

Giant raft of data to help us understand disease

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Scientists at the Novo Nordisk Foundation Center for Protein Research at the University of Copenhagen have used a new method to assemble a massive catalogue of data on proteins. This gives them unprecedented insight into a process called protein phosphorylation. The research was recently published in the scientific journal *Nature Communications*.

Postdoc Alicia Lundby, from the [Novo Nordisk Foundation Center for Protein Research](#), says: "Phosphorylation changes are really important to our understanding of cancer and other diseases. Although the study of phosphorylation goes back decades, up until now we hadn't been able to measure overall phosphorylation changes in tissue samples. Understanding these phosphorylation changes brings us a step closer to unravelling the mechanisms of disease."

Unravelling the mechanisms of disease

Phosphorylation happens when a phosphate group is added to a protein. Phosphorylation is like a switch that activates proteins, altering their function and changing cell signalling pathways. These signalling pathways are like cellular control panels. Deregulated cell signalling, when the control panel malfunctions, is a common hallmark of disease.

In the [treatment of cancer](#), for example, there is great variation in how well the patients respond to different treatments. Most likely as a result of differences in the signalling pathways. The method developed by the

team has the potential to make it possible to screen patient [tissue samples](#) to determine the best course of treatment for the individual.

An unprecedented resource

The team of scientists used high-resolution tandem mass spectrometry to generate the catalog of [phosphorylated proteins](#). This research has never been attempted before on this scale – 31,480 phosphorylation sites from 7,280 proteins in 14 different tissue types. From a scientific perspective, it offers an unprecedented resource that is available to biologists online.

"This dataset is like a big atlas that can be used by other scientists to benefit their research," says Alicia Lundby.

For their next project Alicia Lundby and colleagues will be investigating the beta-adrenergic pathway of the heart to gain insight into why the heart suddenly beats faster when adrenalin is released. It is hoped this will improve our understanding of the molecular impact of Beta-blockers, a widely prescribed medication for heart conditions.

Provided by University of Copenhagen

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