



Performance de la nouvelle équation CKD-EPI (sans la variable ethnique) en transplantation rénale

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conflits d'intérêt

Je suis consultant pour Nephrolytix

ORIGINAL ARTICLE

New Creatinine- and Cystatin C–Based Equations to Estimate GFR without Race

L.A. Inker, N.D. Eneanya, J. Coresh, H. Tighiouart, D. Wang, Y. Sang, D.C. Crews, A. Doria, M.M. Estrella, M. Froissart, M.E. Grams, T. Greene, A. Grubb, V. Gudnason, O.M. Gutiérrez, R. Kalil, A.B. Karger, M. Mauer, G. Navis, R.G. Nelson, E.D. Poggio, R. Rodby, P. Rossing, A.D. Rule, E. Selvin, J.C. Seegmiller, M.G. Shlipak, V.E. Torres, W. Yang, S.H. Ballew, S.J. Couture, N.R. Powe, and A.S. Levey, for the Chronic Kidney Disease Epidemiology Collaboration*

› [N Engl J Med. 2021 Nov 4;385\(19\):1737-1749.](#)

Table 3. Accuracy of Current and New Approaches for GFR Estimation as Compared with Measured GFR in the Validation Data Set.

Filtration Marker and Equation*	Black Participants	Non-Black Participants	Difference between Black Participants and Non-Black Participants (95% CI)†
Bias: Median Difference between Measured GFR and eGFR (95% CI)‡			
<i>milliliters per minute per 1.73 square meters</i>			
Creatinine			
eGFRcr(ASR), current	-3.7 (-5.4 to -1.8)	-0.5 (-0.9 to 0.0)	-3.2 (-5.0 to -1.3)
eGFRcr(ASR-NB), new	7.1 (5.9 to 8.8)	-0.5 (-0.9 to 0.0)	7.6 (6.1 to 9.0)
eGFRcr(AS), new	3.6 (1.8 to 5.5)	-3.9 (-4.4 to -3.4)	7.6 (5.6 to 9.5)
Creatinine			
eGFRcr(ASR), current	85.1 (82.2 to 87.9)	89.5 (88.5 to 90.4)	-4.4 (-7.6 to -1.2)
eGFRcr(ASR-NB), new	86.4 (83.4 to 89.1)	89.5 (88.5 to 90.4)	-3.1 (-6.2 to 0)
eGFRcr(AS), new	87.2 (84.5 to 90.0)	86.5 (85.4 to 87.6)	0.7 (-2.4 to 3.8)

- Quid en Europe ?
- Quid en Transplantation rénale?
- Quid de l'équation EKFC?

Ann Intern Med. 2021;174:183-191.

Annals of Internal Medicine

ORIGINAL RESEARCH

Development and Validation of a Modified Full Age Spectrum Creatinine-Based Equation to Estimate Glomerular Filtration Rate

A Cross-sectional Analysis of Pooled Data

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Background: The Chronic Kidney Disease in Children Study (CKID) equation for children and the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation for adults are recommended serum creatinine (Scr)-based calculations for estimating glomerular filtration rate (GFR). However, these equations, as well as their combination, have limitations, notably the problem of implausible changes in GFR during the transition from adolescence to adulthood and overestimation of GFR in young adults. The full age spectrum (FAS) equation addresses these issues but overestimates GFR when Scr levels are low.

Objective: To develop and validate a modified FAS Scr-based equation combining design features of the FAS and CKD-EPI equations.

Design: Cross-sectional analysis with separate pooled data sets for development and validation.

Setting: Research and clinical studies ($n = 13$) with measured GFR available.

Patients: 11 251 participants in 7 studies (development and internal validation data sets) and 8378 participants in 6 studies (external validation data set).

Measurements: Clearance of an exogenous marker (reference method), Scr level, age, sex, and height were used to develop a new equation to estimate GFR.

Results: The new European Kidney Function Consortium (EKFC) equation is a FAS equation with low bias (-1.2 mL/min/1.73 m² [95% CI, -2.7 to 0.0 mL/min/1.73 m²] in children and -0.9 mL/min/1.73 m² [CI, -1.2 to -0.5 mL/min/1.73 m²] in adults) across the FAS (2 to 90 years) and Scr range (40 to 490 μ mol/L [0.45 to 5.54 mg/dL]) and with fewer estimation errors exceeding 30% (6.5% [CI, 3.8% to 9.1%] in children and 3.1% [CI, 2.5% to 3.6%] in adults) compared with the CKID and CKD-EPI equations.

Limitation: No Black patients were included.

