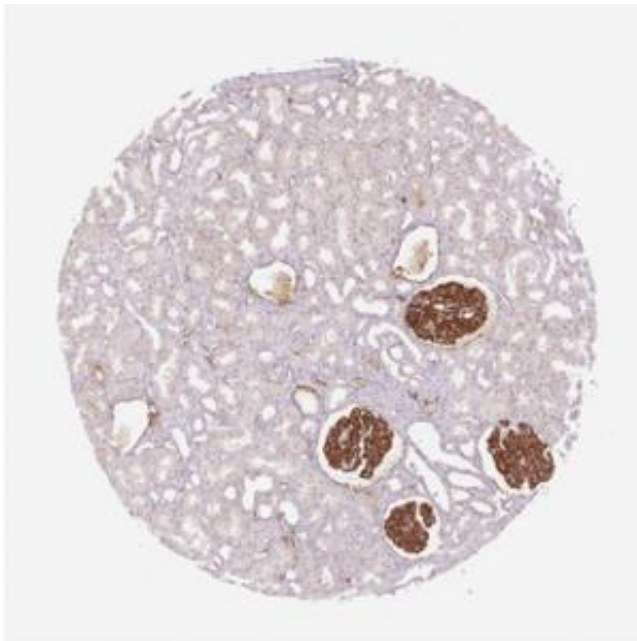


First major analysis of Human Protein Atlas published in Science

January 22 2015



PODXL, the podocalyxin-like protein localized in the renal glomeruli, the network responsible for filtering the blood. TISSUE: Kidney.

[Credit: Image from the Human Protein Atlas]

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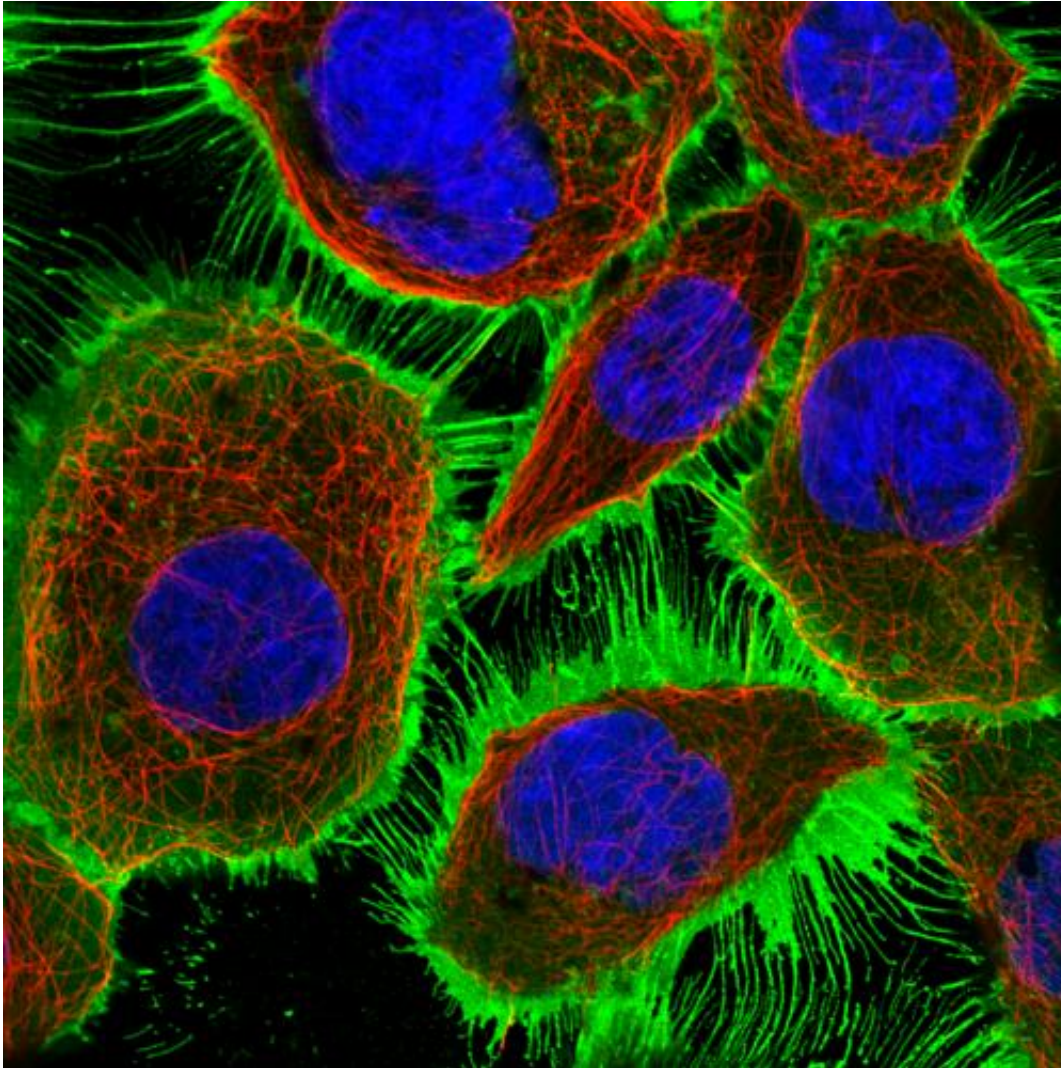
A research article published today in *Science* presents the first major analysis based on the Human Protein Atlas, including a detailed picture

