

DFG et genre


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Do you have, or have you had during the past 2 years, received any non-financial support from an entity?	No	
Do you have, or have you had during the past 2 years, received any personal fees from an entity?	Yes	IDS Nephrolyx ALENTIS/MEDPACE
Do you have, or have you had during the past 2 years, received any grants from an entity?	No	
Are you a member (current) of any kind of committee, board, WG, etc. of another scientific association with similar aims as ERA?	Yes	I am president of the working group "Néphrologie Solidaire" of the French speaking society of Nephrology Dialysis Transplantation

DFG

- DFG mesuré
- Créatinine et équations
- Cystatine C et équations

Le DFG mesuré est-il différent chez l'homme et la femme?



**KDIGO 2024 CLINICAL PRACTICE GUIDELINE
FOR THE EVALUATION AND MANAGEMENT
OF CHRONIC KIDNEY DISEASE**

KDIGO: Prognosis of CKD by GFR and albuminuria categories

				Persistent albuminuria categories		
				Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30–300 mg/g 3–30 mg/mmol	>300 mg/g >30 mg/mmol
GFR categories (ml/min/1.73 m ²) Description and range	G1	Normal or high	≥90			
	G2	Mildly decreased	60–89			
	G3a	Mildly to moderately decreased	45–59			
	G3b	Moderately to severely decreased	30–44			
	G4	Severely decreased	15–29			
	G5	Kidney failure	<15			

Green: low risk (if no other markers of kidney disease, no CKD); Yellow: moderately increased risk; Orange: high risk; Red: very high risk. GFR, glomerular filtration rate.

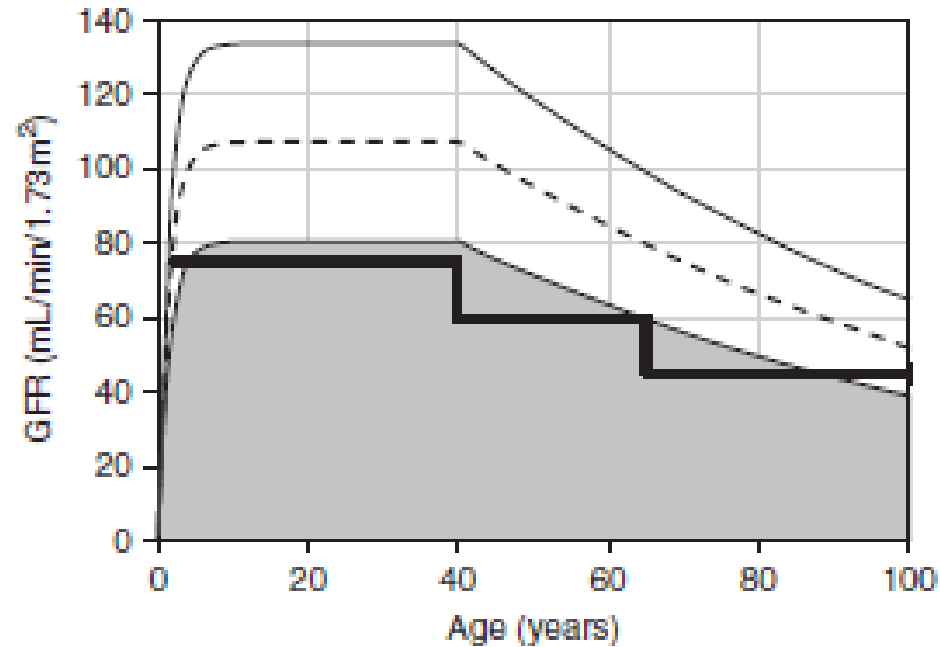
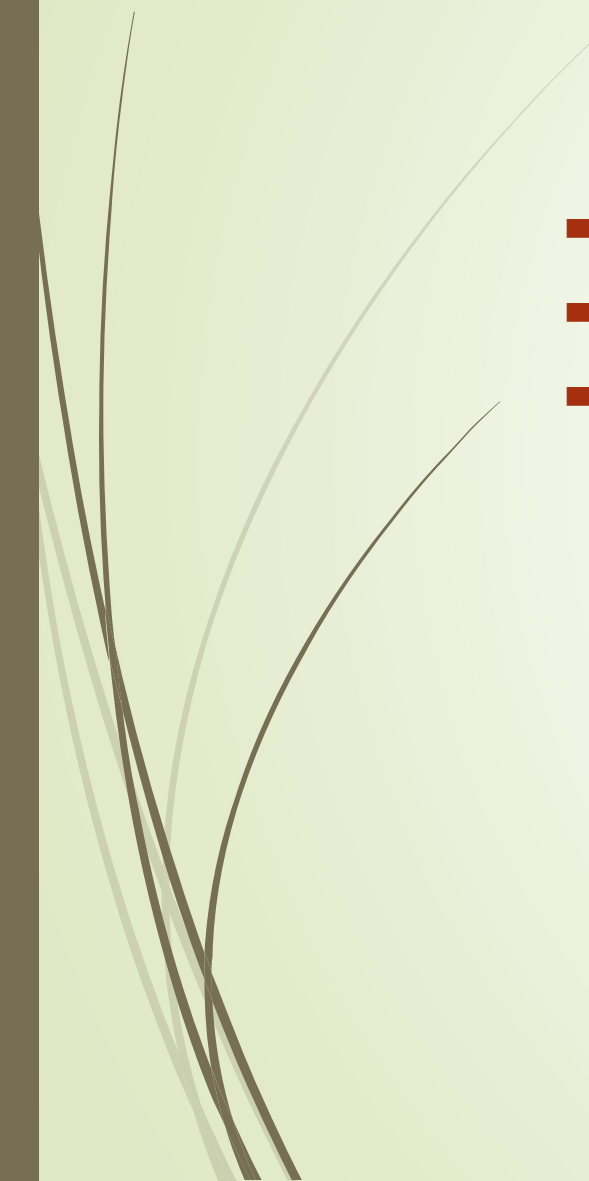


Figure 3. Age-specific thresholds in relation to age-specific GFR percentiles. GFR cut-off values and percentiles according to age (here percentiles of eGFR are calculated using the FAS equation). The bold line represents an age-adapted threshold for CKD: 75 mL/min per 1.73 m² for age below 40 years, 60 mL/min per 1.73 m² for age between 40 and 65 years, and 45 mL/min per 1.73 m² for age above 65 years. The dashed line represents the median (50th percentile) and the thin solid lines represent the 97.5th and 2.5th percentiles. The shaded zone is considered as below the normal reference intervals for GFR (<2.5th percentile).



Le DFG mesuré est-il différent chez l'homme et la femme?

- DFG mesuré
 - Sujets sains
 - Donneurs de rein
- 

5.2. Évaluation rénale et du risque d'insuffisance rénale chronique terminale post-don

Christophe Mariat, François Gaillard, Marie-Alice Macher, Juliette Guegen, Marie Courbebaisse, Emmanuel Letavernier, Dany Anglicheau

5.2.1. Évaluation du débit de filtration glomérulaire avant don

Tableau 5.3 : Percentiles de DFG mesuré normal (ml/min/1,73 m²) dans une population de donneurs vivants en France et en Suisse

Âge (années)	Percentiles				
	5 ^e	10 ^e	50 ^e	90 ^e	95 ^e
18	82	88	106	125	130
20	82	88	106	125	130
25	82	88	106	125	130
30	82	88	106	125	130
35	82	88	106	125	130
40	82	88	106	125	130
45	78	83	102	120	126
50	74	79	97	116	121
55	69	74	93	112	117
60	65	70	89	107	112
65	60	66	84	103	108
70	56	61	80	98	104
75	52	57	75	94	99
80	47	52	71	90	95
85	43	48	67	85	90
90	38	44	62	81	86
95	34	39	58	76	82

Les valeurs au-delà de 70 ans sont validées dans une population externe de 329 individus âgés en bonne santé.

Recommandations d'aide à la pratique clinique pour le don de rein du vivant

ARGUMENTAIRE

SFHI



agence de la
Diamédecine
Du don à la vie.





Pas de differences hommes femmes...
à première vue...

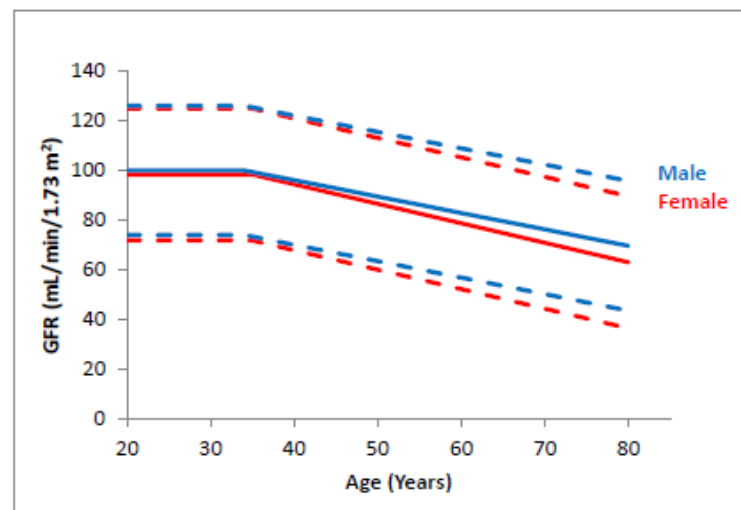


5.5 ASSESSMENT OF RENAL FUNCTION

Table 5.5.1 Age and Gender-Specific GFR based on almost 3000 Healthy Potential UK living kidney donors

Age (years)	Measured GFR (mL/min/1.73m ²)	
	Male	Female
20-29	100 (74-126)	98 (72-125)
30-34	100 (74-126)	98 (72-125)
35	99 (73-126)	98 (72-125)
40	96 (70-122)	94 (68-121)
45	93 (67-119)	91 (64-117)
50	90 (63-116)	87 (60-113)
55	86 (60-112)	83 (56-109)
60	83 (57-109)	79 (52-105)
65	80 (54-106)	75 (48-101)
70	76 (50-102)	71 (44-97)
75	73 (47-99)	67 (40-94)
80	70 (44-96)	63 (36-90)

Figure 5.5.1 Mean and Lower Normal Values (-2SD) for GFR Determined in Almost 3000 Healthy UK Potential Living Kidney Donors (6)*



* The mean fall in GFR each decade after 40years is 6.6 mL/min/1.73m² for men and 7.7 mL/min/1.73m² in women

Guidelines for
Living Donor Kidney
Transplantation

Fourth Edition
March 2018

BTS/RA Living Donor Kidney Transplantation Guidelines 2018

United Kingdom Guidelines

Glomerular Filtration Rate in Healthy Living Potential Kidney Donors: A Meta-Analysis Supporting the Construction of the Full Age Spectrum Equation

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Table 3. Meta-analysis results for comparing mean GFR between men and women

Age group, years	#Studies	#M	#F	I ² (%; p value)	Standardized effect size (95% CI)	p value	Effect size (95% CI), ml/min/1.73 m ²
20–30	11/12	497	371	33.1 (0.134)	–0.03 (–0.16 to 0.11)	0.714	–0.4 (–2.3 to 1.6)
30–40	11/12	656	659	49.4 (0.032)	0.00 (–0.11 to 0.11)	0.969	0.0 (–1.5 to 1.6)
40–50	10/12	703	892	22.3 (0.238)	–0.01 (–0.11 to 0.09)	0.831	–0.1 (–1.6 to 1.3)
50–60	10/12	514	750	50.0 (0.035)	0.23 (0.12 to 0.35)	0.0001	3.4 (1.7 to 5.1)
60–70	7/12	157	206	22.6 (0.257)	0.25 (0.04 to 0.47)	0.020	3.7 (0.6 to 6.9)
>70	3/12	38	39	0.0 (1.000)	0.00 (–0.48 to 0.48)	1.000	0.0 (–6.7 to 6.7)
Total		2,565	2,917				

#Studies = The number of studies or articles involved in the hypothesis of equality (out of 12 selected articles). I² (p value) = measure of homogeneity among studies, with p indicating Cochran's Q significance. Standardized effect size = difference in mean mGFR between males (#M) and females (#F) divided by the pooled SD. 95% CI for the effect size. p = p value for testing the hypothesis of equality of mean mGFR between sexes. Effect size = GFR-difference corresponding to the standardized effect size expressed in ml/min/1.73 m².

12 études
n = 5,482
46.8% hommes

GFR in Healthy Aging: an Individual Participant Data Meta-Analysis of Iohexol Clearance in European Population-Based Cohorts

Bjørn O. Eriksen ^{1,2} Runolfur Palsson ^{3,4} Natalie Ebert,⁵ Toralf Melsom,^{1,2} Markus van der Giet,⁶ Vilmundur Gudnason ^{4,7} Olafur S. Indridasson ³ Lesley A. Inker,⁸ Trond G. Jenssen,^{1,9} Andrew S. Levey,⁸ Marit D. Solbu,^{1,2} Hocine Tighiouart,^{10,11} and Elke Schaeffner⁵

Due to the number of contributing authors, the affiliations are listed at the end of this article.