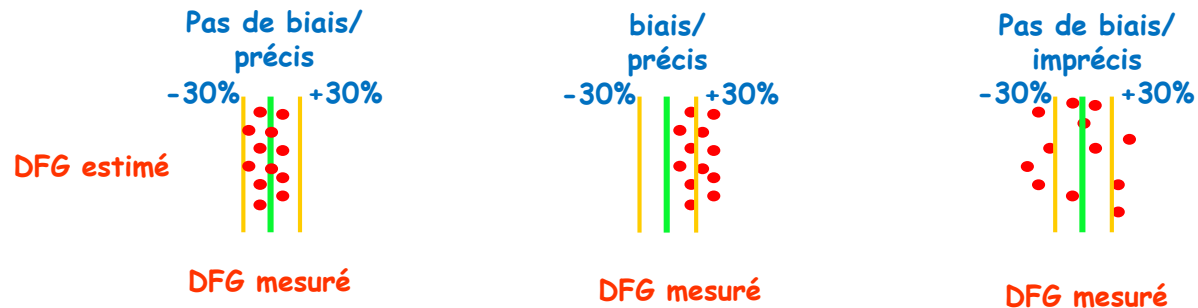
Conclusion: The new EKFC equation shows improved accuracy and precision compared with commonly used equations for estimating GFR from Scr levels.

Primary Funding Source: Swedish Research Council (Vetenskapsrådet).

Ann Intern Med. 2021;174:183-191. doi:10.7326/M20-4366 **Annals.org**
For author, article, and disclosure information, see end of text.
This article was published at [Annals.org](https://annals.org) on 10 November 2020.
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[†] Drs. Nyman and Delanaye share last/senior authorship.

Statistiques

- Corrélation: une condition “*sine qua non*” mais insuffisante!
- Biais: différence moyenne ou médiane entre 2 valeurs = erreur systématique
- Précision: SD ou IQR autour de ce biais = erreur aléatoire
- Exactitude à 30% = % du DFG estimé dans $\pm 30\%$ du DFG mesuré



Bland JM, Altman DG, Lancet, 1986, 8476, 307

Delanaye P, Nephrol Dial Transplant, 2013, 28, 1396

Résultats

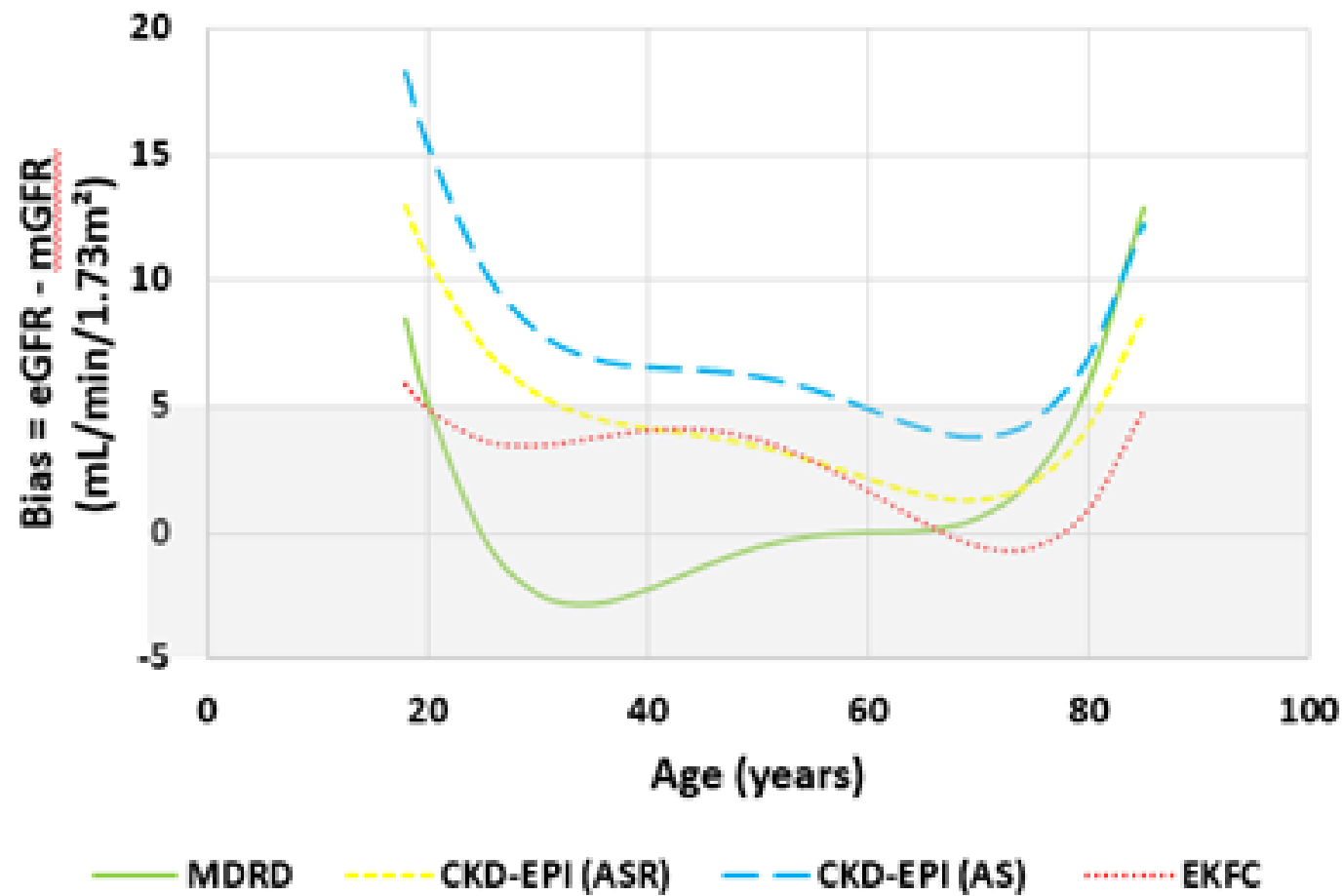
- Cohorte historique de Saint-Etienne, France
- 489 greffés rénaux avec DFG mesuré par clairance d'inuline (une mesure/un patient)
- +18 ans
- « Caucasiens »
- Créatinine enzymatique standardisée

