

'Blindfold handshake' in the cell prevents diseases

February 17 2010

(PhysOrg.com) -- Researchers at the University of Dundee, UK, have made a significant new discovery about how cells behave and protect themselves against cancers and genetic disorders.

Professor Tomo Tanaka and his team members Dr Etsushi Kitamura and Mr Shinya Komoto, all at the College of Life Sciences, working in collaboration with researchers in Japan and Germany, have uncovered how cells ensure inheritance of their genetic information in order to prevent diseases.

The research team discovered what Professor Tanaka described as a 'blindfold handshake' in the crucial process of cell division, which generates the growth of tissue and organs.

The research is published in the latest issue of the scientific journal *Developmental Cell*.

Human cells contain 46 <u>chromosomes</u>, all of which carry vital <u>genetic</u> <u>information</u> that is crucial for the proper function of cells. Each chromosome must be precisely copied and separated as cells divide during growth of tissues and organs. Loss or excess of any chromosome could generate <u>cancer cells</u>, or cause genetic disorders such as Down's syndrome.

'The process of chromosome separation is regulated by a network of 'threads' called microtubules which pull the chromosomes apart into each



newborn cell,' said Professor Tanaka. 'It had been thought this process the network was organised by the cell ends.'

'To prepare for this process of chromosome separation, the thread network must first find and capture each chromosome. Normal cells can achieve this process in a defined, very short time window but it has been a mystery how they accomplish it so efficiently.'

'We have discovered that these thread networks, somewhat unexpectedly, are generated not only from the cell ends but also from sites on the chromosomes themselves. Even more unexpectedly, chromosomes organize the thread network more frequently when preparation for chromosome separation is delayed, as if they sense there is a delay and they must be hurried.'

'It is remarkable that our cells invented such a clever mechanism. Because the thread networks from cell ends and from chromosomes can find each other and mingle quickly, cells become prepared for chromosome separation efficiently and on time. It is like two blindfolded persons trying to find each other's hand for shaking; to achieve their handshake quickly, both persons need to extend their arms and move them around until they touch and their hands grasp each other.'

The research team believes that this is one of the most crucial steps in assuring <u>cells</u>' chromosome inheritance during their divisions, thus preventing cell death, cancers and other diseases. The team is currently trying to discover how the 'blindfold handshake' is maintained without breakage once established.

The research is published by *Developmental Cell* on 16th February.



Provided by University of Dundee

Citation: 'Blindfold handshake' in the cell prevents diseases (2010, February 17) retrieved 3 May 2024 from <u>https://medicalxpress.com/news/2010-02-blindfold-handshake-cell-diseases.html</u>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.