

Computer model aimed at optimizing treatment of diabetic kidney diseases

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Credit: MedUni Innsbruck/Lackner

Diabetic kidney diseases are the main cause of kidney failure in industrialized countries. An international, EU-funded R&D project—which is being headed by the Medical University of Innsbruck, and involves collaboration with the Medical University of Vienna and international partners—is being implemented with the aim of using computer software to provide personalized predictions of the disease's

progression and bring about improvements in individuals' responses to treatment. Project findings will have the potential for application also in other chronic conditions.

An [international consortium](#) has started the R&D project "DC-Ren: Drug combinations for rewriting trajectories of renal pathologies in type II diabetes'. Aimed at developing systematic approaches in order to discover improved combination of drug treatment for complex diseases, the international research initiative ranked on top of 50 other applicants to secure the EUR 6m in funding.

The R&D project is headed by Gert Mayer, Director of the University Hospital for Internal Medicine IV (Nephrology and Hypertension) at the Medical University of Innsbruck. The goal is to develop a data-based support tool for decision-making with a view to optimizing personalized therapies. The university will be working with teams from Austria (emergentec biodevelopment GmbH, and a working group led by Rainer Oberbauer, head of the Division of Nephrology and Dialysis at the Medical University of Vienna /Vienna General Hospital), Denmark, Germany, Israel, Italy and the Netherlands.

Mathematical model for predicting disease trajectory

"Diabetic kidney diseases are the main cause of kidney failure in industrialized countries," says Innsbruck-based nephrologist and project coordinator Gert Mayer. "Although we have seen a significant improvement in the range of treatment options available, it is still not possible to fully predict their effectiveness in individuals." A [mathematical model](#) is intended to generate predictions on disease trajectories and responses to treatment, which in turn will help to improve the precision of personalized combined medications. "The scientific approach is based on an innovative new patient assessment concept in the form of a hybrid AI solution developed by one of the

project partners, Vienna-based technology company emergentec biodevelopment GmbH," Mayer explains. Key biobanks and clinical data will be used in combination with experimental, analytical and statistical evaluations in order to develop a prototype technology solution, which will then be validated in clinical settings. Mayer sees huge potential in the model: "Besides assessing new health technologies and the possibilities they open up, the aims of the DC-ren [project](#) are clearly a move towards enhancing precision medicine as a means of treating complex diseases." "As in our two previous EU projects on this subject, we will use innovative approaches to further improve the effectiveness of treatments for diabetic kidney disease," added Rainer Oberbauer of MedUni Vienna.

Diabetic kidney disease more prevalent

Around 50 million people in Europe, or 10% of the population, suffer from chronic kidney conditions. Meanwhile, about 40% of diabetics suffer kidney damage as a result of the disease. The steady increase in the prevalence of hypertension and diabetes in Europe means that kidney, heart and vascular diseases are also becoming more widespread. Early recognition and prevention are playing a central role in treatment, and are also becoming a major focus in nephrology research. If the [disease](#) is diagnosed at any early stage and its trajectory can be forecast accurately, targeted treatment can be administered, removing the need for dialysis or a [kidney](#) transplant, which become necessary in the later stages of the condition. According to Gert Mayer: "Renal insufficiency not only restricts the functioning of the kidneys, it also affects the cardiovascular system and bone metabolism—the consequence is an increased risk of heart attack and osteoporosis."

Provided by Medical University of Vienna

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