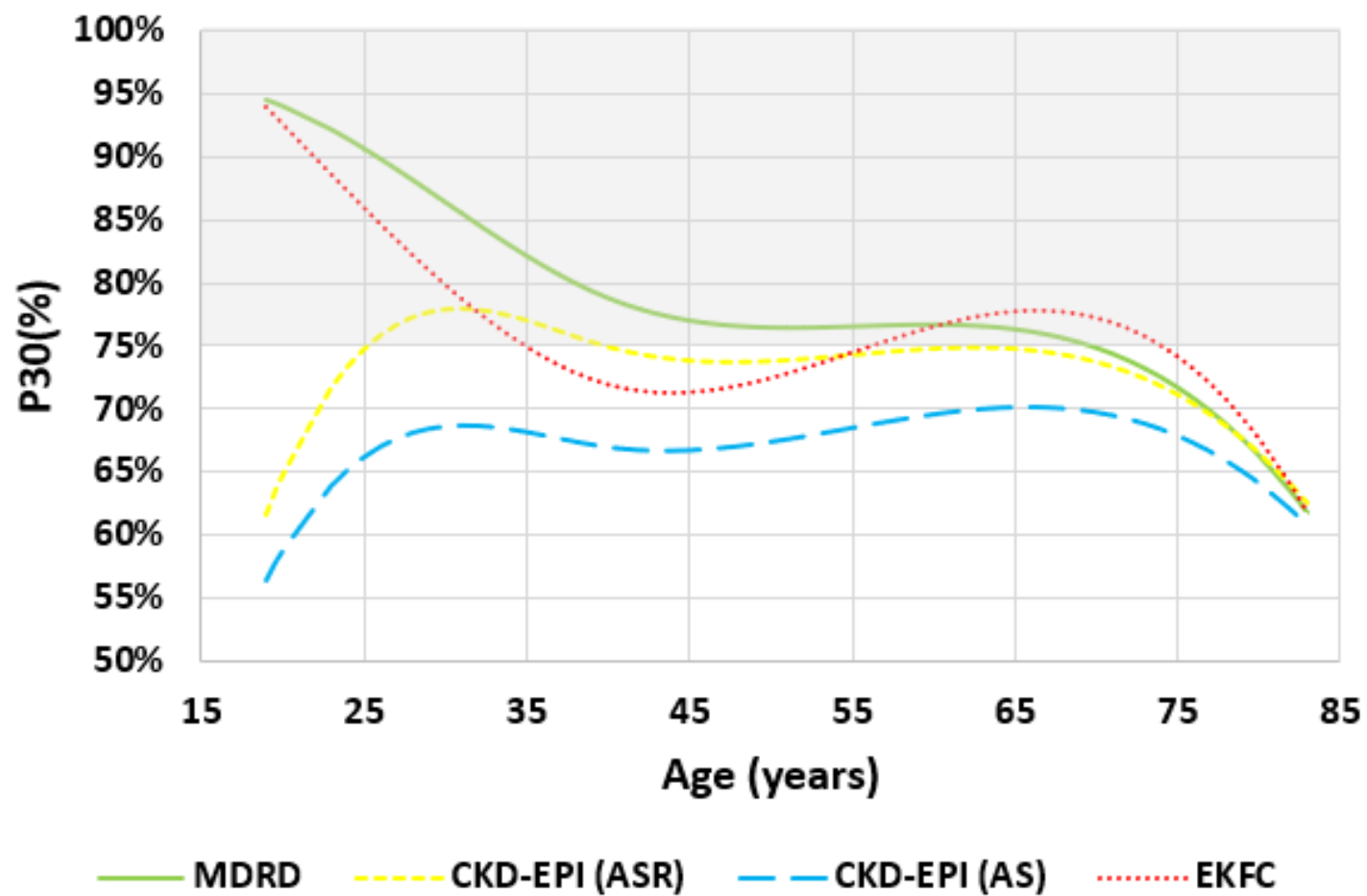
- Age médian: 57,0 [47,0;66,0] ans
- 32,5% de femmes
- Créatinine sérique médiane: 1,44 [1,15;1,77] mg/dL
- DFGm médian: 47,7 [35,3;62,2] mL/min/1,73m².

