

Are serum creatinine and cystatin C concentrations influenced by renal transplantation?



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INTRODUCTION

Recent KDIGO guidelines advocate for increased clinical use of cystatin C. In renal transplantation (RT), creatinine-based equations might be less accurate than in non-transplanted (NT) subjects. Data on cystatin C remain scarce, though it appears to offer no clear added value over creatinine in RT.

AIM

We performed a matched analysis between RT and NT subjects to determine if transplantation status influences serum creatinine and cystatin C concentrations

METHOD

Glomerular filtration rate was measured (mGFR) by Cr-EDTA plasma clearance in both NT and RT populations. Serum creatinine and cystatin C measurements were standardized. RT subjects were evaluated one year after transplantation. Out of 880 RT and 2,959 NT subjects, we performed 1/1 matching

- age (±3years)
- mGFR (±3 mL/min/1.73m²)
- body mass index (BMI) (±2.5 kg/m²)
- sex (identical)
- ethnicity (Black and non-Black, identical).

We then compared the performance of the European Kidney Function Consortium (EKFC) equations with creatinine (EKFC_{crea}), cystatin C (EKFC_{cys}), and combined equations (EKFC_{crea+cys}) in the matched groups.

RESULTS

Out of 880 RT patients and 2,959 NT subjects, we were able to match 732 NT and RT pairs (148 unmatched RT patients, 17%). Median age of 54 years, median mGFR of 52 mL/min/1.73m², median BMI of 25 kg/m², and with 34% of women and 27% of Black individuals

From these two matched populations, no difference was found in serum creatinine between NT and RT subjects:

1.41 [1.17;17.6] versus 1.39 [1.15;1.80] mg/dL

Median concentration of cystatin C was significantly higher in RT patients:

1.56 [1.29;195] versus 1.45 [1.22; 1.84] mg/L

Table 1: Results of the matched analysis

	Age (years)	Sex (% of women)	Black (%)	Height (cm)	Weight (kg)	BMI (kg/m ²)	mGFR (mL/min/1.73m ²)	Creatinine (mg/dL)	Cystatin C (mg/L)
Non transplanted N=732	54 [43;63]	34.4	26.9	170 [163;176]	74 [65;84]	25.5 [22.9;28.7]	52 [43;63]	1.41 [1.17;1.76]	1.45 [1.22;1.84]
Transplanted N=732	53 [43;62]	34.4	26.9	170 [163;176]	74 [64;83]	25.1 [22.7;28.7]	52 [42;62]	1.39 [1.15;1.80]	1.56 [1.29;1.95]*
Transplanted with S/T N=248	55 [44;62]	31.4	26.2	170 [162;176]	74 [65;84]	25.7 [23.2;29.0]	53 [43;62]	1.46 [1.20;1.82]	1.56 [1.29;1.93]*
Transplanted without S/T N=484	51 [42;62]	36.0	27.3	170 [163;176]	73 [64;83]	24.9 [22.5;28.5]	51 [41;62]	1.38 [1.13;1.79]	1.56 [1.29;1.97]*

All results are expressed in median [quartile 1; quartile 3]

BMI: body mass index, mGFR: measured glomerular filtration rate, S/T: sulfamethoxazole/trimethoprim

*=p<0.05 with non-transplanted (Mann-Whitney and Chi² test)

Table 2: Performance of the EKFC equations in the matched groups

	EKFC _{crea}				EKFC _{cys}				EKFC _{crea+cys}			
All	Bias	IQR	P20	P30	Bias	IQR	P20	P30	Bias	IQR	P20	P30
Non transplanted N=732	0.00 [-0.88;0.87]	13.6 [-6.3;7.3]	68.7 [65.4;72.1]	84.3 [81.7;86.9]	0.13 [-0.41;0.96]	12.8 [-5.6;7.2]	68.6 [65.2;71.9]	88.3 [85.9;90.6]	0.52 [-0.11;1.14]	10.5 [-4.4;6.2]	78.8 [75.9;81.8]	91.0 [88.9;93.1]
Transplanted N=732	0.66 [-0.20;1.99]	13.7 [-4.8;8.8]	67.9 [64.5;71.3]	84.6 [81.9;87.2]	-3.25 [-3.89;-2.43]*	11.1 [-8.8;2.3]	71.0 [67.8;74.3]	89.6 [87.4;91.8]	-0.41 [-1.31;0.35]	10.3 [-5.4;4.9]	80.2 [77.3;83.1]	94.7 [93.0;96.3]

All results are expressed in median [quartile 1; quartile 3].

Bias and IQR are expressed in mL/min/1.73m². P20 and P30 are expressed in %.

EKFC_{crea}: creatinine-based European Kidney Function Consortium equation, EKFC_{cys}: cystatin C-based European Kidney Function Consortium equation, EKFC_{crea+cys}: combined European Kidney Function Consortium equation, IQR: interquartile range, P20: percentage of results of estimated glomerular filtration within ±20% of measured glomerular filtration rate.

*worse results (comparison between RT and NT). \$ better results (comparison between eGFR equations in each group)

CONCLUSIONS

In conclusion, at one-year post-renal transplantation, the performance of EKFC_{crea} equation is comparable to that observed in NT populations, with superior performance noted for the combined equations. While renal transplantation status is associated with an increase in cystatin C concentration, the resulting impact is limited to a slight underestimation for EKFC_{cys} and is negligible for the EKFC_{crea+cys} equation.

REFERENCES

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CONTACT INFORMATION

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