Scientists locate disease switches

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A team of scientists from the University of Copenhagen and the Max Planck Institute in Germany, has identified no less than 3,600 molecular switches in the human body. These switches, which regulate protein functions, may prove to be a crucial factor in human aging and the onset and treatment of diseases such as cancer, Alzheimer's disease and Parkinson's disease. The results of the team's work have been published in the current edition of the journal *Science*.

The team, led by Professor Matthias Mann of Novo Nordisk Center for Protein Research at the University of Copenhagen and the Max Planck Institute for Biochemistry in Germany, have detected 3,600 acetylation switches in 1,750 different proteins.

"This is more than just a technological achievement, it has also expanded the number of known acetylation switches by a factor of six, and it gives us for the first time a comprehensive insight into this type of protein modification," says Professor Mann.

A given protein can perform more than one task, and how it behaves is regulated by adding a small molecule that acts as a 'switch' which can turn on the different tasks. Acetylation is essential for cells' ability to function normally. Defective protein regulation plays a role in ageing and the development of diseases such as cancer, Parkinson's and Alzheimer's.

"With the new mapping, we can now begin to study and describe how acetylation switches respond to medications that could repair the defects

on them. It can have a major impact on medical care," says Professor Mann, adding that medications to repair the damaged protein regulation are already showing promising in the treatment of cancer.

Cooperating proteins

The team also discovered that acetylation modification occurs primarily on proteins that work together, and that these switches have much greater consequences for the organism's function than previously thought. In one example, the function of Cdc28, an important growth protein in yeast, can be disrupted by the addition of an acetylation button, ultimately affecting the organism's ability to survive.

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Source: University of Copenhagen