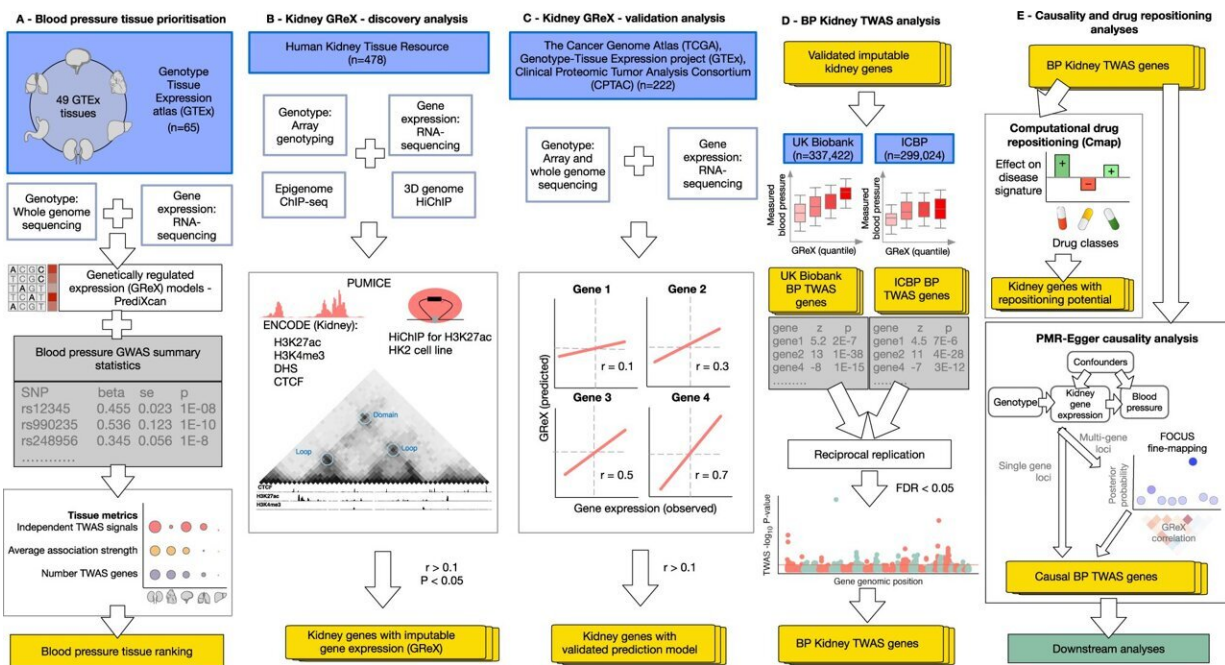


# Cells harvested from urine may have diagnostic potential for kidney disease, find scientists

March 19 2024, by Michael Addelman



Transcriptome-wide association studies, kidney and blood pressure – schematic representation of input data sources (with sample size), analytical processes and output data. Credit: *Nature Communications* (2024). DOI: 10.1038/s41467-024-46132-y

Genes expressed in human cells harvested from urine are remarkably similar to those of the kidney itself, suggesting they could be an

important non-invasive source of information on the kidney.

The news offers hope that doctors may one day be able to investigate suspected kidney pathologies without carrying out invasive procedures such as biopsies, raising the tantalizing prospect of earlier and simpler disease detection.

The impact of late detection of kidney disease can be severe and can lead to serious— and sometimes life threatening— complications.

The team led by University of Manchester scientists measured the levels of approximately 20,000 genes in each cellular sediment sample of urine using a technique called transcriptomics.

The study benefited from access to the world's largest collection of human kidney samples collected after surgery or kidney biopsy conducted before transplantation, known as the Human Kidney Tissue Resource, at The University of Manchester.

They extracted both DNA and RNA from each sample and connected information from their analysis, together with data from previous large-scale analyses of blood pressure (called [genome-wide association studies](#)), using sophisticated computational methods.

Transcriptomics allows scientists to understand which genes are turned on or off in different situations so they can understand how cells respond to changes in their environment.

Such molecular-level understanding enhances the precision and effectiveness of diagnostic approaches, potentially improving patient care and outcomes.

The study, [published](#) in *Nature Communications*, also showed that low

levels of a specific gene in the kidney is likely to be one of the causes of high blood pressure.

The gene, called ENPEP, is an important part of the hormonal system which is essential for regulation of blood pressure, by making an enzyme called aminopeptidase A.

It was one of 399 genes identified by the researchers whose levels in the kidney are also causally related to either increasing or decreasing in blood pressure.

The study was led by Professor Maciej Tomaszewski, Chair of Cardiovascular Medicine at The University of Manchester and Honorary Consultant Physician at Manchester University NHS Foundation Trust.

He is also Integrative Cardiovascular Medicine Co-Theme Lead at the National Institute for Health and Care Research (NIHR) Manchester Biomedical Research Center (BRC).

He said, "This study shows that using cutting edge technology we are able to combine different unique datasets together using genetics as a connector.

"One of the most exciting findings of that is we discover how cells harvested from urine have the potential to provide a glimpse into the molecular operation of the human kidney.

"That gives us an exciting avenue of research for non-invasive diagnostic testing."

He added, "Persistent high blood pressure—or hypertension—can increase the risk of a number of serious and potentially life-threatening health conditions, such as [heart disease](#), heart attacks and strokes.

"Our results also show that the gene ENPEP in the kidney is a new promising target for development of new blood pressure lowering medications.

"There are several classes of effective antihypertensives available, though the last new medication approved for management of high blood pressure was over a decade and a half ago.

"While for some people, they are effective, side effects make it difficult for others to take over the long term. That is why we need more choice."

Professor Bryan Williams, Chief Scientific and Medical Officer at the British Heart Foundation, said, "There is a well-known link between the heart and the kidneys in regulating blood pressure. This study uses cutting-edge scientific techniques to analyze genes present in kidney cells that are normally expelled in the urine.

"Analyzing these cells could reveal which [genes](#) may be playing a key role in people with high blood pressure, and could potentially offer clinicians a new, non-invasive way to help diagnose those with kidney disease early on.

"High blood pressure is a major risk factor for heart disease and stroke, and this research has identified a gene called ENPEP that regulates important enzymes in the [kidney](#) that could be a promising target for blood pressure-lowering drugs. This study has demonstrated the power in using large sets of data and in doing so, shows how funding research like this can help us to improve treatment for people with high [blood pressure](#)."

**More information:** Xiaoguang Xu et al, Genetic imputation of kidney

transcriptome, proteome and multi-omics illuminates new blood pressure and hypertension targets, *Nature Communications* (2024). [DOI: 10.1038/s41467-024-46132-y](https://doi.org/10.1038/s41467-024-46132-y)

Provided by University of Manchester

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