Table 1. Characteristics of the population-based cohorts

Characteristic	RENIS-T6*	RENIS-FU*	BIS	AGES-Kidney
Number of participants, n (%)	1622 (100.0)	1324 (100.0)	547 (100.0)	716 (100.0)
Age, yr (SD)	58.1 (3.8)	63.6 (4.0)	78.4 (6.2)	80.3 (4.1)
Male sex, n (%)	797 (49.1)	657 (49.6)	311 (56.9)	317 (44.3)
Body weight, kg (SD)	79.7 (14.4)	79.4 (14.3)	77.3 (14.0)	77.1 (14.1)
Height, cm (SD)	170.6 (8.7)	170.6 (8.7)	166.2 (8.5)	167.7 (9.4)
Body mass index, kg/m ² (SD)	27.3 (4.0)	27.2 (4.1)	27.9 (4.3)	27.4 (4.3)
Body surface area, m ² (SD)	1.9 (0.2)	1.9 (0.2)	1.9 (0.2)	1.9 (0.2)
Cardiovascular disease, n (%)				
Myocardial infarction	1 (0.1)	18 (1.4)	83 (15.2)	89 (12.4)
Myocardial revascularization	5 (0.3)	26 (2.0)	93 (17.0)	113 (15.8)
Angina pectoris	2 (0.1)	12 (0.9)	56 (10.2)	60 (8.4)
Stroke	3 (0.2)	24 (1.8)	42 (7.7)	53 (7.4)
Diabetes, n (%)	19 (1.2)	42 (3.2)	136 (24.9)	81 (11.3)
Cancer, n (%)	76 (4.7)	120 (9.1)	123 (22.5)	134 (18.7)
Hypertension, n (%) ^b	692 (42.7)	693 (52.3)	503 (92.0)	623 (87.0)
Systolic BP, mm Hg (SD)	129.7 (17.6)	130.7 (17.0)	144.9 (21.5)	142.3 (20.3)
Diastolic BP, mm Hg (SD)	83.4 (9.8)	81.9 (9.3)	82.3 (13.0)	69.6 (10.7)
Antihypertensive medication, n (%)	298 (18.4)	420 (31.7)	425 (77.7)	524 (73.2)
Digoxin or digitoxin, n (%)	1 (0.1)	6 (0.5)	18 (3.3)	24 (3.4)
Lipid-lowering medication, n (%)	106 (6.5)	232 (17.5)	202 (36.9)	287 (40.1)
Antidiabetic medication, n (%)	0 (0.0)	11 (0.8)	99 (18.1)	44 (6.1)
Smoking, n (%)				
Never	503 (31.0)	432 (32.6)	263 (48.1)	295 (41.2)
Current	344 (21.2)	177 (13.4)	32 (5.9)	42 (5.9)
Previous	775 (47.8)	715 (54.0)	252 (46.1)	379 (52.9)
Absolute GFR, ml/min (SD)	104.0 (20.1)	98.5 (19.8)	64.8 (19.2)	66.7 (19.4)
Body surface area-indexed GFR, ml/min per 1.73 m ² (SD)	94.0 (14.4)	89.1 (14.5)	60.5 (16.3)	61.9 (16.6)
CKD-EPI estimate of GFR based on creatinine, ml/min per 1.73 m ² (SD)	94.9 (9.5)	88.2 (10.5)	68.8 (17.1)	65.5 (17.1)
Urinary ACR \geq 30.0 mg/g, n (%)	24 (1.5)	26 (2.0)	126 (23.0)	110 (15.4)
Urinary ACR \geq 300.0 mg/g, n (%)	1 (0.1)	2 (0.2)	19 (3.5)	15 (2.1)

Data are shown as mean (SD) or n (%). CKD-EPI, CKD Epidemiology Collaboration.

*RENIS-T6 and RENIS-FU are the baseline and follow-up examinations of the RENIS cohort.

^bOffice systolic BP \geq 140 mm Hg, office diastolic BP \geq 90 mm Hg, or the use of antihypertensive medications.

3 études
n =4,209 mesures
2885 sujets
49,4% hommes

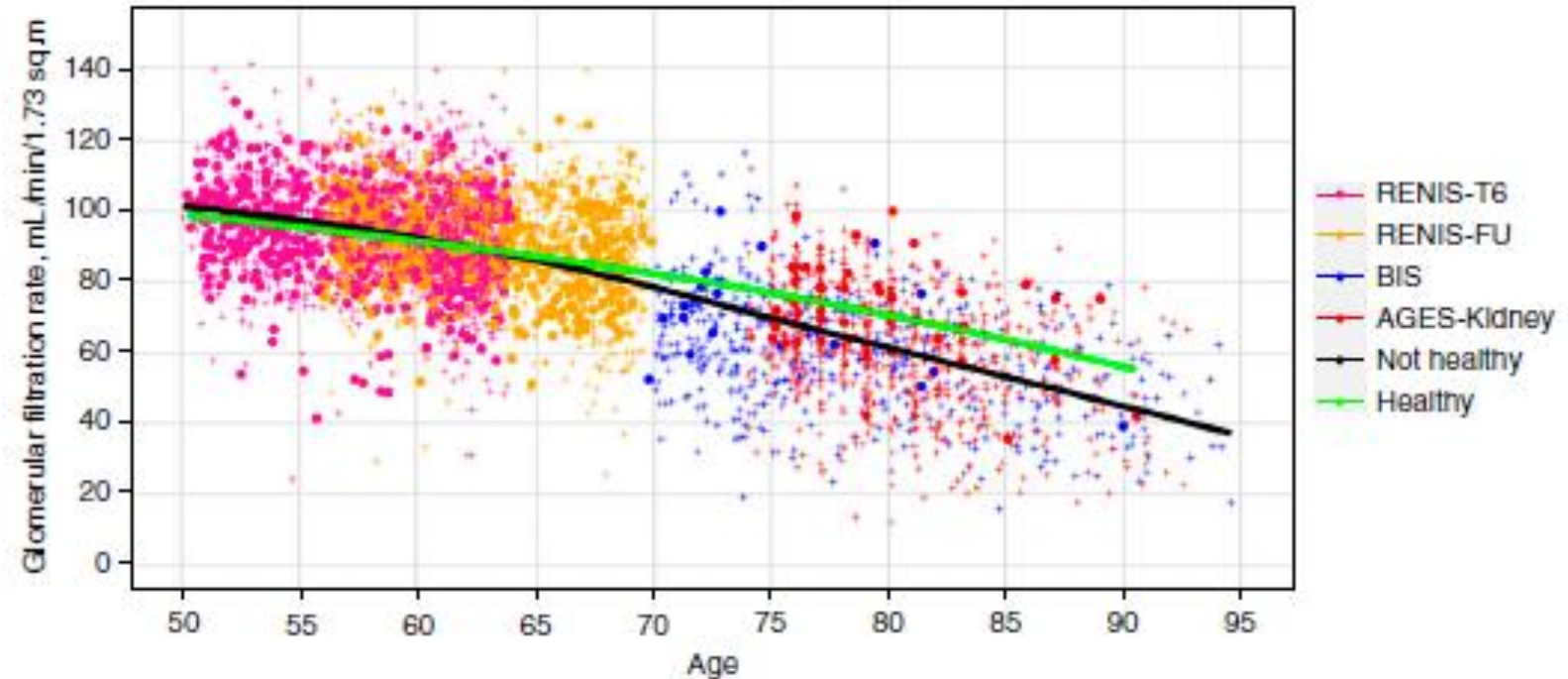


Figure 2. Unadjusted GFR according to cohort and health status. Body surface area-indexed GFR measured as plasma iothexol clearance and plotted against age in the RENIS, BIS, and AGES-Kidney cohorts ($n=4209$). The marker colors indicate cohort membership. Filled circles indicate measurements in persons who were healthy and crosses in persons who were unhealthy. Measurements for both the baseline (RENIS-T6) and the follow-up examinations (RENIS-FU) of the same persons in the RENIS cohort are shown. The red and green curves represent unadjusted locally estimated scatterplot smoothing fits to measurements in people who were unhealthy and healthy, respectively.

Table 4. Predicted percentiles of GFR (ml/min per 1.73 m²) for healthy women and men according to age group

Age Group (yr)	Women				Men			
	Number of GFR Measurements	Median	2.5th Percentile	97.5th Percentile	Number of GFR Measurements	Median	2.5th Percentile	97.5th Percentile
50-54	226	93.4	73.7	113.1	217	93.0	73.1	113.0
55-59	405	88.8	69.2	108.3	423	89.4	69.6	109.3
60-64	566	84.2	64.7	103.6	521	85.8	66.1	105.5
65-69	296	79.6	60.3	98.9	293	82.2	62.7	101.8
70-74	129	75.0	55.8	94.1	102	78.6	59.2	98.0
75-79	253	70.4	51.4	89.4	225	75.0	55.7	94.3
80-84	164	65.8	46.9	84.7	188	71.4	52.2	90.6
85-89	68	61.2	42.4	79.9	79	67.8	48.8	86.8
≥90	20	56.6	38.0	75.2	34	64.2	45.3	83.1

Estimates corresponding to Figure 3

Healthy : ♂ -0.72 (95% CI, -0.96 to -0.48) versus
 ♀ -0.92 (95% CI, -1.14 to -0.70) ml/min per 1.73m²/year

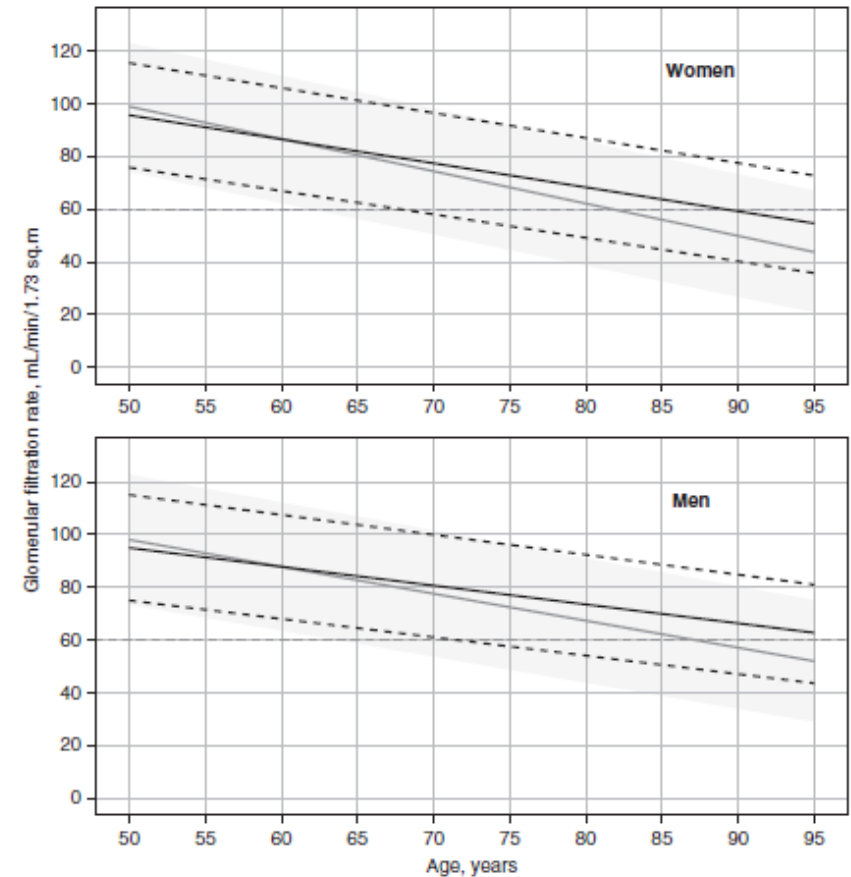


Figure 3. GFR according to sex and health status. Predicted median (bold black line) and 2.5th and 97.5th percentiles (dashed black lines) as a function of age for healthy women (upper panel) and men (lower panel). The predicted median (gray line) and 95% inter-percentile intervals (dark gray band) are shown for persons classified as unhealthy for comparison. The gray dashed line indicates the 60 ml/min per 1.73 m² level.



Sex Differences in Age-Related Loss of Kidney Function

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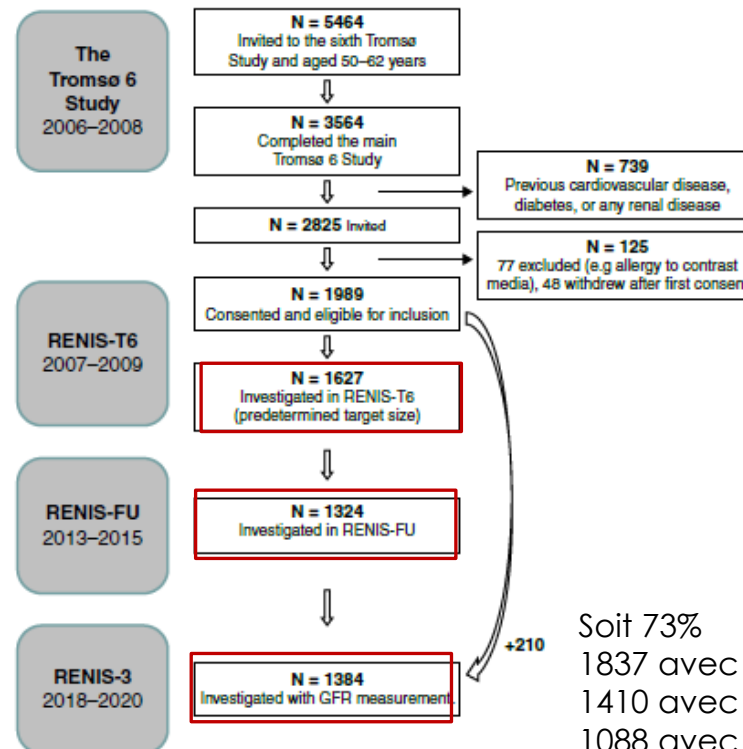
¹Section of Nephrology, University Hospital of North Norway, Tromsø, Norway

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N=1,837
 58 ±3,8 ans
 53% femmes
 Sains: 26, 27 et 22%



Soit 73%
 1837 avec une mesure
 1410 avec 2 mesures
 1088 avec 3 mesures

Très peu de
 personnes sont
 “stables” en DFG
 en vieillissant

Figure 1. Flow diagram of the study subjects in RENIS. Inclusion of subjects in the Renal Iohexol Clearance Survey (RENIS). Participants were recruited from the sixth wave of the Tromsø Study.

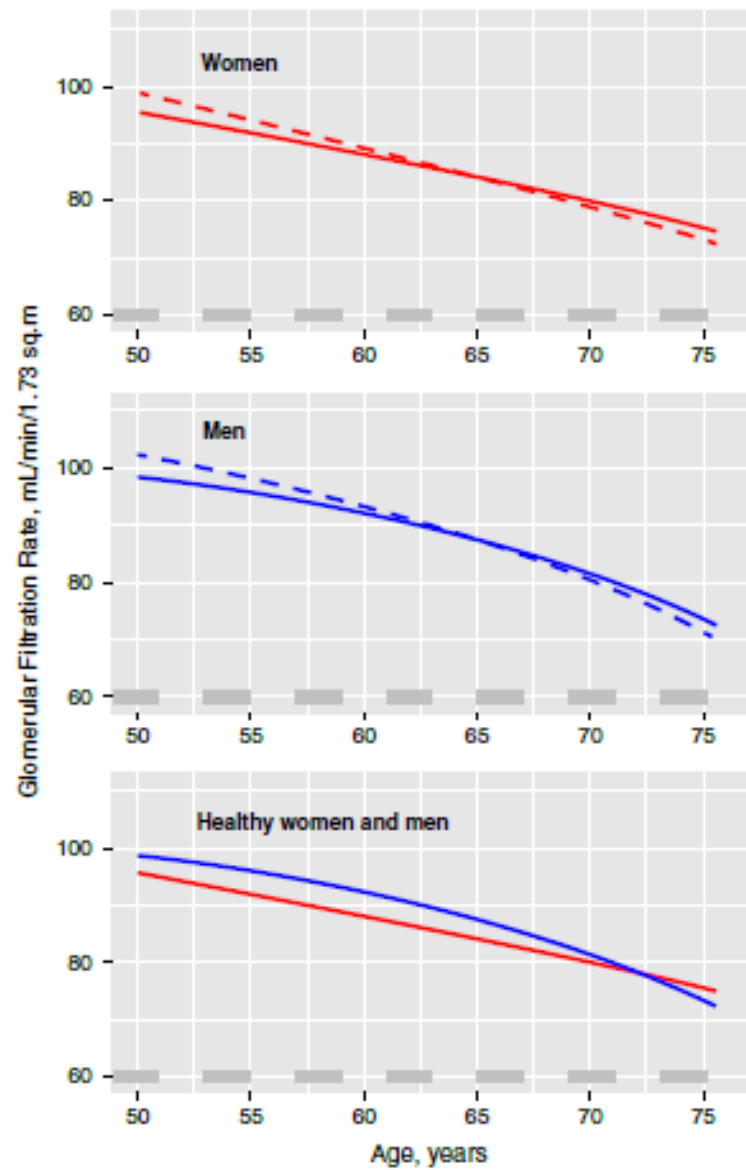


Figure 3. Mean GFR decline with age for women and men by health status ("healthy" in solid and "not healthy" in dashed). The lower panel depicts the mean GFR decline with age for healthy women versus healthy men. Calculated using a GAMM (model 3, Supplemental Table 2).

