

## Summary

### **Renal and cardiovascular prognostic markers in patients with non-dialysis chronic kidney disease**

In western industrial countries, one out of ten adults has chronic kidney disease (CKD). CKD is a major public health issue, since the prevalence of CKD is steadily increasing, and since CKD is associated with an increased risk of need for dialysis, cardiovascular events and mortality.

In our ongoing CARE FOR HOME study, we aimed to analyse predictors which allow estimating the individual risk of CKD progression towards end-stage renal disease, and the individual risk of cardiovascular events and mortality, among individual CKD patients.

Since 2008, CARE FOR HOME has been recruiting patients with CKD (GFR categories G2 – G4). All patients were invited for annual follow-up examinations to our study center in order to assess the occurrence of cardiovascular and renal events. We focused our analysis on sonographic parameters. As a non-invasive and seemingly inexpensive imaging study, ultrasound is considered to be particularly attractive for renal and cardiovascular outcome prediction, which may facilitate its integration into clinical practice.

Against this background we aimed to analyze whether the integration of the ultrasound parameters RRI (renal resistive index) or DI-RISK (difference of resistive indices in spleen and kidney) can improve the KFRE (Kidney Failure Risk Equation), which is an established model for prediction of CKD progression towards end-stage renal disease.

Next we analyzed whether pulmonary hypertension (PH) estimated by echocardiography is a cardiovascular prognostic marker in CKD patients. High pulmonary artery systolic pressure estimated by echocardiography predicts cardiovascular outcome in the general population and in dialysis patients, but has not systemically been assessed among patients with mild to moderate CKD.

Finally we analysed two different formulas to estimate GFR in septuagenarians – the BIS2 and the CKD-EPI<sub>creat-cys</sub> equations – because the prognostic value of these different equations for cardiovascular and renal outcome prediction among elderly people has not been compared.

As results, we first found out that the integration of sonographic parameters into the Kidney Failure Risk Equation does not improve the prediction of CKD progression towards ESRD. Therefore we cannot recommend routine ultrasound examinations in CKD patients for assessing the individual risk of CKD progression.

Next, we found that prevalence of PH is elevated in CKD patients compared to the general population, and that prevalent PH predicts cardiovascular events independently from classical and CKD-specific risk factors.

Finally, substituting the BIS2 equation for the CKD-EPI<sub>creat-cys</sub> equation for GFR estimation will not improve prediction of total mortality, of cardiovascular events, or of renal events among individuals 70 years or older. Thus, we cannot recommend integration of the BIS2 equation into daily clinical routine.

We hope that the results of our CARE FOR HOME study may contribute to a better understanding on how best to predict cardiovascular and renal events in CKD patients. This may allow us to focus future efforts to prevent CKD progression and cardiovascular events upon high-risk patients.