairs had many more differences, including 39 pairs of twins that had more than 100 genetic differences between them.

How can these identical twins have genetic differences if they come from the same sperm and egg and therefore carry the same genetic information? The scientists suggest that the differences are due to mutations during the process of embryo development, where the mutations **arose** after the zygote had already split. This means that there would be different mutations in each zygote. How early into the development process the mutations occur likely affect how different the twins are. The earlier the mutation, the more likely there are to be a larger number of genetic differences.

So are these differences useful, harmful or indifferent? Scientists suggest there is not an easy way to determine that, because using twins would have been a good starting point for those studies, but now it seems that some of those twins are not genetically identical after all!

Answer the following questions in full sentences:

1. What is this news story about?

2. Explain why the number of genetic changes is not a whole number.

3. Explain the difference between identical (monozygotic) and fraternal (dizygotic) twins.

4. Write down the meanings of any words **in bold** in the article.