Healthy
 ♂ n=179
 ♀ n=242

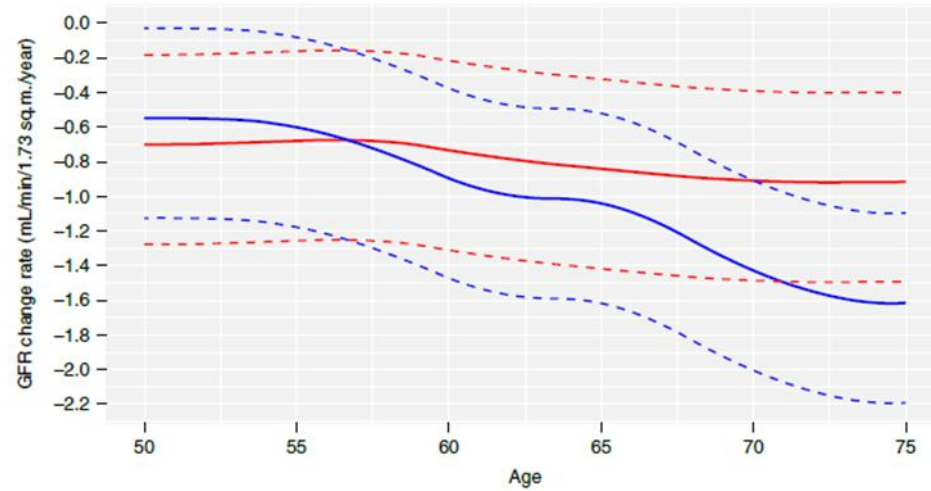


Figure 4. Sex-specific GFR change rates for healthy women and men as a function of age with 95% reference intervals. The solid lines represent the GFR change rates for women (red) and men (blue). The dashed lines represent the 95% reference intervals estimated from the best linear unbiased predictions of the random slopes of the GAMM in Supplemental Table 2.

Table 4. Age-specific annual GFR change rates for healthy women and men

Age Group, yr	Women			Men		
	Mean	Percentiles		Mean	Percentiles	
		2.5th	97.5th		2.5th	97.5th
50–54	-0.70	-1.25	-0.21	-0.55	-1.11	-0.06
55–59	-0.70	-1.25	-0.20	-0.73	-1.28	-0.23
60–64	-0.79	-1.34	-0.30	-0.98	-1.53	-0.48
65–69	-0.87	-1.42	-0.38	-1.22	-1.77	-0.73
70–75	-0.92	-1.47	-0.42	-1.53	-2.08	-1.03

The values are means (ml/min per 1.73 m² per year) for each 5-year interval. The 95% reference intervals were estimated from the best linear unbiased predictions of the random slopes of the generalized additive model in Supplemental Table 2.



Différence de DFG mesuré?





Différence de DFG mesuré?

- Peut-être, oui: une petite (entre 3 et 5 mL/min/1.73m²) (après 40-50 ans)
- Pentes semblent différentes (mais dans quelle sens?)
- Pourquoi = ?
- Biais de survie? Environnement hormonal?
- Rôle de l'indexation par la BSA qui est imparfaite (?)
- Est-ce important du point de vue clinique? (âge *versus* genre)
- Je confesse...

ORIGINAL ARTICLE

Single-Nephron Glomerular Filtration Rate in Healthy Adults

Aleksandar Denic, M.D., Ph.D., Jerry Mathew, M.D.,
Lilach O. Lerman, M.D., Ph.D., John C. Lieske, M.D., Joseph J. Larson, B.S.,
Mariam P. Alexander, M.D., Emilio Poggio, M.D., Richard J. Glassock, M.D.,
and Andrew D. Rule, M.D.

N Engl J Med 2017;376:2349-57.

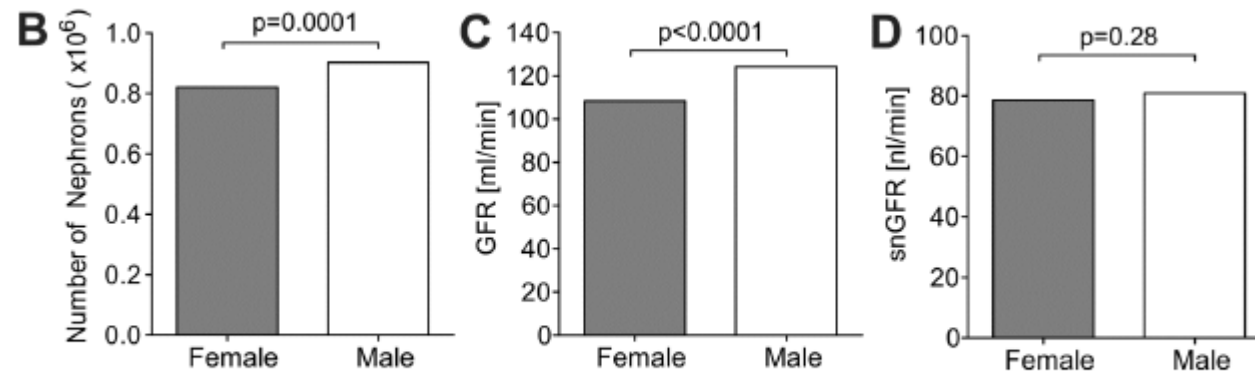


Figure S1. The mean single nephron glomerular filtration rate was relatively stable across the spectrum of age and sex.

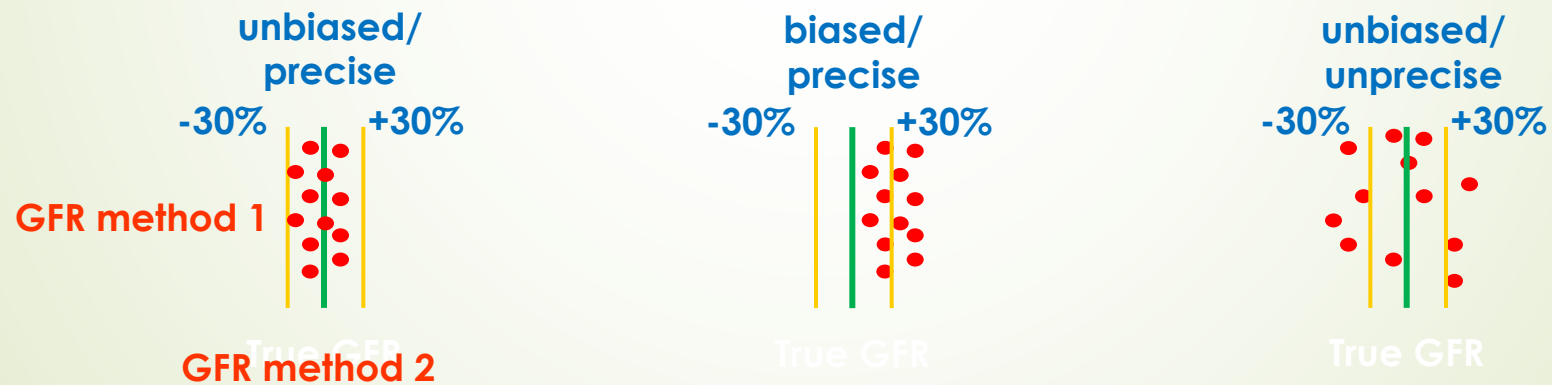


DFG estimé: créatinine

- La Valeur normale de créatinine est différente chez les hommes et chez les femmes
- Masse musculaire

Statistics

- Good correlation: a “*sine qua non*” condition but insufficient
- Bias: mean difference between two values = the systematic error
- Precision: SD around the bias = the random error
- Accuracy 30% = % of eGFR between $\pm 30\%$ of measured GFR



A New Equation to Estimate Glomerular Filtration Rate

Andrew S. Levey, MD; Lesley A. Stevens, MD, MS; Christopher H. Schmid, PhD; Yaping (Lucy) Zhang, MS; Alejandro F. Castro III, MPH; Harold I. Feldman, MD, MSCE; John W. Kusek, PhD; Paul Eggers, PhD; Frederick Van Lente, PhD; Tom Greene, PhD; and Josef Coresh, MD, PhD, MHS, for the CKD-EPI (Chronic Kidney Disease Epidemiology Collaboration)*

Ann Intern Med. 2009;150:604-612.

Table 2. The CKD-EPI Equation for Estimating GFR on the Natural Scale*

Race and Sex	Serum Creatinine Level, $\mu\text{mol/L}$ (mg/dL)	Equation
Black		
Female	≤ 62 (≤ 0.7)	$\text{GFR} = 166 \times (\text{Scr}/0.7)^{-0.329} \times (0.993)^{\text{Age}}$
	> 62 (> 0.7)	$\text{GFR} = 166 \times (\text{Scr}/0.7)^{-1.209} \times (0.993)^{\text{Age}}$
Male	≤ 80 (≤ 0.9)	$\text{GFR} = 163 \times (\text{Scr}/0.9)^{-0.411} \times (0.993)^{\text{Age}}$
	> 80 (> 0.9)	$\text{GFR} = 163 \times (\text{Scr}/0.9)^{-1.209} \times (0.993)^{\text{Age}}$
White or other		
Female	≤ 62 (≤ 0.7)	$\text{GFR} = 144 \times (\text{Scr}/0.7)^{-0.329} \times (0.993)^{\text{Age}}$
	> 62 (> 0.7)	$\text{GFR} = 144 \times (\text{Scr}/0.7)^{-1.209} \times (0.993)^{\text{Age}}$
Male	≤ 80 (≤ 0.9)	$\text{GFR} = 141 \times (\text{Scr}/0.9)^{-0.411} \times (0.993)^{\text{Age}}$
	> 80 (> 0.9)	$\text{GFR} = 141 \times (\text{Scr}/0.9)^{-1.209} \times (0.993)^{\text{Age}}$


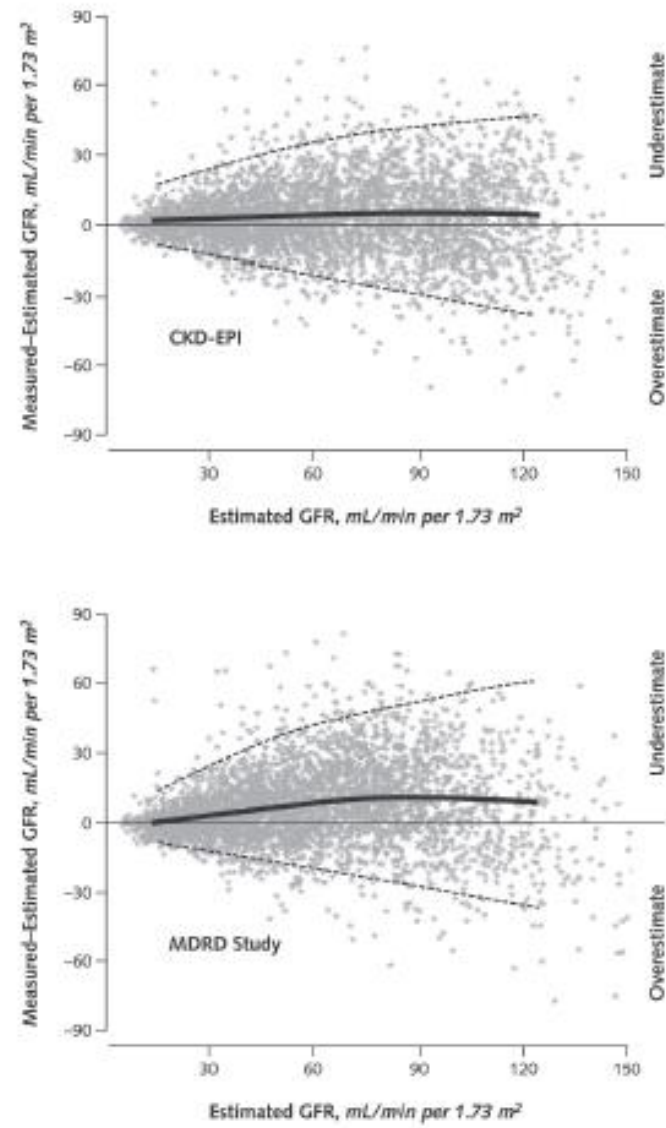
- 
- CKD-EPI
 - « Development dataset » n=5504
 - « Internal validation » n=2750
 - « External validation » n=3896
 - Créatinine calibrée
 - DFG mesuré

Figure. Performance of the CKD-EPI and MDRD Study equations in estimating measured GFR in the external validation data set.



