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Using Data to Improve Understanding of Relationships between Proteins and Diseases

Working with a new Emmy Noether Group, Dr. Pascal Schlosser is investigating how machine learning can aid in understanding the complex relationships between genes, proteins, and diseases.

Proteins have a multitude of biological functions in the human body. Diseases may develop if there are disruptions in protein production, structure, or function. A statistician at the Institute for Genetic Epidemiology at the Freiburg University Medical Centre, Dr Pascal Schlosser, is using an innovative approach combining machine learning and network analysis to investigate the relationship between molecular features, especially proteins, and diseases. The aim of this hypothesis free technique is to bring greater efficiency to identifying potential therapeutic targets and improve the prioritising of experimental, clinical, follow up studies.

"The goal is to develop data-directed, easily-accessible, and scalable methodology with which we can – from complex relationships – make causal conclusions about the disease," says Schlosser, who also belongs to the Cluster of Excellence, the Centre for Integrative Biological Signalling Studies (CIBSS), and the Collaborative Research Centre (*Sonderforschungsbereich* (*SFB*)) 1453 "NephroGenetics" at the University of Freiburg. The *DFG* is supporting the project for six years under the auspices of the Emmy Noether Programme for Junior Researchers.

New Insights into the Power Plants of Cells

"Our approach not only improves current methods of genetic examination, but it also includes sections of DNA, such as the mitochondrial genome," says Schlosser. Mitochondria are vital for energy production within cells. They are therefore often described as the "power plants" of cells. A central concern of the project is researching the relationship between mitochondria and their metabolic products. Within that context, special attention is being placed on the kidneys, because the mitochondrial role of generating energy is decisive for their capability to effectively filter waste products out of the blood. "These findings could help us to understand other organs and tissues better," says Schlosser.

"The work of Dr Schlosser and his team marks a milestone in our striving to decipher the mechanisms underlying diseases at a molecular level. It also underscores the leading role of Freiburg as a research location in genetic and medical research," says Prof Dr Lutz Hein, Dean of the Medical Faculty of the University of Freiburg, and Board Member of the Freiburg University Medical Centre.

Press release

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Further information

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