Protective barrier inside chromosomes helps to keep cells healthy

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Fresh insights into the structures that contain our genetic material could explain how the body's cells stay healthy.

A protective barrier formed inside each of our chromosomes helps to prevent errors occurring when cells divide, researchers say.

The study sheds light on the precise interplay between key factors inside chromosomes that leads to the formation of the barrier.

Findings from the study could help improve understanding of the causes of some diseases - including cancer - that are triggered by errors in the cell division process, the team says.

When cells divide, chromosomes containing our genetic information separate into two new cells, known as daughter cells. Errors in this process can lead to disease, the team says.

Scientists produced an artificial chromosome in the lab to investigate how cells renew themselves - a process known as cell division.

The method has allowed researchers to study key players involved in cell division - which include proteins that form much of the structure of chromosomes, and fragments of DNA that help to orchestrate the process.

The team at the University of Edinburgh focused on a region inside

chromosomes - known as the centromere - which plays a pivotal role in the regulation of cell division.

They found that a complex series of steps takes place to form a barrier that prevents centromeres from being invaded and inactivated by other regions of the chromosome. This helps to maintain a fully functional centromere, thereby reducing the chances of errors occurring when the chromosomes separate, the team says.

The study, published in *Nature Communications*, was funded by the Wellcome Trust. It was carried out in collaboration with the National Institutes of Health in the US, and the Kazusa DNA Research Institute, Japan.

Professor William Earnshaw, of the University of Edinburgh's School of Biological Sciences, who led the study, said: "The creation of a protective barrier shields centromeres from other parts of the chromosome during cell division, which prevents disease-causing errors from occurring. The study was made possible by our unique synthetic chromosome system, which allowed us to study the structure and maintenance of centromeres in remarkable detail."

Provided by University of Edinburgh