ORIGINAL ARTICLE

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

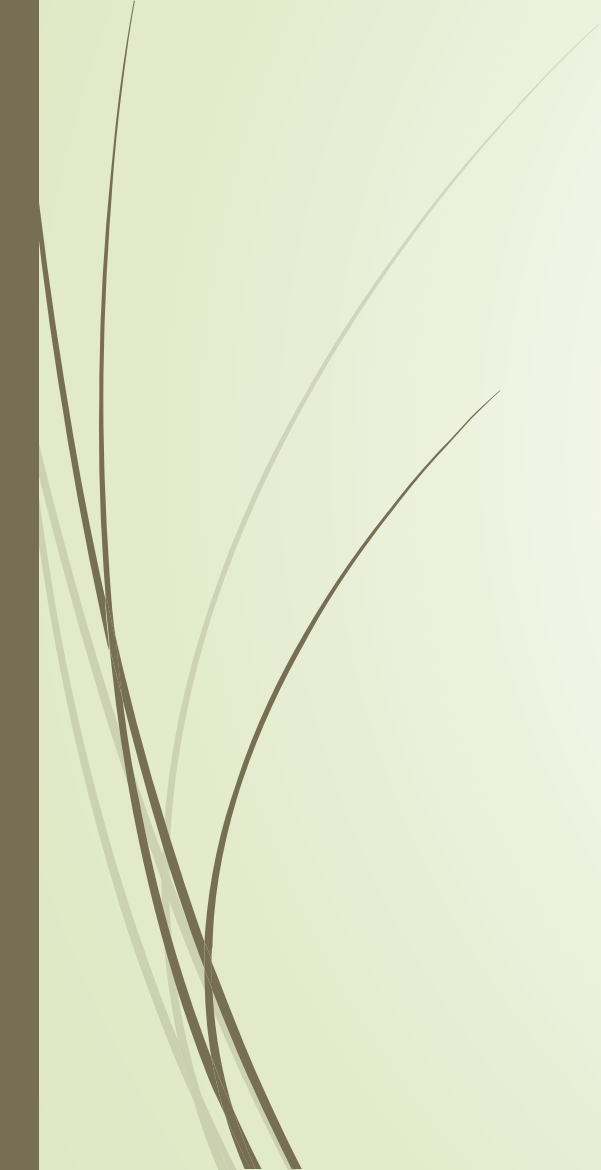
L.A. Inker, N.D. Eneanya, J. Coresh, H. Tighiouart, D. Wang, Y. Sang, D.C. Crews, A. Doria, M.M. Estrella, M. Froissart, M.E. Grams, T. Greene, A. Grubb, V. Gudnason, O.M. Gutiérrez, R. Kalil, A.B. Karger, M. Mauer, G. Navis, R.G. Nelson, E.D. Poggio, R. Rodby, P. Rossing, A.D. Rule, E. Selvin, J.C. 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)

CKD-EPI: What else?



Development and Validation of a Modified Full Age Spectrum Creatinine-Based Equation to Estimate Glomerular Filtration Rate A Cross-sectional Analysis of Pooled Data

Hans Pottel, PhD*; Jonas Björk, PhD*; Marie Courbebaisse, MD, PhD; Lionel Couzi, MD, PhD; Natalie Ebert, MD, MPH; Björn O. Eriksen, MD, PhD; R. Neil Dalton, PhD; Laurence Dubourg, MD, PhD; François Gaillard, MD, PhD; Cyril Garrouste, MD; Anders Grubb, MD, PhD; Lola Jacquemont, MD, PhD; Magnus Hansson, MD, PhD; Nassim Kamar, MD, PhD; Edmund J. Lamb, PhD; Christophe Legendre, MD; Karin Littmann, MD; Christophe Mariat, MD, PhD; Toralf Melsom, MD, PhD; Lionel Rostaing, MD, PhD; Andrew D. Rule, MD; Elke Schaeffner, MD, PhD, MSc; Per-Ola Sundin, MD, PhD; Stephen Turner, MD, PhD; Arend Bökenkamp, MD; Ulla Berg, MD, PhD; Kajsa Åsling-Monemi, MD, PhD; Luciano Selistre, MD, PhD; Anna Åkesson, BSc; Anders Larsson, MD, PhD; Ulf Nyman, MD, PhD†; and Pierre Delanaye, MD, PhD†

DFG mesuré et créatinine calibrée
N=11,251 (“development and internal validation dataset”)
N=8,378 (“external validation dataset”)
N=4,005 entre 2 et 18 ans
7+6 cohortes
Caucasiens

Figure 1. The new EKFC equation.

Age	SCr/Q	Equation
2–40 y	<1	$107.3 \times (\text{SCr}/\text{Q})^{-0.322}$
	≥ 1	$107.3 \times (\text{SCr}/\text{Q})^{-1.132}$
>40 y	<1	$107.3 \times (\text{SCr}/\text{Q})^{-0.322} \times 0.990^{(\text{Age} - 40)}$
	≥ 1	$107.3 \times (\text{SCr}/\text{Q})^{-1.132} \times 0.990^{(\text{Age} - 40)}$

Q Values

For ages 2–25 y:

Males:

$$\ln(\text{Q}) = 3.200 + 0.259 \times \text{Age} - 0.543 \times \ln(\text{Age}) - 0.00763 \times \text{Age}^2 + 0.0000790 \times \text{Age}^3$$

Females:

$$\ln(\text{Q}) = 3.080 + 0.177 \times \text{Age} - 0.223 \times \ln(\text{Age}) - 0.00596 \times \text{Age}^2 + 0.0000686 \times \text{Age}^3$$

For ages >25 y:

Males:

$$\text{Q} = 80 \mu\text{mol/L (0.90 mg/dL)}$$

Females:

$$\text{Q} = 62 \mu\text{mol/L (0.70 mg/dL)}$$

SCr and Q in $\mu\text{mol/L}$ (to convert to mg/dL, divide by 88.4)

Q values (in $\mu\text{mol/L}$ or mg/dL) correspond to the median SCr values for the age- and sex-specific populations. EKFC = European Kidney Function Consortium; SCr = serum creatinine.

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Age-adapted percentiles of measured glomerular filtration in healthy individuals: extrapolation to living kidney donors over 65 years

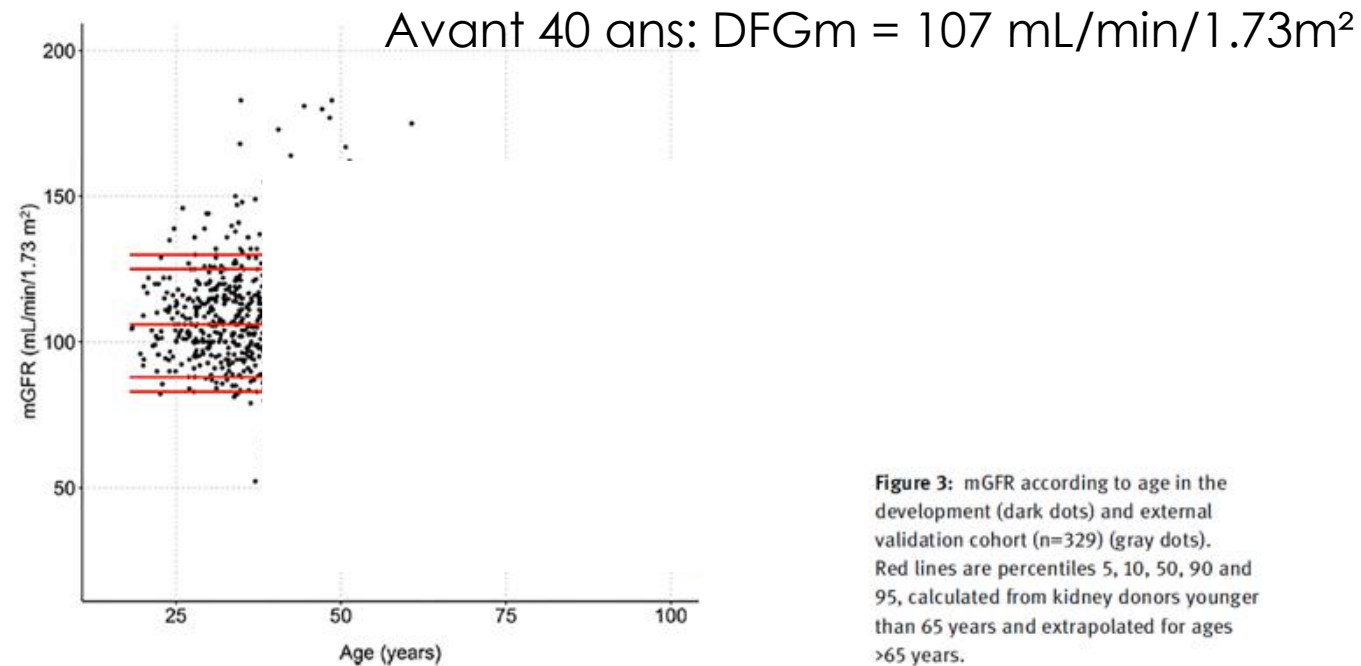


Figure 3: mGFR according to age in the development (dark dots) and external validation cohort (n=329) (gray dots). Red lines are percentiles 5, 10, 50, 90 and 95, calculated from kidney donors younger than 65 years and extrapolated for ages >65 years.

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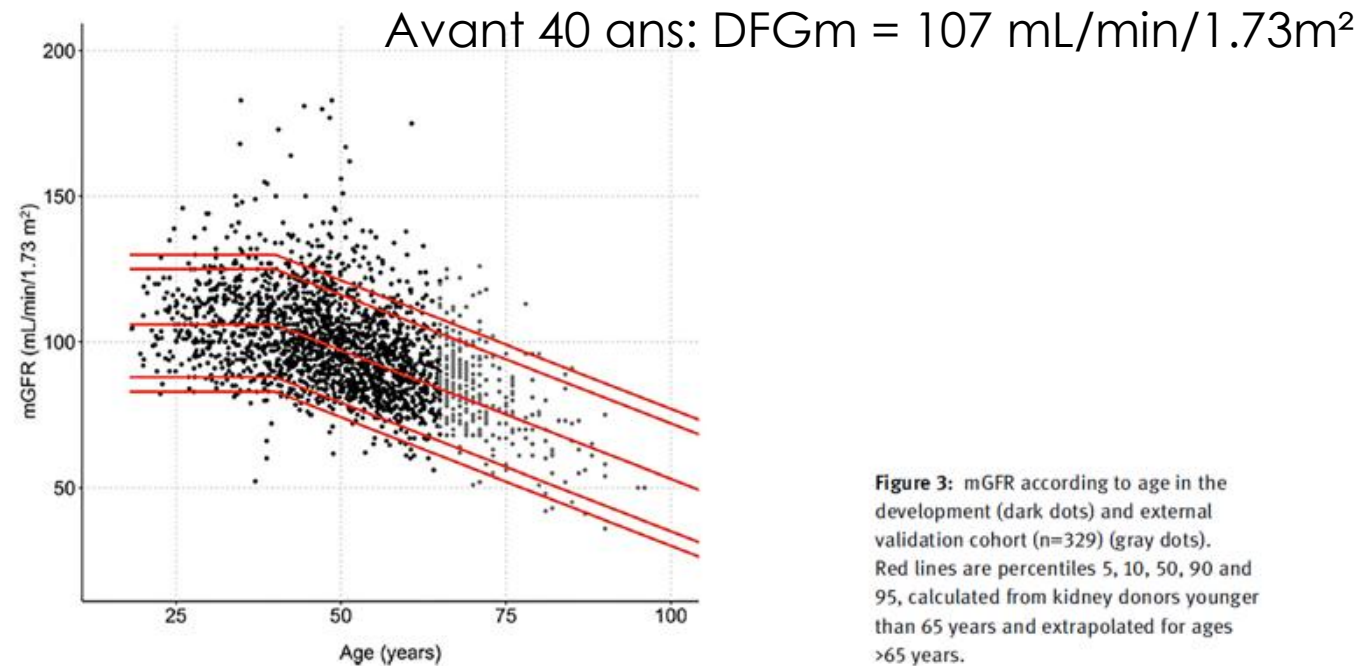
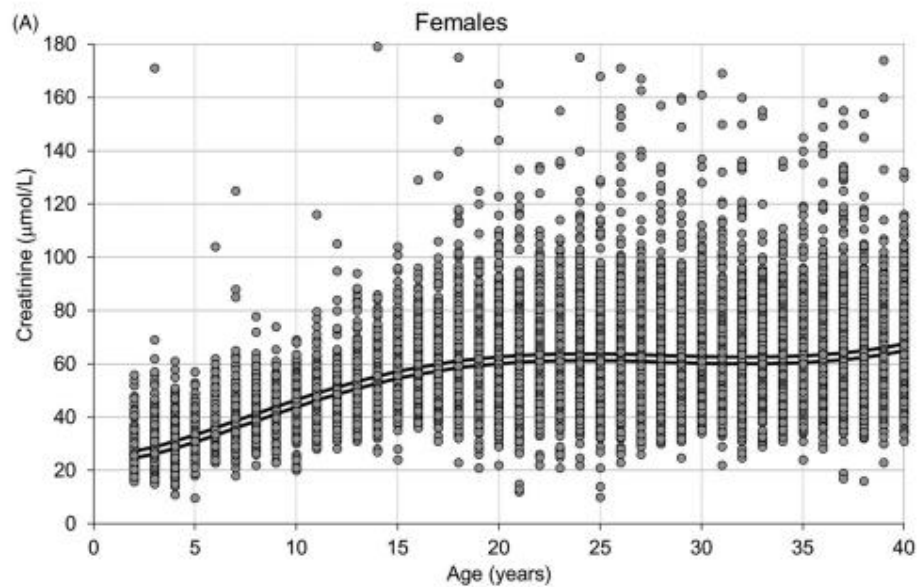
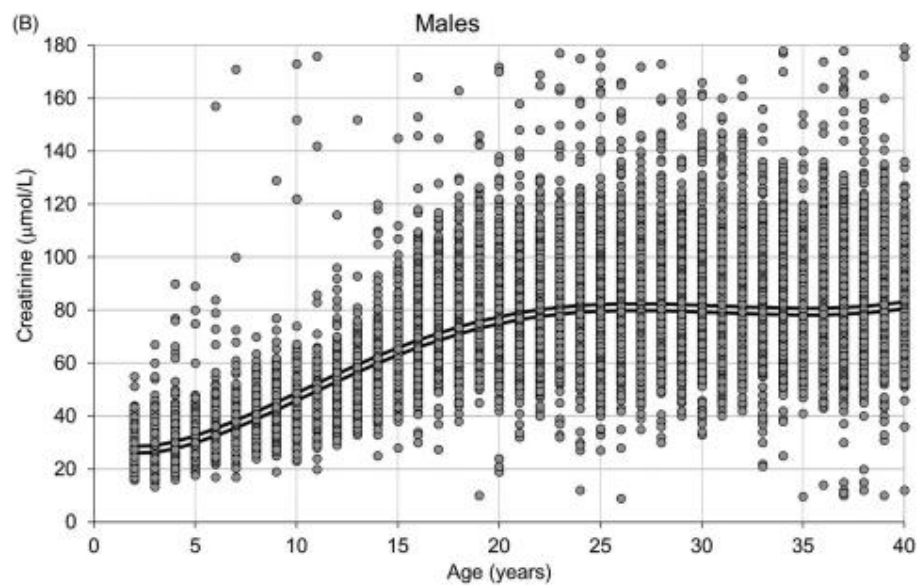


