New research explains why illness affects men and women differently

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The study, conducted by scientists at the Precision Healthcare University Research Institute (PHURI) at Queen Mary University of London (UK), in collaboration with the Berlin Institute of Health at Charité, Universitätsmedizin Berlin and the UK Medical Research Council (MRC) Epidemiology Unit at the University of Cambridge - has identified key biological differences that may help explain these differences.

Using data from the UK Biobank and the Fenland Study, the team examined the genetic links between about 6,000 proteins and hundreds of diseases in 56,000 men and women. The team found that two-thirds of the proteins had different levels between men and women. However, when the researchers looked more closely at the genetic switches that control these protein levels, they found that only a very small number—about 100 proteins—were actually regulated differently based on sex.

These findings, which could impact drug development and research, indicate that although there are differences between the sexes in the expression levels of certain proteins, the causes of these differences are not simply due

to genetic differences.

Instead, the authors emphasize the importance of considering factors beyond genetics – and other medical factors such as hormones – when comparing health risks and outcomes between men and women. Their findings suggest that non-medical factors such as where people work and live, their education level, financial status, access to resources, and lifestyle also contribute to health differences between the sexes. These factors therefore need to be explored further and taken into account more closely when studying sex differences in health.

Mine Koprulu, lead author of the study, said:

> *'For the first time in history, we have been able to study human biology at this level of detail – across genes, proteins and beyond. This is the largest study ever to explore the similarities and differences in how our genetic code regulates blood protein levels between the sexes. Our findings highlight the need to better understand the factors that influence health disparities – from the genetic level onwards – to create more appropriate and equitable health care for all.'*

Sharing the above view, Professor Claudia Langenberg, Director of PHURI at Queen Mary and Professor of Computational Medicine at the Berlin Institute of Health of the Charité, Germany, said:

> *'Drug development processes increasingly incorporate information about genetic differences in protein levels and function, and this has led to major investments in population-based cohorts such as UK Biobank. From this perspective, a better understanding of differences in protein regulation across populations, such as between men and women, is essential to guide precision medicine approaches and identify cases where 'one size does not fit all'. Our results clearly show that, with very few exceptions, the protein-regulating genetic variants identified to date function in very similar ways in both men and women. This provides evidence for an important implicit assumption – that insights from studying these variants apply to both sexes.'*

In this study, data were classified as male or female based on chromosomal information (XX or XY). The authors acknowledge that chromosomal information does not always match an individual's gender identity. However, for the purposes of this study (scientific analysis at the genetic and protein level), this classification was necessary, and gender identity data is not reliably encoded across data sources, meaning it cannot be used consistently across all data.