Estimated glomerular filtration rate based on serum cystatin C provides prognostic information beyond its role as an index of kidney function

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OBJECTIVES

Cystatin C is an alternative marker for kidney function that is less influenced by muscle mass than serum creatinine, and have been shown to be a better predictor of mortality and cardiovascular disease (CVD) in the general population[1, 2]. Previous reports have suggested that cystatin C might be associated with poor prognosis among patients currently infected with HIV as well [3-5]. Cystatin C can be used to calculate estimate glomerular filtration rate (eGFRcy); however, clinical significance of eGFRcy in predicting adverse outcomes has not been tested in HIV subjects, comparing with eGFR based on serum creatinine (eGFRcr).

METHODS

Study design and population: The study was conducted at Tokyo Metropolitan Komagome Hospital and subjects were consecutively enrolled between February and April 2008. The cohort was followed for 3.5-years to compare the ability to predict adverse outcomes between eGFRcy and eGFRcr.

Measurements: eGFR was calculated by using the following equation;

[eGFRcr = 194 × serum creatinine$^{-1.094}$ × age$^{-0.287}$ × 0.739 (if female)]

[eGFRcy = 104 × cystatin C$^{-1.019}$ × 0.996^{age} × 0.929 (if female) – 8]

This equation was applied to our cohort mainly because the MDRD equation for eGFR has been shown to be less accurate in the Asian individuals including Japanese [6, 7].

Power of eGFRcr and eGFRcy for predicting the incidence of adverse outcomes

Adverse outcomes included all-cause mortality, CVD and a decrease in eGFR over 25% from baseline. The ability to predict incidence of the adverse outcomes was evaluated using the area under the receiver operating characteristic curves (Au-ROC).

Table 1. Baseline demographic and clinical characteristics

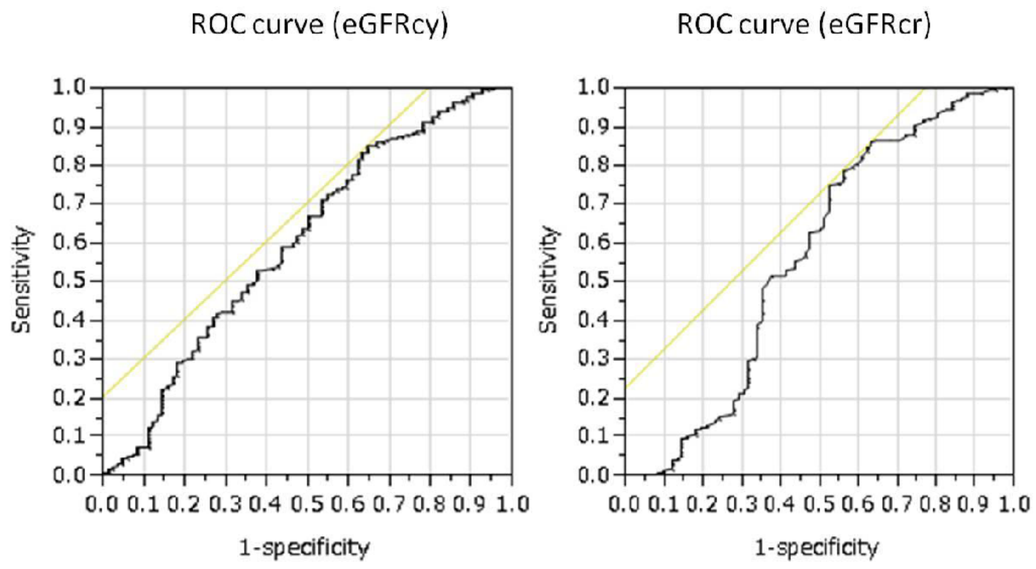
Patients, no.	661
Age, years	46.4 ±11.6
Hypertension (+), no. (%)	124 (18.8)
Diabetes (+), no (%)	44 (6.7)
Current smoking (+), no. (%)	343 (51.9)
HBV (+), no. (%)	45 (6.8)
HCV (+), no. (%)	27 (4.1)
CD4 cell count, cells/μL	411 ± 204
Undetectable HIV-RNA level, no (%)	81.7
Serum creatinine, mg/dL	0.81 ± 0.27
Serum cystatin C, mg/L	0.80± 0.25
Serum cystatin C, ≥1.0 mg/L, no (%)	64 (9.7)
eGFRcr, mL/min/1.73 m^2	85.3 ±19.6
eGFRcy, mL/min/1.73 m^2	105.8 ±24.2
Proteinuria, no. (%)	66 (10.0)
Hemoglobin, g/dL	14.4 ± 1.63
Serum albumin, g/dL	4.42 ± 0.30
Total cholesterol, mg/dL	196 ± 43
Triglycerides, mg/dL	218 ±169
C-reactive protein, mg/dL	0.36 ± 0.98

※All patients completed the follow-up period.

RESULTS

Figure 1. Prevalence of CKD ***CKD is defined as eGFRcr or eGFRcy < 60 mL/min/1.73m²**

Figure 2. ROC curves to predict adverse outcomes



The power of eGFRcy (Au-ROC = 0.604) was moderate yet significant (P = 0.0003), whereas that of eGFRcr (Au-ROC = 0.564) was not statistically significant (P = 0.0950)

CONCLUSIONS

#1. The prevalence of CKD based on eGFRcy decreased to 40% of that based on eGFRcr.

#2. eGFRcy was superior to eGFRcr in predicting the incidence of the composite adverse outcomes.

TAKE HOME MESSAGE

eGFRcy may elaborate on the prognosis of CKD in HIV-infected patients.

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