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N=83,257 données de 3 laboratoires (Suède et Belgique)

62 µmol/L = 0,70 mg/dL



80 µmol/L = 0,90 mg/dL

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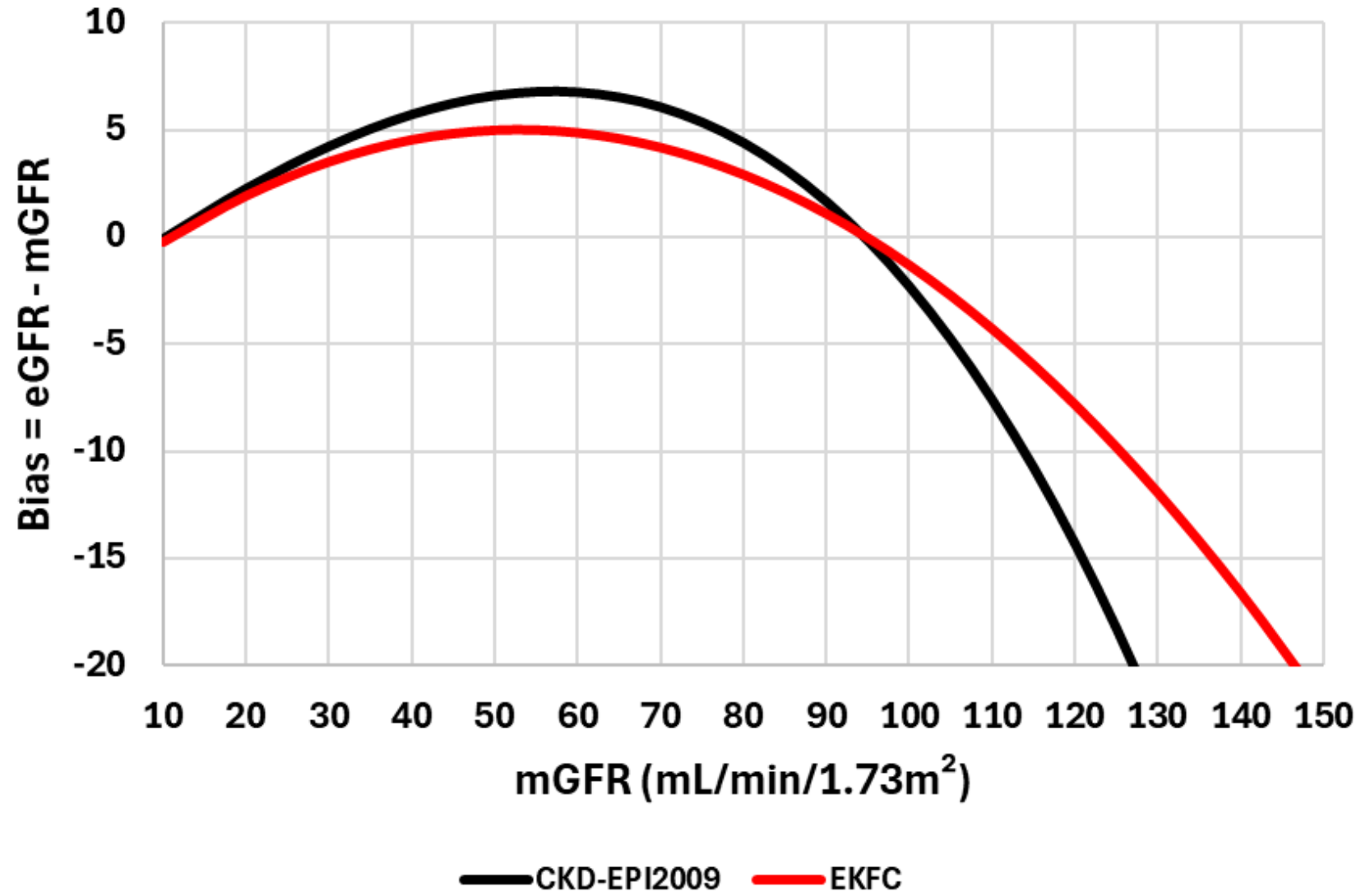
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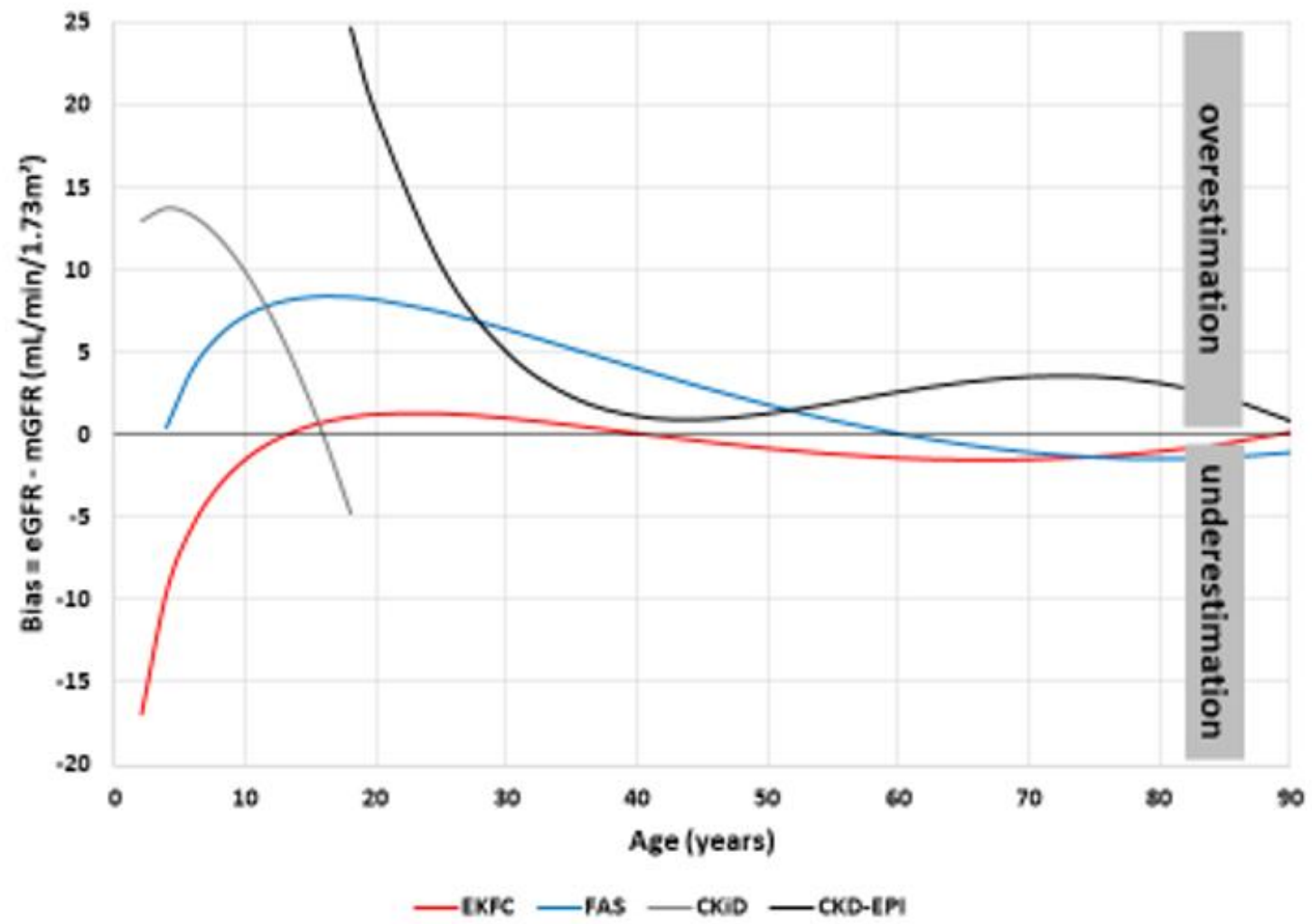
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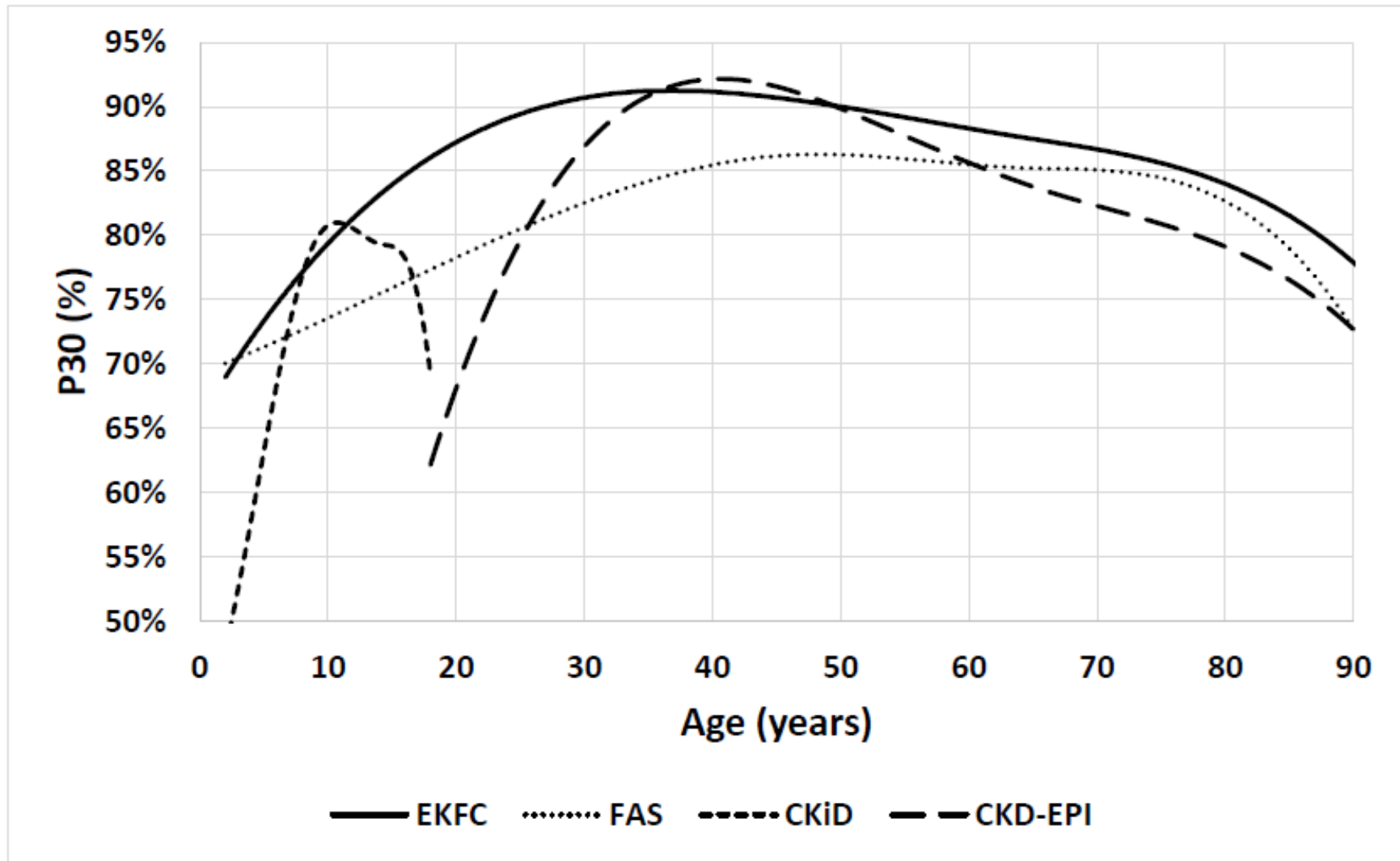


Figure S8. P30-accuracy against age for the EKFC, FAS, CKiD and CKD-EPI equation in the external validation dataset. P30 (%) was graphically presented across the age spectrum using cubic splines with two free knots and using 3rd degree polynomials.

Nephrology Dialysis Transplantation (2023) 38: 106–118

<https://doi.org/10.1093/ndt/gfac241>

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Performance of creatinine-based equations to estimate glomerular filtration rate in White and Black populations in Europe, Brazil and Africa












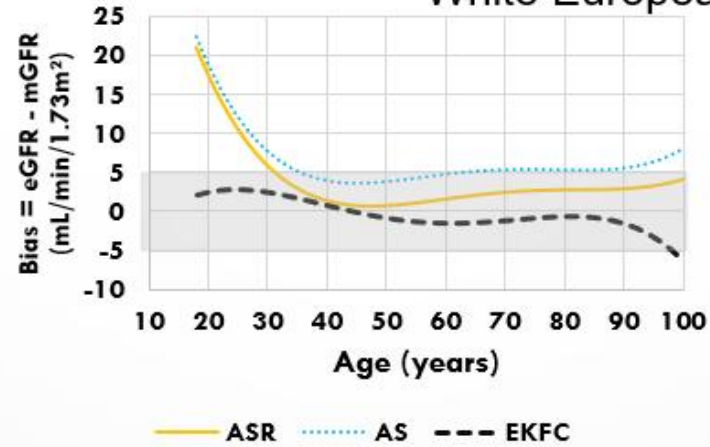
Pierre Delanaye ^{1,2,*}, Emmanuelle Vidal-Petiot ^{3,*}, Jonas Björk ^{4,5}, Natalie Ebert ⁶,
Björn O. Eriksen⁷, Laurence Dubourg⁸, Anders Grubb⁹, Magnus Hansson¹⁰, Karin Littmann¹¹,
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Jean-Philippe Haymann²⁹, Luciano da Silva Selistre³⁰, Jorge P. Strogoff-de-Matos ³¹, Justine B. Bukabau³²,
Ernest K. Sumaili³², Eric Yayo³³, Dagui Monnet³³, Ulf Nyman³⁴, Hans Pottel^{35,†} and Martin Flamant^{36,†}

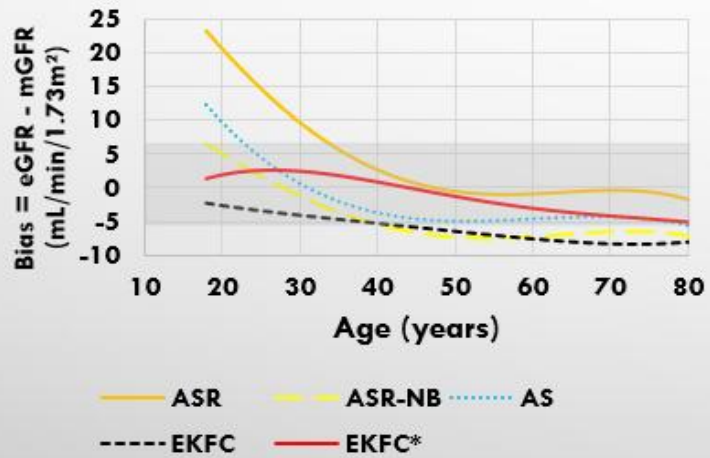
Table 2: Median bias (mL/min/1.73 m²) and P30 (%) for the five different creatinine-based equations according to mGFR, age, sex and BMI.