of the proteins that are linked to cancer, the number of proteins present in the bloodstream, and the targets for all approved drugs on the market.

The Human Protein Atlas, a major multinational research project supported by the Knut and Alice Wallenberg Foundation, recently launched (November 6, 2014) an open source [tissue](#)-based interactive map of the [human protein](#). Based on 13 million annotated images, the database maps the distribution of proteins in all major tissues and organs in the human body, showing both proteins restricted to certain tissues, such as the brain, heart, or liver, and those present in all. As an open access resource, it is expected to help drive the development of new diagnostics and drugs, but also to provide basic insights in normal human biology.

In the *Science* article, "Tissue-based Atlas of the Human Proteome", the approximately 20,000 protein coding genes in humans have been analysed and classified using a combination of genomics, transcriptomics, proteomics, and antibody-based profiling, says the article's lead author, Mathias Uhlén, Professor of Microbiology at Stockholm's KTH Royal Institute of Technology and the director of the Human Protein Atlas program.

The analysis shows that almost half of the protein-coding genes are expressed in a ubiquitous manner and thus found in all analysed tissues.



The protein EGFR (epidermal growth factor receptor) is visualized using confocal microscopy and immunofluorescent reporters in a human cell line (A-431). EGFR is localized to the plasma membrane (green). The cytoskeleton and microtubules are shown in red and the nucleus in blue. Credit: Human Protein Atlas

Approximately 15% of the genes show an enriched expression in one or several tissues or organs, including well-known tissue-specific proteins, such as insulin and troponin. The testes, or testicles, have the most tissue-enriched proteins followed by the brain and the liver.

The analysis suggests that approximately 3,000 proteins are secreted from the cells and an additional 5,500 proteins are located to the membrane systems of the cells.

"This is important information for the pharmaceutical industry. We show that 70% of the current targets for approved pharmaceutical drugs are either secreted or membrane-bound proteins," Uhlén says.

"Interestingly, 30% of these [protein](#) targets are found in all analysed tissues and organs. This could help explain some side effects of drugs and thus might have consequences for future drug development."

The analysis also contains a study of the metabolic reactions occurring in different parts of the human body. The most specialised organ is the liver with a large number of chemical reactions not found in other parts of the [human body](#).

More information: "Tissue-based map of the human proteome," by M. Uhlén et al. *Science*, [DOI: 10.1126/science.1260419](https://doi.org/10.1126/science.1260419)

Provided by KTH Royal Institute of Technology

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