Epigenetic regulation required to ensure correct number of chromosomes

February 16 2014

Abnormal number of chromosomes is often associated with cancer development. In a new study published in the journal *Nature Structural and Molecular Biology* researchers at Karolinska Institutet in Sweden have shown that a subtle epigenetic change plays an important role in the correct segregation of chromosomes.

Normally when a cell divides, the chromosomes are segregated equally to two daughter cells. However, tumour cells frequently have either too few or too many chromosomes, leading to the incorrect expression of a number of genes. When a cell is about to divide, the cell division machinery takes hold of chromosomes by the centromere so that they may be pulled apart and one copy of each given to the daughter cells.

In the current study, researchers have shown that an epigenetic process, involving the attachment of a small protein to the histone H2B (called H2Bub1), facilitates an important structural change of the centromere immediately prior to cell division. It was previously shown that enzymes that modify histone H2B in this way also play a role in protecting against cancer. This was previously linked to defects in chromosomal repair.

"Our study confirms this role for H2Bub1, but we are extending it to include another mechanism that directly leads to the incorrect number of chromosomes in cells," says Peter Svensson at the Department of Biosciences and Nutrition, one of the researchers who conducted the study.

The researchers behind the new study say that the fact that this mechanism is highly similar in human cells and yeast cells suggests that it plays a key role in ensuring proper chromosome distribution following each cell division. The research has been funded by the Swedish Research Council, and the Swedish Cancer Society.

More information: "Centromeric histone H2B monoubiquitination promotes noncoding transcription and chromatin integrity", Laia Sadeghi, Lee Siggens, J Peter Svensson & Karl Ekwall, *Nature Structural & Molecular Biology*, online 16 February 2013, doi.org/10.1038/nsmb.2776

Provided by Karolinska Institutet