Medical Xpress

'Junk DNA' drives cancer growth

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Researchers from the University of Leeds, UK, the Charite University Medical School and the Max Delbruck Centre for Molecular Medicine (MDC) in Berlin, Germany, have discovered a new driving force behind cancer growth.

Their studies have identified how 'junk' DNA promotes the growth of cancer cells in patients with Hodgkin's lymphoma. Professor Constanze Bonifer (University of Leeds) and Dr Stephan Mathas (Charité, MDC) who co-led the study suspect that these pieces of 'junk' DNA, called 'long terminal repeats', can play a role in other forms of cancer as well. The work is published in *Nature Medicine*.

The researchers uncovered the process by which this 'junk DNA' is made active, promoting cancer growth.

"We have shown this is the case in Hodgkin's lymphoma, but the exact same mechanism could be involved in the development of other forms of blood cancer," said Prof. Bonifer. "This would have implications for diagnosis, prognosis, and therapy of these diseases."

'Long terminal repeats' (LTRs) are a form of 'junk DNA' - genetic material that has accumulated in the human genome over millions of years. Although LTRs originate from viruses and are potentially harmful, they are usually made inactive when embryos are developing in the womb.

If this process of inactivation doesn't work, then the LTRs could activate

cancer genes, a possibility that was suggested in previous animal studies. This latest research has now demonstrated for the first time that these 'rogue' active LTRs can drive the growth of cancer in humans.

The work focused on cancerous cells of Hodgkin's lymphoma (the Hodgkin-/Reed Sternberg cells) that originate from white blood cells (antibody-producing B cells). Unusually, this type of lymphoma cell does not contain a so-called 'growth factor receptor' that normally controls the growth of other B-cells.

They found that the lymphoma cells' growth was dependent on a receptor that normally regulates the growth of other immune cells, but it is not usually found in B-cells. However in this case, the Hodgkin-/Reed Sternberg cells 'hijacked' this receptor for their own purposes by activating some of the 'junk DNA'. In fact the lymphoma cells activated hundreds, if not thousands, of LTRs all over the genome, not just one.

Hodgkin-/Reed Sternberg cells may not be the only cells that use this method to subvert normal controls of cell growth. The researchers found evidence of the same LTRs activating the same growth receptor in anaplastic large cell lymphoma, another blood cancer.

The consequences of such widespread LTR activation are currently still unclear, according to the study's authors. Such processes could potentially activate other genes involved in tumour development. It could also affect the stability of chromosomes of lymphoma cells, a factor that may explain why Hodgkin-/Reed Sternberg cells gain many chromosomal abnormalities over time and become more and more malignant.

Provided by University of Leeds