KSN 2019
Seoul, Korea · May 23 - 26

Abstract Submission No. : IL-9066

Which estimated glomerular filtration rate (eGFR) would be suitable for surrogate marker to estimate risk of end stage renal disease (ESRD)?

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Introduction and Aims
Recently, an eGFR decline of 30% to 40% over 2 to 3 years may be acceptable surrogate end point for renal outcome. However, it is unknown about the influence of estimation method of eGFR on accuracy and effectiveness of a surrogate marker and the usefulness of rate of eGFR change during a year (eGFR slope) as a surrogate end point for renal outcome.
Methods
The creatinine was converted to IDMS-traceable creatinine and eGFR was calculated by the modified MDRD equation (eGFRm) or CKD-EPI 2009 creatinine equation (eGFRc). We selected participants of self-motivated routine health check-up program from 1995 to 2009 in three university affiliated hospitals, who followed the examinations, repeatedly. Data of incident ESRD was extracted from the ESRD registry of Korea. We defined two baseline periods, one (YR1 group) and three years (YR3 group), to determine the eGFR change and slope. We compared the effectiveness of eGFR changes or slopes to estimate the risk of ESRD according to the estimated methods.
Results
There were 9971 candidates for YR1 group and 10171 candidates for YR3 group, who were aged more than 18 years and had eGFR more than 15 ml/min/1.73 m2 at the first examination. There were 0.26 % (26/9971) and 0.19 % (19/10171) of ESRD during follow-up period in YR1 and YR3 group, respectively. The accuracy to estimated ESRD was more effective with eGFR change than eGFR slope using both eGFRs. AUCs to estimate ESRD were 0.708 (0.597-0.818) for eGFRc change, 0.695 (0.587-0.801) for eGFRm change, 0.665 (0.565-0.766) for eGFRc slope, and 0.669 (0.567-0.765) for eGFRm slope In YR1 group and, in YR3 group, 0.757 (0.638- 0.878) for eGFRc change, 0.740 (0.624-0.855) for eGFRm change, 0.613 (0.505- 0.720) for eGFRc slope, and 0.680 (0.583-0.777) for eGFRm slope (P=0.002).We estimated parameters of diagnostic accuracy using eGFRc criteria. The criterion of eGFRc decrease ≥ 40% shows similar accuracy compared to the criterion of eGFRc decrease ≥ 57% except in specificity in YR1 group. The criterion of eGFRc decrease ≥ 30% showed lower specificity and positive predictive value compared to the criterion of eGFRc decrease ≥ 40% in YR1 group and YR3 group. The findings of diagnostic accuracy of eGFRm criteria showed similar patterns as those of eGFRc criteria.
Conclusions
There were no difference of AUC to estimate incident ESRD between eGFR calculated by CKD-EPI equation and modified MDRD equation. The parameter of eGFR change provided more accurate surrogate end point than the parameter of eGFR slope for renal outcome. The criterion of eGFR change ≥ 40% showed more appropriate surrogate end point than the criterion of eGFR change ≥ 30%.