	Sample (%)	Bias		P30	
		CKD-EPI _{ASR} /CKD-EPI _{ASR-NR} /CKD-EPI _{AS} /LMREY/EKFC	CKD-EPI _{ASR} /CKD-EPI _{ASR-NR} /CKD-EPI _{AS} /LMREY/EKFC	CKD-EPI _{ASR} /CKD-EPI _{ASR-NR} /CKD-EPI _{AS} /LMREY/EKFC	CKD-EPI _{ASR} /CKD-EPI _{ASR-NR} /CKD-EPI _{AS} /LMREY/EKFC
Sex					
Male					
White Europeans	9068 (52.4)	2.2/2.2/5.7/-4.1/-0.4	81.9/81.9/77.4/86.3/85.5		
Black Europeans	596 (61.8)	-0.6/-8.1/-5.5/-11.5/-7.8	81.4/78.2/81.5/70.3/79.4		
Black Africans	271 (53.3)	10.9/-2.7/1.2/-11.3/-5.1	66.8/74.2/72.3/75.3/78.2		
Female					
White Europeans	8253 (47.6)	3.7/3.7/6.5/-2.3/-0.2	83.2/83.2/79.7/88.4/87.8		
Black Europeans	368 (38.2)	5.9/-2.3/-0.5/-5.3/-3.7	70.9/78.5/80.2/80.4/82.3		
Black Africans	237 (46.7)	15.4/1.4/4.2/-5.5/-3.6	59.9/77.6/76.8/80.6/80.6		

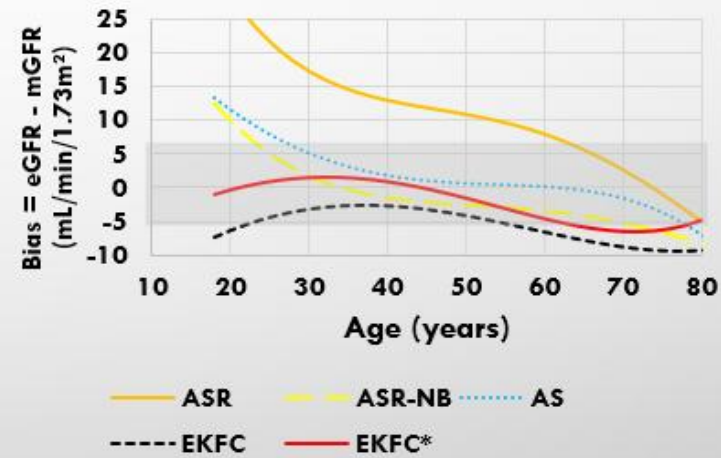
White Europeans (n=17,321)



Black Europeans (n=964)



Black Africans (n=508)



Americentrism in estimation of glomerular filtration rate equations

Kidney International (2022) **101**, 856–858; <https://doi.org/10.1016/j.kint.2022.02.022>

KEYWORDS: glomerular filtration rate; race; serum creatinine

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THE WORLD ACCORDING TO AMERICANS



ORIGINAL ARTICLE

Cystatin C–Based Equation to Estimate GFR without the Inclusion of Race and Sex

H. Pottel, J. Björk, A.D. Rule, N. Ebert, B.O. Eriksen, L. Dubourg, E. Vidal-Petiot,
A. Grubb, M. Hansson, E.J. Lamb, K. Littmann, C. Mariat, T. Melsom,
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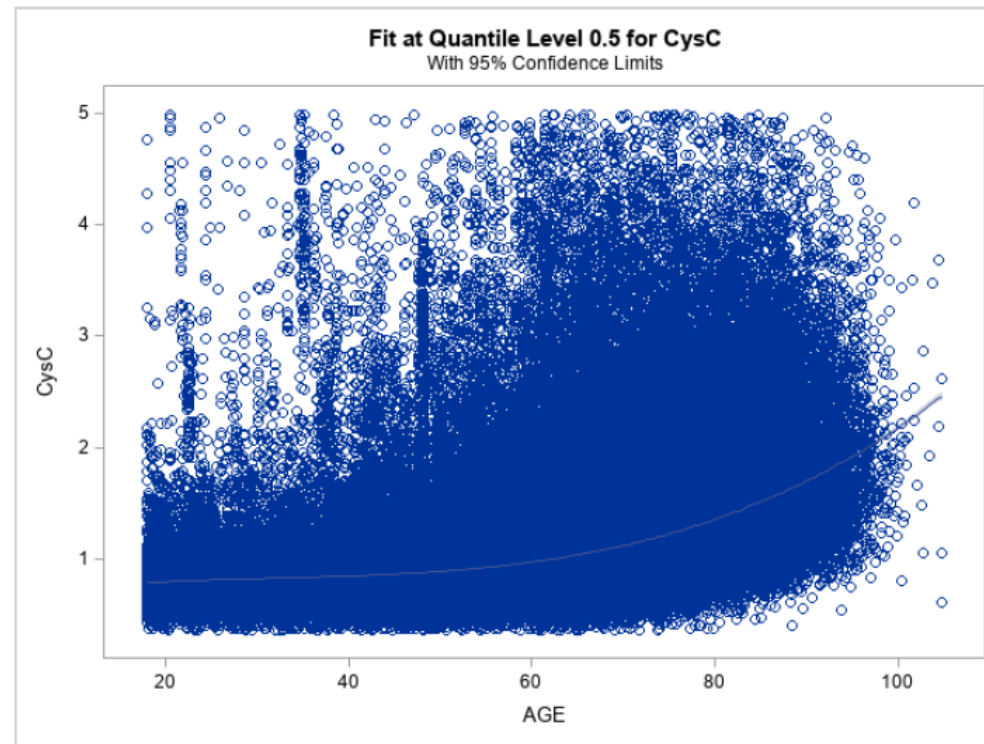
ABSTRACT

N Engl J Med 2023;388:333-43.

Etape 1: cystatine C et âge

Données de laboratoire
de Suède
N=227,643
♀ 95,469
♂ 132,174

Figure S3. Cystatin C versus age and the median quantile line for the 227,643 included subjects.

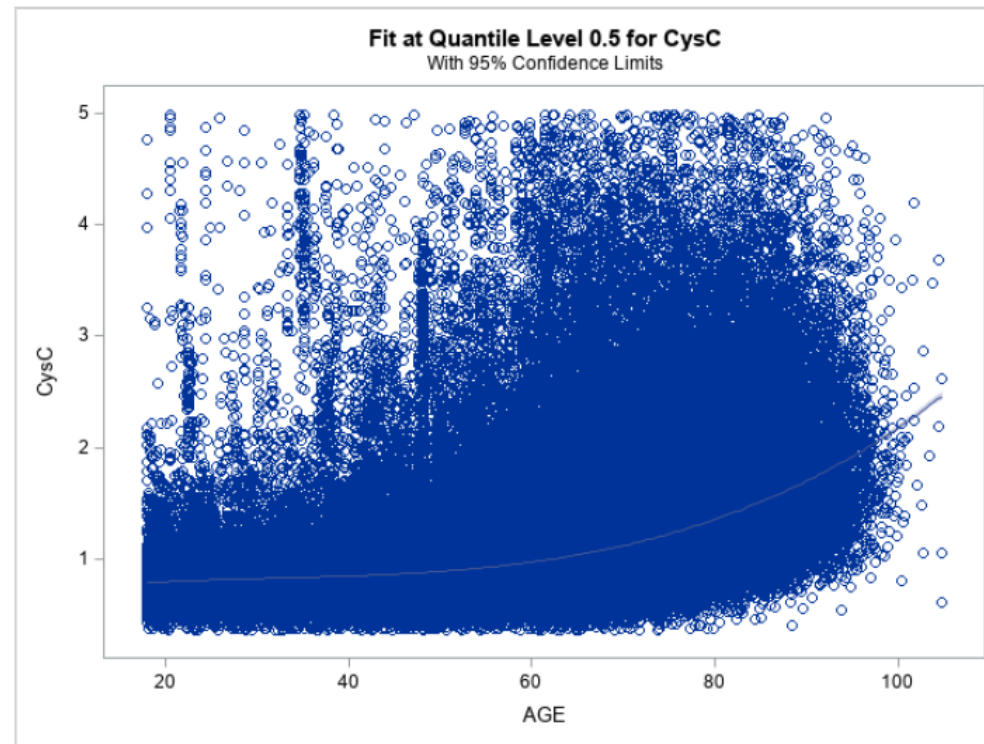


$$\begin{aligned} \text{♀ } Q' &= 0.79 \text{ mg/L until 50 y,} \\ & Q' = 0.79 + 0.005 \times (\text{Age} - 50) \\ \text{♂ } Q' &= 0.86 \text{ mg/L until 50 y} \\ & Q' = 0.86 + 0.005 \times (\text{Age} - 50) \end{aligned}$$

Etape 2: cystatine C et **genre**

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♂ 132,174

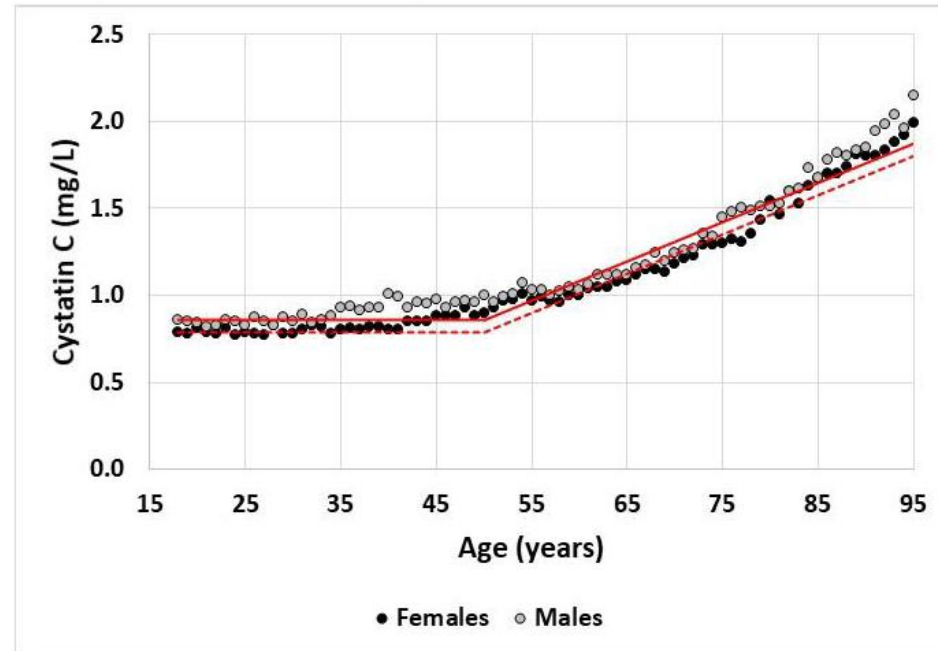
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Etape 2: cystatine C et genre

Figure S4. Median plasma cystatin C in one-year intervals against age for men and women. A mathematical model to define Q'-values is proposed (red solid line): for adults Q' = 0.79 mg/L (women, dashed line) and 0.86 mg/L (men, solid line) until 50 years and a linear increasing model thereafter.



$$Q' = 0.83 \text{ mg/L until 50 years}$$
$$Q' = 0.83 + 0.005 \times (\text{Age} - 50)$$

Etape 3: Cystatine C et “race”

- Données du même centre français
- Méthodes pour mesurer le DFG (Cr-EDTA), la créatinine et la cystatine C identiques
- Populations noire et blanche

Table S3. Patient characteristics of the entire cohorts used for the matching analysis (mean \pm SD)

Ethnicity/Sex	N	Age (years)	BMI (kg/m ²)	mGFR (mL/min/1.73m ²)	SCr (mg/dL)	CysC (mg/L)
White Men	1296 (57%)	53.0 \pm 14.6	26.2 \pm 4.9	61.8 \pm 26.0	1.52 \pm 0.73	1.52 \pm 0.68
Black Men	436 (63%)	50.7 \pm 13.1	26.3 \pm 4.5	62.0 \pm 22.1	1.73 \pm 0.81	1.41 \pm 0.61
White Women	966 (43%)	52.5 \pm 15.2	25.8 \pm 6.2	62.8 \pm 26.8	1.16 \pm 0.61	1.38 \pm 0.73
Black Women	261 (37%)	51.9 \pm 15.2	27.4 \pm 5.8	59.1 \pm 25.6	1.40 \pm 0.79	1.46 \pm 0.76

Etape 3: Cystatine C et "race"

Analyse matchée 1:1 pour

- genre
- IMC ($\pm 2,5$ kg/m²)
- DFG mesuré (± 3 mL/min/1.73m²)
- âge (± 3 y)

Table S4. Demographic and renal characteristics of the matched White and Black subjects (mean \pm SD)

Sex	N	Age (years)	BMI (kg/m ²)	mGFR (mL/min/1.73m ²)	SCr (mg/dL)	CysC (mg/L)
White Men	377	51.1 \pm 12.2	25.7 \pm 3.4	63.8 \pm 21.0	1.43 \pm 0.62	1.41 \pm 0.56
Black Men	377	50.8 \pm 12.3	25.8 \pm 3.5	63.6 \pm 21.0	1.65 \pm 0.64	1.37 \pm 0.59
White Women	200	53.4 \pm 11.9	26.1 \pm 4.6	59.7 \pm 23.2	1.16 \pm 0.53	1.40 \pm 0.69
Black Women	200	53.3 \pm 11.9	26.2 \pm 4.6	59.8 \pm 23.1	1.33 \pm 0.61	1.41 \pm 0.64

Etape 4: Validation

$$\text{EKFC} - \text{eGFR} = 107.3 / [\text{Biomarker}/\text{Q}]^\alpha \times [0.990^{(\text{Age}-40)} \text{ if age } > 40 \text{ years}],$$

with $\alpha=0.322$ when biomarker/Q is less than 1
and $\alpha=1.132$ when biomarker/Q is 1 or more.

