Scientists reveal first 3D image of cancer prevention molecule

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(PhysOrg.com) -- Cancer Research UK scientists have created the first 3D structure of a key protein that protects against the development of cancer, according to research published in *Nature Structural & Molecular Biology* today.

The team at Cancer Research UK's Beatson Institute for Cancer Research, in Glasgow used high-tech X-ray analysis to map out the structure of a protein called c-Cbl – and showed that it changes shape when it is switched on.

c-Cbl controls cell growth which – when unregulated – causes cells to divide excessively and can lead to cancer.

The protein is defective in some leukaemia patients. Discovering that c-Cbl can switch between two shapes will help scientists find ways to prevent faulty c-Cbl from triggering cancer.

Lead author, Dr Danny Huang, at Cancer Research UK's Beatson Institute in Glasgow, said: "Using cutting-edge research techniques we've created the first 3D image of the structure of this protein – which is pretty incredible because in real life it's about the size of a millionth of a hair width.

"We were intrigued to see that this protein actually changes shape when it's switched on.

“Understanding the structure of this protein is vital because if the protein can’t be switched on it is more likely to cause cancer. So cracking the 3D structure is a step towards designing the cancer drugs of the future.”

The team shows that when it’s switched on c-Cbl labels a cell receptor molecule for destruction.

In healthy cells the receptor amplifies a chain of cell signals resulting in normal cell growth. But in cancer cells these signals do not get switched off leading to uncontrolled cell growth.

By labelling the receptor molecule for destruction, the cell growth signal is switched off at the right time. If c-Cbl cannot change to its active shape, it cannot label the receptor for destruction.

Dr Julie Sharp, Cancer Research UK’s senior science information manager, said: “Thanks to the generosity of the public, we’re able to fund a broad range of research projects like this across the UK to help us better understand how cancer cells grow, survive and spread.

“We hope these intriguing 3D structures of a key cancer protection protein will help pave the way to new approaches to tackle this disease more effectively.

“More than 300,000 people are diagnosed with cancer in the UK every year. But more people are beating the disease than ever before, and Cancer Research UK is at the heart of this progress.”

More information: Structural basis for autoinhibition and phosphorylation-dependent activation of c-Cbl. Huang et al. *Nature Structural & Molecular Biology*.

Provided by Cancer Research UK