TABLE 1.

Performance of the creatinine-based equation in the whole population and in subgroups according to age, mGFR, and sex

Whole population, n = 489	MDRD	CKD-EPI _{ASR}	CKD-EPI _{AS}	EKFC
Median bias	-0.4 (-1.5 to 1.0)	2.4 (1.7-3.5)	5.5 (4.0-6.6)	2.2 (1.1-3.1)
IQR (Pct25; Pct75)	14.5 (-7.0 to 7.4)	16.2 (-5.0 to 11.1)	16.6 (-2.2 to 14.4)	15.3 (-5.4 to 9.9)
P20	58.5 (54.1-62.9)	56.6 (52.2-61.1)	55.2 (50.8-59.6)	60.3 (56.0-64.7)
P30	77.1 (73.4-80.8)	74.2 (70.3-78.1)	68.3 (64.2-72.4)	75.3 (71.4-79.1)





Conclusions

- La nouvelle équation CKD-EPI sans le facteur ethnique est suboptimale pour l'estimation du DFG chez le sujet transplanté rénal en France
- Alors que les équations basées sur la créatinine sont déjà moins performantes en greffe qu'en population générale
- EKFC est une bonne alternative

The new 2021 CKD-EPI equation without race in a European cohort of renal transplant patients



Single center



489

White kidney
transplant recipients

GFR

Measured by inulin clearance

Estimated by

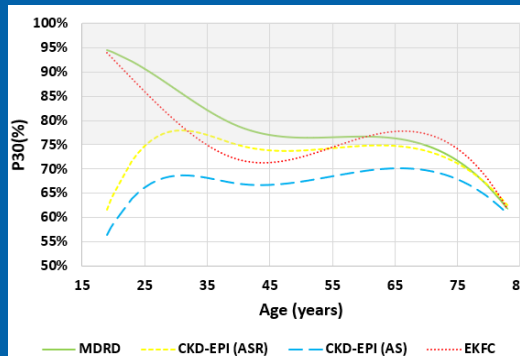
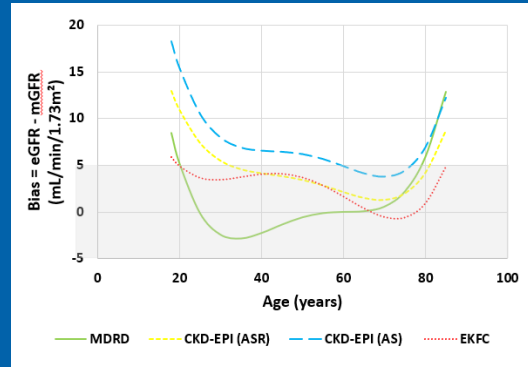
CKD-EPI (2009): CKD-EPI_{ASR}

CKD-EPI (2021): CKD-EPI_{AS}

European Kidney Function Consortium: EKFC

ASR: age, sex, race

Bias and P30 (% of eGFR within $\pm 30\%$ of mGFR) according to age



Conclusions

- Bias of the new CKD-EPI_{AS} equation was much higher than that of the CKD-EPI_{ASR} and EKFC equations
- P30 of the new CKD-EPI_{AS} equation was significantly lower compared to the CKD-EPI_{ASR} and EKFC equations

Delanaye et al. *Transplantation*. August 2022

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3 - 6 OCTOBRE 2023

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Merci !

Questions?