Adultes

DFG mesuré, créatinine "IDMS traceable" et cystatine C calibrée
N=12,832

11 cohortes

White Europeans: n=7,727

White Europeans from Paris: n=2,646

White US: n=1,093

Black Europeans from Paris: n=858

Black Africans: n=508

Table 1. Performance of Single Biomarker (Serum Creatinine or Cystatin C)–Based Equations to Estimate the Glomerular Filtration Rate.*

Variable	Serum Creatinine–Based Equations		
	CKD-EPI eGFRcr(ASR)	CKD-EPI eGFRcr(AS)	EKFC eGFRcr
EKFC cohort, 7727 White patients			
Median bias (95% CI) — ml/min/1.73 m ² †	3.96 (3.67 to 4.32)	7.40 (7.02 to 7.76)	0.58 (0.32 to 0.86)
IQR of estimated GFR– measured GFR— ml/min/1.73 m ² ‡	15.5 (–3.0 to 12.5)	16.3 (0.0 to 16.3)	14.5 (–6.5 to 8.0)
Root-mean-square error (95% CI) — ml/min/1.73 m ² §	14.8 (14.4 to 15.2)	16.3 (15.9 to 16.6)	13.1 (12.8 to 13.4)
P ₃₀ — % (95% CI)¶	40.3 (39.2 to 41.4)	34.7 (33.6 to 35.8)	43.3 (42.2 to 44.4)
P ₉₀ — % (95% CI)‖	81.6 (80.8 to 82.5)	75.7 (74.8 to 76.7)	85.8 (85.0 to 86.5)

7.40 (7.02 to 7.76) 0.58 (0.32 to 0.86)

16.3 (0.0 to 16.3) 14.5 (–6.5 to 8.0)

16.3 (15.9 to 16.6) 13.1 (12.8 to 13.4)

34.7 (33.6 to 35.8) 43.3 (42.2 to 44.4)

75.7 (74.8 to 76.7) 85.8 (85.0 to 86.5)

Table 1. Performance of Single Biomarker (Serum Creatinine or Cystatin C)–Based Equations to Estimate the Glomerular Filtration Rate.*

Variable	Cystatin C–Based Equations	
	CKD-EPI eGFR _{cys}	EKFC eGFR _{cys} without Sex
EKFC cohort, 7727 White patients		
Median bias (95% CI) — ml/min/1.73 m ² †	0.28 (–0.02 to 0.64)	0.00 (–0.37 to 0.27)
IQR of estimated GFR– measured GFR— ml/min/1.73 m ² ‡	19.1 (–7.9 to 11.2)	14.4 (–7.9 to 6.5)
Root-mean-square error (95% CI) — ml/min/1.73 m ² §	15.8 (15.5 to 16.1)	13.5 (12.9 to 14.1)
P ₃₀ — % (95% CI)¶	32.0 (31.0 to 33.0)	41.7 (40.6 to 42.8)
P ₉₀ — % (95% CI)‖	80.8 (79.9 to 81.7)	86.2 (85.4 to 87.0)

Cystatin C–Based Equations	
CKD-EPI eGFR _{cys}	EKFC eGFR _{cys} without Sex
0.28 (–0.02 to 0.64)	0.00 (–0.37 to 0.27)
19.1 (–7.9 to 11.2)	14.4 (–7.9 to 6.5)
15.8 (15.5 to 16.1)	13.5 (12.9 to 14.1)
32.0 (31.0 to 33.0)	41.7 (40.6 to 42.8)
80.8 (79.9 to 81.7)	86.2 (85.4 to 87.0)

Table 1. Performance of Single Biomarker (Serum Creatinine or Cystatin C)–Based Equations to Estimate the Glomerular Filtration Rate.*

Variable	Serum Creatinine–Based Equations			Cystatin C–Based Equations	
	CKD-EPI eGFR _{cr} (ASR)	CKD-EPI eGFR _{cr} (AS)	EKFC eGFR _{cr}	CKD-EPI eGFR _{cys}	EKFC eGFR _{cys} without Sex
EKFC cohort, 7727 White patients					
Median bias (95% CI) — ml/min/1.73 m ² †	3.96 (3.67 to 4.32)	7.40 (7.02 to 7.76)	0.58 (0.32 to 0.86)	0.28 (–0.02 to 0.64)	0.00 (–0.37 to 0.27)
IQR of estimated GFR– measured GFR— ml/min/1.73 m ² ‡	15.5 (–3.0 to 12.5)	16.3 (0.0 to 16.3)	14.5 (–6.5 to 8.0)	19.1 (–7.9 to 11.2)	14.4 (–7.9 to 6.5)
Root-mean-square error (95% CI) — ml/min/1.73 m ² §	14.8 (14.4 to 15.2)	16.3 (15.9 to 16.6)	13.1 (12.8 to 13.4)	15.8 (15.5 to 16.1)	13.5 (12.9 to 14.1)
P ₃₀ — % (95% CI)¶	40.3 (39.2 to 41.4)	34.7 (33.6 to 35.8)	43.3 (42.2 to 44.4)	32.0 (31.0 to 33.0)	41.7 (40.6 to 42.8)
P ₃₀ — % (95% CI)‖	81.6 (80.8 to 82.5)	75.7 (74.8 to 76.7)	85.8 (85.0 to 86.5)	80.8 (79.9 to 81.7)	86.2 (85.4 to 87.0)

Table 2. Performance of Combined Serum Creatinine- and Cystatin C–Based Equations to Estimate GFR.*

Variable	CKD-EPI eGFRcr-cys(ASR)	CKD-EPI eGFRcr-cys(AS)	EKFC eGFRcr-cys without Sex
EKFC cohort, 7727 White patients			
Median bias (95% CI) — ml/min/1.73 m ² †	2.50 (2.17 to 2.76)	5.04 (4.69 to 5.36)	0.37 (0.14 to 0.66)
IQR of estimated GFR – measured GFR — ml/min/1.73 m ² ‡	14.8 (–3.6 to 11.2)	16.7 (–1.8 to 14.9)	12.0 (–5.9 to 6.1)
Root-mean-square error (95% CI) — ml/min/1.73 m ² §	13.1 (12.8 to 13.4)	14.7 (14.4 to 15.0)	11.3 (11.0 to 11.6)
P ₁₀ — % (95% CI) ¶	41.5 (40.4 to 42.6)	37.2 (36.2 to 38.3)	48.9 (47.8 to 50.0)
P ₃₀ — % (95% CI)	88.3 (87.6 to 89.0)	84.2 (83.4 to 85.0)	90.4 (89.8 to 91.1)
Paris cohort, 2646 White patients			
Median bias (95% CI) — ml/min/1.73 m ² †	–1.35 (–1.82 to –0.97)	0.64 (0.16 to 1.15)	–0.65 (–1.06 to –0.23)
IQR of estimated GFR – measured GFR — ml/min/1.73 m ² ‡	13.4 (–7.5 to 5.8)	14.1 (–5.8 to 8.3)	12.4 (–6.8 to 5.6)
Root-mean-square error (95% CI) — ml/min/1.73 m ² §	12.1 (11.6 to 12.7)	12.6 (12.0 to 13.1)	11.8 (11.2 to 12.4)
P ₁₀ — % (95% CI) ¶	43.9 (42.0 to 45.8)	42.3 (40.4 to 44.1)	45.8 (43.9 to 47.7)
P ₃₀ — % (95% CI)	89.7 (88.5 to 90.8)	89.2 (88.0 to 90.4)	92.1 (91.1 to 93.1)
U.S. cohort, 1093 White patients			
Median bias (95% CI) — ml/min/1.73 m ² †	9.23 (8.45 to 10.10)	13.9 (13.1 to 14.9)	0.97 (0.01 to 2.12)
IQR of estimated GFR – measured GFR — ml/min/1.73 m ² ‡	18.4 (0.5 to 18.8)	18.1 (5.1 to 23.3)	17.4 (–8.2 to 9.2)
Root-mean-square error (95% CI) — ml/min/1.73 m ² §	18.1 (17.1 to 19.1)	21.0 (20.1 to 22.0)	15.5 (14.3 to 16.7)
P ₁₀ — % (95% CI) ¶	37.1 (34.3 to 40.0)	28.1 (25.4 to 30.8)	45.7 (42.7 to 48.6)
P ₃₀ — % (95% CI)	79.5 (77.1 to 81.9)	72.1 (69.4 to 74.8)	88.7 (86.9 to 90.6)
Paris cohort, 858 Black patients			
Median bias (95% CI) — ml/min/1.73 m ² †	–0.37 (–1.06 to 0.57)	–2.08 (–2.71 to –1.32)	–0.65 (–1.23 to 0.11)
IQR of estimated GFR – measured GFR — ml/min/1.73 m ² ‡	15.2 (–6.4 to 8.8)	14.0 (–7.9 to 6.1)	12.4 (–6.2 to 6.2)
Root-mean-square error (95% CI) — ml/min/1.73 m ² §	13.3 (11.9 to 14.6)	12.6 (11.2 to 13.9)	11.6 (10.0 to 13.0)
P ₁₀ — % (95% CI) ¶	38.7 (35.4 to 42.0)	38.9 (35.7 to 42.2)	48.3 (44.9 to 51.6)
P ₃₀ — % (95% CI)	87.9 (85.7 to 90.1)	89.0 (87.0 to 91.1)	92.0 (90.1 to 93.8)
African cohort, 508 Black patients			
Median bias (95% CI) — ml/min/1.73 m ² †	8.55 (6.87 to 10.30)	4.08 (2.37 to 5.78)	0.42 (–1.03 to 1.51)
IQR of estimated GFR – measured GFR — ml/min/1.73 m ² ‡	24.7 (–4.5 to 20.1)	22.0 (–7.4 to 14.7)	17.1 (–7.2 to 10.0)
Root-mean-square error (95% CI) — ml/min/1.73 m ² §	19.7 (18.2 to 21.1)	17.2 (15.8 to 18.5)	14.7 (13.3 to 16.0)
P ₁₀ — % (95% CI) ¶	28.7 (24.8 to 32.7)	34.3 (30.1 to 38.4)	43.5 (39.2 to 47.8)
P ₃₀ — % (95% CI)	75.0 (71.2 to 78.8)	77.6 (73.9 to 81.2)	84.3 (81.1 to 87.4)

Section S9. Performance statistics according to mGFR-level, sex and age subgroups

Table S9.1a. Comparison of Bias for mGFR < 60 mL/min/1.73m²

BIAS [95%CI]	Men			Women		
	age 18-40	age 40-65	age ≥ 65	age 18-40	age 40-65	age ≥ 65
N	223	1008	1556	184	741	1197
EKFC-eGFR _{Cr}	4.3 [2.2; 5.1]	2.5 [1.7; 3.2]	0.8 [0.4; 1.4]	4.3 [1.8; 6.6]	2.7 [1.9; 3.5]	0.6 [0.1; 1.3]
CKD-EPI-eGFR _{Cr} (AS)	6.5 [4.3; 8.1]	3.4 [2.5; 4.4]	4.8 [4.3; 5.5]	6.6 [3.8; 8.8]	4.6 [3.5; 5.4]	5.5 [5.0; 6.3]
EKFC-eGFR _{Cys} (S)	5.7 [4.3; 6.7]	1.1 [0.5; 1.6]	0.9 [0.5; 1.3]	4.0 [2.4; 5.5]	0.8 [0.1; 1.3]	0.3 [-0.3; 0.8]*
EKFC-eGFR _{Cys}	3.6 [2.6; 5.1]	-0.4 [-1.0; 0.2]*	-0.2 [-0.7; 0.2]*	6.5 [4.6; 7.8]	2.6 [2.1; 3.3]	2.0 [1.4; 2.4]
CKD-EPI-eGFR _{Cys}	-0.0 [-1.4; 1.3]*	-3.5 [-4.3; -2.9]	-2.8 [-3.3; -2.3]	-0.2 [-1.9; 1.4]*	-2.7 [-3.4; -2.1]	-2.6 [-3.1; -2.0]
EKFC-eGFR _{Cr+Cys} (S)	5.6 [4.1; 6.5]	2.1 [1.6; 2.7]	1.2 [0.8; 1.6]	5.0 [4.0; 6.2]	1.8 [1.2; 2.3]	0.5 [-0.1; 1.0]*
EKFC-eGFR _{Cr+Cys}	4.6 [3.4; 5.6]	1.4 [0.9; 2.0]	0.6 [0.3; 1.1]	6.1 [5.0; 7.8]	2.8 [2.2; 3.2]	1.3 [0.8; 1.8]
CKD-EPI-eGFR _{Cr+Cys} (AS)	1.7 [0.4; 2.6]	-0.7 [-1.3; 0.1]*	0.7 [0.4; 1.2]	2.0 [0.3; 4.1]	0.0 [-0.8; 0.8]*	0.8 [0.3; 1.3]

Table S9.1b. Comparison of Bias for mGFR ≥ 60 mL/min/1.73m²

BIAS [95%CI]	Men			Women		
	age 18-40	age 40-65	age ≥ 65	age 18-40	age 40-65	age ≥ 65
n	782	2452	858	640	2243	948
EKFC-eGFR _{Cr}	2.3 [0.6; 3.5]	-3.9 [-4.6; -3.4]	-5.0 [-6.0; -4.0]	3.1 [1.1; 4.5]	-0.0 [-0.8; 0.5]*	-3.7 [-4.5; -2.7]
CKD-EPI-eGFR _{Cr} (AS)	8.8 [7.0; 10.4]	2.7 [2.0; 3.4]	6.0 [4.9; 7.4]	10.9 [9.0; 12.9]	7.5 [6.8; 8.3]	8.1 [7.2; 9.3]
EKFC-eGFR _{Cys} (S)	3.2 [2.1; 4.5]	-1.9 [-2.5; -1.1]	-4.5 [-5.3; -3.4]	2.9 [1.5; 4.6]	0.7 [0.1; 1.5]	-4.5 [-5.5; -3.3]
EKFC-eGFR _{Cys}	0.2 [-1.0; 1.8]*	-3.8 [-4.3; -3.0]	-6.0 [-6.9; -5.2]	6.8 [5.4; 8.4]	3.4 [2.7; 4.1]	-2.0 [-3.2; -1.0]
CKD-EPI-eGFR _{Cys}	4.8 [3.0; 6.6]	5.2 [4.0; 6.2]	-0.1 [-2.0; 0.8]*	6.6 [5.0; 8.1]	8.1 [7.3; 9.0]	0.6 [-1.0; 2.2]*
EKFC-eGFR _{Cr+Cys} (S)	1.9 [1.0; 3.2]	-2.6 [-3.2; -2.0]	-4.5 [-5.6; -3.6]	3.6 [2.2; 4.7]	0.3 [-0.4; 0.8]*	-4.1 [-4.9; -3.5]
EKFC-eGFR _{Cr+Cys}	0.5 [-0.2; 1.8]*	-3.5 [-4.2; -3.0]	-5.5 [-6.4; -4.6]	5.1 [4.1; 6.6]	1.5 [0.9; 2.2]	-3.0 [-3.7; -2.3]
CKD-EPI-eGFR _{Cr+Cys} (AS)	7.0 [5.6; 8.0]	6.6 [5.7; 7.4]	5.3 [4.3; 6.6]	10.1 [8.8; 11.5]	11.8 [11.0; 12.5]	7.6 [6.5; 8.8]

EKFC-eGFR_{Cys} (S) = Sex-dependent EKFC-eGFR_{Cys}-equation; CKD-EPI-eGFR_{Cr} (AS) = race-independent CKD-EPI equation; EKFC-eGFR_{Cr+Cys}(S) = SCr/ sex-free CysC combined EKFC equation. As a rule of thumb, one may consider an absolute bias less than 5 mL/min/1.73m² as “clinically” non-significant.

