

New atlas of human kidney cells to help unlock kidney disease research

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In a major breakthrough toward understanding and treating kidney disease, a nationwide research team has created the most comprehensive atlas of the human kidney. Data from the Kidney Tissue Atlas will allow

the comparison of healthy kidney cells to those injured by kidney disease, helping investigators understand the factors that contribute to the progression of kidney disease and kidney failure or recovery from injury.

The atlas, published in *Nature* is part of the [Kidney Precision Medicine Project](#) (KPMP), was supported by NIH's National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), .

Due to the complexity of the kidney, scientists have struggled to develop kidney models that accurately represent human kidney structures and function. The lack of human kidney models has limited the ability to develop [new drugs](#) to treat or prevent [kidney disease](#).

The Kidney Tissue Atlas comprises maps of 51 main kidney cell types that include rare and novel cell populations, 28 kidney cellular states that represent injury or disease, a repository of raw gene data, and interactive 3D models of cells and microenvironment relationships created from 45 healthy donor kidneys and 48 kidney disease biopsies.

The atlas thus establishes a critical foundation for KPMP's overall goal to help discover new treatments for [chronic kidney disease](#) (CKD) and [acute kidney injury](#) (AKI), medical conditions that present a significant global health burden. The publicly available data created by KPMP, including all 3D renderings and analytical tools, can be accessed at atlas.kpmp.org.

"KPMP's new atlas represents open, public science at its best," said Dr. Eric Brunskill, KPMP program director in NIDDK's Division of Kidney, Urologic, and Hematologic Disease. "With the atlas, we've created an interactive, hypothesis-generating resource for kidney disease investigators and clinicians around the world."

While CKD and AKI have historically been described as single, uniform diseases, KPMP builds on growing consensus that kidney disease can have several different root causes and disease pathways leading to subgroups of CKD and AKI. Instead of a "one size fits all" approach to treating kidney disease, precision medicine explores more personalized treatments. KPMP's kidney atlas is intended to help identify disease subgroups within CKD and AKI, leading to the discovery of new, and possibly individualized, ways to treat CKD and AKI.

The study also received support from the [Human Cell Atlas](#) initiative, an international research effort to gather information on at least 10 billion [human cells](#), and NIH's [Human BioMolecular Atlas Program](#) (HuBMAP). HuBMAP's goal is to develop an open and global platform to map [healthy cells](#) in the [human body](#); the KPMP and HuBMAP teams worked closely to align the outputs of this molecular atlas as an example of cross-consortia collaborations.

"KPMP brings together the best of new technology, patient engagement, and partnership, and represents an evolution in the way we think about kidney disease," said NIDDK Director Dr. Griffin P. Rodgers. "We're confident the Kidney Tissue Atlas will help us discover new ways to get the right kidney disease treatment to the right patient at the right time."

More information: An atlas of healthy and injured cell states and niches in the human kidney, *Nature* (2023). [DOI: 10.1038/s41586-023-05769-3](#).
www.nature.com/articles/s41586-023-05769-3

Data related to this research are available for request at the [NIDDK Central Repository](#).

Provided by National Institute of Diabetes and Digestive and Kidney Diseases

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