Molecular mouse-trap technique sheds light on key cell processes

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Scientists have shed new light on the fundamental biological process of cell division, thanks to an emerging analytical method.

Their research is aiding understanding of cell division, which helps the body renew and stay healthy, but which can misfire and cause cancer.

Researchers combined sophisticated chemical methods with advanced computing capabilities, to study how DNA is packaged into chromosomes when cells divide.

Their research focused on the structure of a set of large proteins that play a key role in the process. This protein complex - known as condensin - interacts with DNA, helping it to be shaped into chromosomes that can be segregated when cells divide.

Their approach involves application of a chemical trap to capture and map of parts of proteins that are close to one another. This enables researchers to develop a frame-by-frame account of their movement and create a computer model of their structure.

Attempts to decipher the structure of these proteins using existing methods had failed, because of the proteins' size and flexibility. The latest method, which researchers at the University of Edinburgh helped to create, has been more than a decade in development.

Known as Cross Linking Mass Spectrometry (CLMS), it helps identify

exactly where molecules touch one another, enabling scientists to model complex biological molecules.

The study, published in the Royal Society journal *Open Biology*, was carried out in collaboration with the Foundation for Applied Molecular Evolution in the US and the Murdoch Children's Research Institute in Australia. It was funded by the Wellcome Trust.

Professor William Earnshaw, of the University of Edinburgh's School of Biological Sciences, who led the study, said: "Until now, the complexities of how chromosomes are formed has been something of a mystery. Understanding the structure of proteins involved, and how they interact, will enable us to modify and analyse their component parts in order to finally figure out how they really work."

Provided by University of Edinburgh