Scientists find important new step in protein production

May 21 2010

(PhysOrg.com) -- Scientists at the University of Manchester have identified an extra step in protein production, a major activity of all cells, which they believe impacts particularly on how our cells respond to stresses such as starvation and virus attack.

Drs Graham Pavitt and Martin Jennings, whose findings are published in *Nature* on 20 May 2010, have found a new function for a protein, called eIF5, which is critical for appropriate and normal control of the protein production process.

Protein production (or synthesis) takes place within ribosomes - complex structures made of RNA and proteins - and is facilitated by a number of accessory factors that enhance its rate and tightly control the whole process, which is central to all cell activities. In experimental models, changes that alter protein synthesis control can lead to obesity, diabetes and even altered memory functions within the brain. In addition when many viruses attack, they use our protein synthesis pathways to produce more viruses. There is a war inside the infected cells, which fight back to try to shut down protein synthesis and prevent production of new infectious virus.

The new findings show that the protein synthesis factor eIF5 not only promotes protein synthesis by activating a second factor (called eIF2), it also has a second function which locks eIF2 in a 'switched-off' state; that is, it regulates the overall process as well as activating it. This second function is necessary for control of protein production in times of stress.

Dr Pavitt, at Manchester's Faculty of Life Sciences, said: "We investigated how simple yeast cells sensed and responded to changes in their nutrition, specifically to starvation for amino acids, which are essential building blocks for proteins. Now we know there is another important step in this process, one that is particularly important in the cellular response to stress."

He added: "Although we used yeast cells in our study, there is sufficient similarity in the mechanism across all cells to suggest that the new regulatory function operates in a similar or identical manner in mammalian cells, including man.

"Further work is now required to determine if these new findings will have consequences for our deeper understanding of human health and disease."

More information: The paper 'eIF5 has GDI activity necessary for translational control by eIF2 phosphorylation' is available from the *Nature* website.

Provided by University of Manchester