Crucial step in cell division discovered

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(Medical Xpress) -- Cancer Research UK scientists have discovered how cells 'pinch in' at the middle in order to split into two new cells. Their research is published in Developmental Cell today.

The team, based at Cancer Research UK's London Research Institute, discovered that a protein called Ect2 gathers at the place on a cell's surface where it pinches in at the middle.

Once it has gathered and attached to the right place on the cell's surface, it triggers a series of reactions, which causes the cell to divide and separate the cell's genetic information equally between the two new cells.

Tumors can form when cells divide uncontrollably, for example when cells make mistakes separating genetic information during division. So understanding the details of how normal cells divide could help researchers explain how this process goes awry in cancer cells and develop drugs to control the problem.

Dr Mark Petronczki, lead author based at Cancer Research UK's London Research Institute, said: "When cells start to divide, they squeeze in the middle like a belt around a waist. The waistline gets smaller and smaller until the belt is tight enough to split the cell into two identical new cells.

"Scientists already knew that a switch-like molecule called RhoA must be switched on for this to take place. We've discovered that Ect2 gathers at the cell's waistline to activate RhoA.

“We also discovered the role that the microtubules, or ‘cell scaffolding’ plays in helping Ect2 move to the right place. And that another switch-like molecule called CDK1 must be turned off for Ect2 to move to the ‘waistline’ at the right time.”

The researchers used cutting-edge technology to create videos, or live cell images, which enabled them to watch the process of cell division as it happened in human cells in the lab.

Dr. Julie Sharp, senior science information manager at Cancer Research UK, said: “Cancer Research UK scientists have an outstanding track record in revealing the secrets of cell division and in 2001, Sir Paul Nurse and Sir Tim Hunt received a Nobel Prize for Medicine for their work in this area.

“Losing control of the essential process of cell division is one of the fundamental changes leading to cancer. Research like this is important for all types of cancer and could one day lead to better ways to stop this disease in its tracks.”

More information: Targeting of the Rho-Exchange Factor Ect2 to the Equatorial Membrane Controls the Initiation of Cytokinesis. Su et al. *Developmental Cell*. DOI: 10.1016/j.devcel.2011.11.003

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