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24 APRIL 2018 NEWS

Human gene atlas opens avenues for cancer and genetics studies

By **Charlotte Edwards**

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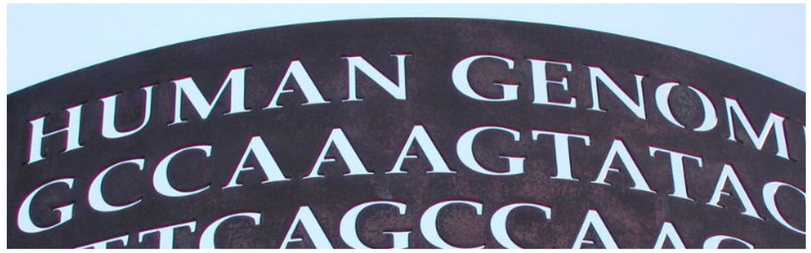

Scientists from the Hebrew University of Jerusalem have created an atlas of the human genome, which highlights the roles genes play in health and disease, using gene editing technology and human embryonic stem cells.

The scientists reported their findings in the *Nature Cell Biology* journal.

Hebrew University of Jerusalem professor and senior author of the study Nissim Benvenisty said: "This gene atlas enables a new functional view on how we study the human genome and provides a tool that will change the fashion by which we analyse and treat cancer and genetic disorders."

The study showed that only 9% of all the genes in the human genome are essential for the growth and survival of human embryonic stem cells, whereas 5% actually limit the growth of these cells. The scientists could also analyse the role of genes responsible for all hereditary disorders in early human development and growth and were able to show how cancer-causing genes could affect the growth of the human embryo.

The researchers were able to analyse virtually all of the genes in the human genome by generating more than 180,000 distinct mutations. They did this by

combining CRISPR-Cas9 gene-editing technology with a new type of embryonic stem cells that the research group had recently isolated. The new type of stem cells make gene editing easier because they only contain a single copy of the human genome instead of two.

The study also identified a small group of genes which are essential for the survival of human embryonic stem cells but not other types. The researchers believe these genes maintain the identity of embryonic stem cells and prevent them from becoming cancerous or turning into adult cells.

Embryonic stem cells are viewed as a unique resource because they can turn into any adult cell in the human body. This versatility has resulted in the cells becoming the main focus of regenerative medicine, disease modelling and drug discovery.

Lead author of the study Dr Atilgan Yilmaz said: “This study creates a new framework for the understanding of what it means to be an embryonic stem cell at the genetic level.

“The more complete a picture we have of the nature of these cells, the better chances we have for successful therapies in the clinic.”

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