* means unbiased.

Table S9.4a. P30-accuracy (% of subjects with eGFR within 30% of mGFR) for mGFR < 60 mL/min/1.73m²

P30 [95%CI]	Men			Women		
	age 18-40	age 40-65	age ≥ 65	age 18-40	age 40-65	age ≥ 65
N	223	1008	1556	184	741	1197
EKFC-eGFR _{Cr}	69.5 [63.4; 75.6]	70.6 [67.8; 73.5]	77.2 [75.1; 79.3]	65.2 [58.3; 72.2]	72.2 [69.0; 75.4]	76.4 [74.0; 78.8]
CKD-EPI-eGFR _{Cr} (AS)	62.8 [56.4; 69.2]	66.4 [63.4; 69.3]	63.2 [60.8; 65.6]	56.5 [49.3; 63.8]	66.7 [63.3; 70.1]	62.4 [59.7; 65.2]
EKFC-eGFR _{Cys} (S)	77.1 [71.6; 82.7]	80.3 [77.8; 82.7]	78.9 [76.8; 80.9]	69.0 [62.3; 75.8]	76.1 [73.0; 79.2]	76.7 [74.3; 79.1]
EKFC-eGFR _{Cys}	80.7 [75.5; 85.9]	81.9 [79.6; 84.3]	80.5 [78.5; 82.4]	65.2 [58.3; 72.2]	74.9 [71.8; 78.0]	75.5 [73.1; 78.0]
CKD-EPI-eGFR _{Cys}	80.7 [75.5; 85.9]	78.8 [76.2; 81.3]	77.3 [75.2; 79.4]	72.8 [66.3; 79.3]	74.0 [70.8; 77.1]	71.6 [69.0; 74.2]
EKFC-eGFR _{Cr+Cys} (S)	78.0 [72.6; 83.5]	81.2 [78.7; 83.6]	84.4 [82.6; 86.2]	74.5 [68.1; 80.8]	80.2 [77.3; 83.0]	82.7 [80.6; 84.9]
EKFC-eGFR _{Cr+Cys}	79.8 [74.5; 85.1]	82.5 [80.2; 84.9]	85.3 [83.5; 87.0]	70.1 [63.4; 76.8]	79.6 [76.7; 82.5]	81.5 [79.2; 83.7]
CKD-EPI-eGFR _{Cr+Cys} (AS)	85.2 [80.5; 89.9]	83.3 [81.0; 85.6]	81.0 [79.1; 83.0]	75.0 [68.7; 71.3]	79.9 [77.0; 82.8]	78.1 [75.8; 80.5]

Table S9.4b. P30-accuracy (% of subjects with eGFR within 30% of mGFR) for mGFR ≥ 60 mL/min/1.73m²

P30 [95%CI]	Men			Women		
	age 18-40	age 40-65	age ≥ 65	age 18-40	age 40-65	age ≥ 65
N	782	2452	858	640	2243	948
EKFC-eGFR _{Cr}	89.5 [87.4; 91.7]	93.3 [92.3; 94.3]	94.1 [92.5; 95.6]	89.2 [86.8; 91.6]	94.6 [93.7; 95.5]	95.0 [93.7; 96.4]
CKD-EPI-eGFR _{Cr} (AS)	80.6 [77.8; 83.3]	89.4 [88.1; 90.6]	86.8 [84.6; 89.1]	79.8 [76.7; 83.0]	88.5 [87.2; 89.8]	84.8 [82.5; 87.1]
EKFC-eGFR _{Cys} (S)	89.0 [86.8; 91.2]	92.4 [91.3; 93.4]	91.3 [89.4; 93.2]	90.6 [88.4; 92.9]	92.5 [91.4; 93.6]	90.5 [88.6; 92.4]
EKFC-eGFR _{Cys}	91.0 [89.0; 93.1]	91.7 [90.6; 92.8]	90.2 [88.2; 92.2]	88.0 [85.4; 90.5]	91.9 [90.8; 93.1]	92.0 [90.3; 93.7]
CKD-EPI-eGFR _{Cys}	84.9 [82.4; 87.4]	83.5 [92.1; 85.0]	83.8 [81.3; 86.3]	85.2 [82.4; 87.9]	82.7 [81.1; 84.2]	81.9 [79.4; 84.3]
EKFC-eGFR _{Cr+Cys} (S)	94.5 [92.9; 96.1]	95.4 [94.6; 96.2]	95.8 [94.5; 97.1]	94.4 [92.6; 96.2]	97.0 [96.3; 97.7]	96.6 [95.5; 97.8]
EKFC-eGFR _{Cr+Cys}	94.8 [93.2; 96.3]	95.7 [94.9; 96.5]	95.5 [94.1; 96.9]	93.1 [91.2; 95.1]	96.3 [95.5; 97.1]	96.9 [85.8; 98.0]
CKD-EPI-eGFR _{Cr+Cys} (AS)	89.6 [87.5; 91.8]	88.9 [87.7; 90.2]	87.1 [84.8; 89.3]	87.0 [84.4; 89.6]	83.3 [81.8; 84.9]	84.7 [82.4; 87.0]

Cystatine C/EKFC

- Cystatine C permet une estimation du DFG sans la variable sexe/genre
- EKFC cystatine est la même équation que EKFC créatinine, seule la valeur de Q change
- Continuum entre les adolescents et les jeunes adultes
- Les équations EKFC sont meilleures que les équations CKD-EPI correspondantes => **alternative valable en Europe, Afrique et USA**
- Les équations combinant la cystatine C et la créatinine sont meilleures
- Standardisation de la cystatine C
- Coût de la cystatine C
- Comment interpréter les résultats discordants?



**KDIGO 2024 CLINICAL PRACTICE GUIDELINE
FOR THE EVALUATION AND MANAGEMENT
OF CHRONIC KIDNEY DISEASE**

1.2.4 Selection of GFR estimating equations

Recommendation 1.2.4.1: We recommend using a validated GFR estimating equation to derive GFR from serum filtration markers (eGFR) rather than relying on the serum filtration markers alone (1D).

Practice Point 1.2.4.1: Use the same equation within geographical regions (as defined locally [e.g., continent, country, and region] and as large as possible). Within such regions, equations may differ for adults and children.

Practice Point 1.2.4.2: Use of race in the computation of eGFR should be avoided.

Special considerations

Pediatric considerations

Practice Point 1.2.4.3: Estimate GFR in children using validated equations that have been developed or validated in comparable populations.

Table 14 | Validated GFR estimating equations

Marker	Equation name and year	Age	Variables	Development populations
Creatinine	CKD-EPI 2009 ²³⁸	≥18; modification CKD-EPI 40 for pediatric available	Developed using A, S, R but reported not using the Black race coefficient, A, S, R (NB)	8254 Black and NB individuals from 10 studies in the United States and Europe ^a
	CKID U25 2021 ²³⁹	1–25	A, S, height	928 children with CKD in the United States and Canada
	CKD-EPI 2021 ¹⁴⁷	≥18	A, S	8254 Black and NB individuals from 10 studies in the United States and Europe ^a
	EKFC 2021 ²⁴⁰	2–100	A, S, European Black and NB specific Q-value; separate Q-values for Africa vs. Europe	mGFR vs. SCr (11,251 participants in 7 studies in Europe and 1 study from the United States) Normal GFR from 5482 participants in 12 studies of kidney donor candidates (100% Caucasian) European NB Q from 83,157 laboratory samples (age 2–40 years) in 3 European hospital clinical laboratories; European Black Q-value (N = 90 living kidney donors from Paris); African Black Q-value (N = 470 healthy individuals from République Démocratique de Congo); All Q-values developed in cohorts independent for EKFC development and validation
Cystatin C	CKD-EPI 2012 ¹⁴⁸	≥18	A, S	5352 Black and NB individuals from 13 studies in the United States and Europe
	EKFC 2023 ⁹¹	18–100	A	mGFR vs. SCys (assumed to be the same as mGFR vs. SCr) Normal GFR (same as for the SCr equation) Q from laboratory samples from 227,643 (42% female) laboratory samples from Uppsala University Hospital, Sweden

Limitations des formules = créatinine

Populations spécifiques:
Les équations ne sont pas
magiques!!
Gardons notre sens clinique!!

Atrophie rénale (Delanaye P, Clin Nephrol, 2009, 71, 102)

Cirrhose (Skruzacek PA, Am J Kidney Dis, 2003, 42, 1169)

USI (Delanaye P, BMC Nephrology, 2014, 15, 9)

Hospitalisés (Poggio ED, Am J Kidney Dis, 2005, 46, 242)

Greffés cœur (Delanaye P, Clin Transplant, 2006, 20, 596)

Greffés rein (Masson I, Transplantation, 2013, 95, 1211)

Obèse (Bouquegneau A, NDT, 2013, 28, iv122)



Ne pas sur-interpreter un DFG estimé...

Toutes les équations restent des estimations

OK au niveau populationnel

Manque de précision au niveau individuel

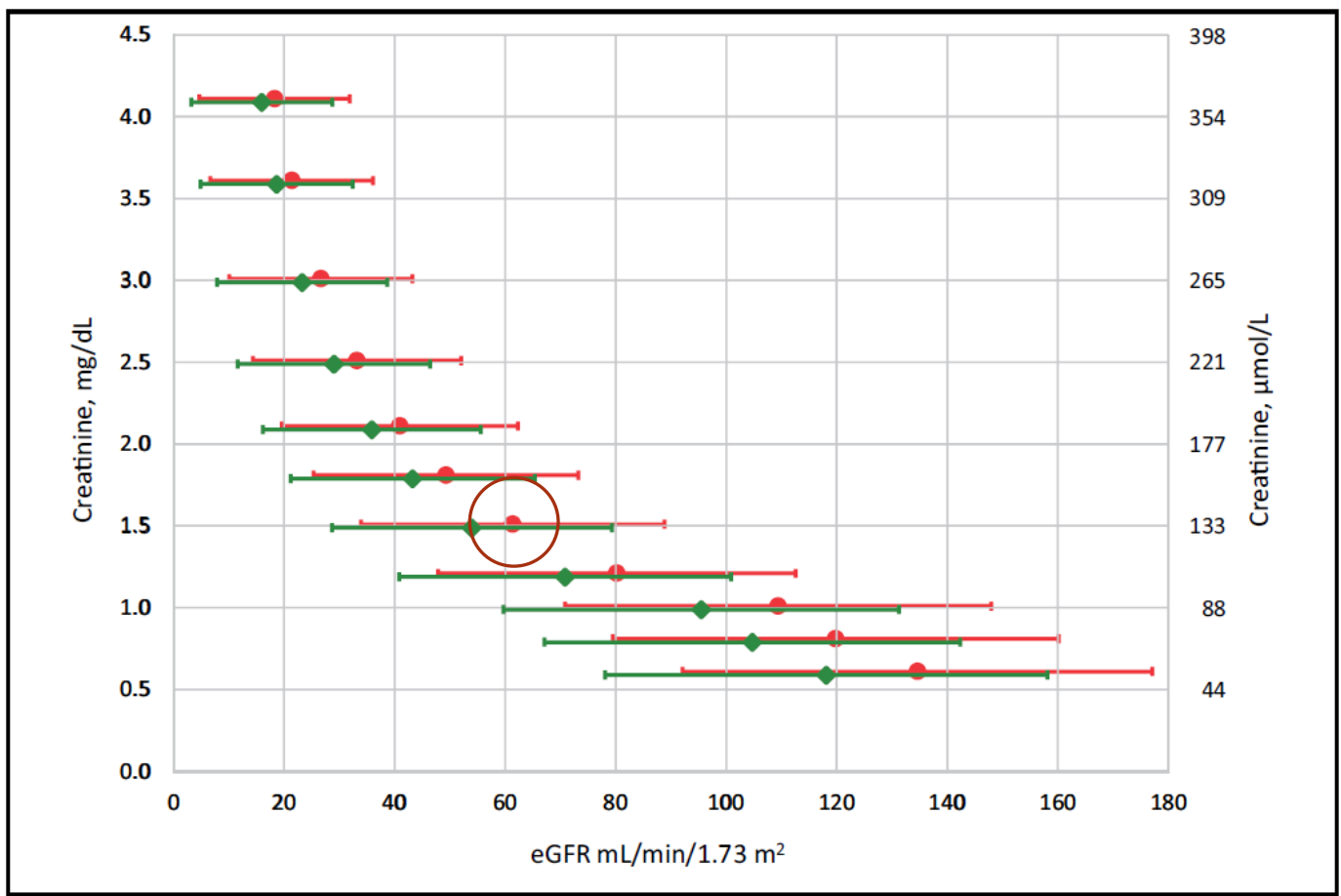


Fig. 1. Uncertainty of eGFR calculated using the CKD-EPI equations for African-Americans and non-African-Americans at various creatinine concentrations for a 50-year-old male. Circles (red, larger values) indicate African-American and diamonds (green, lower values) indicate non-African-American equations. Plot symbols are the eGFR values and error bars represent the 95% CI for each eGFR value.

$$DFGe = 60,25 \text{ ml/min/1.73m}^2$$

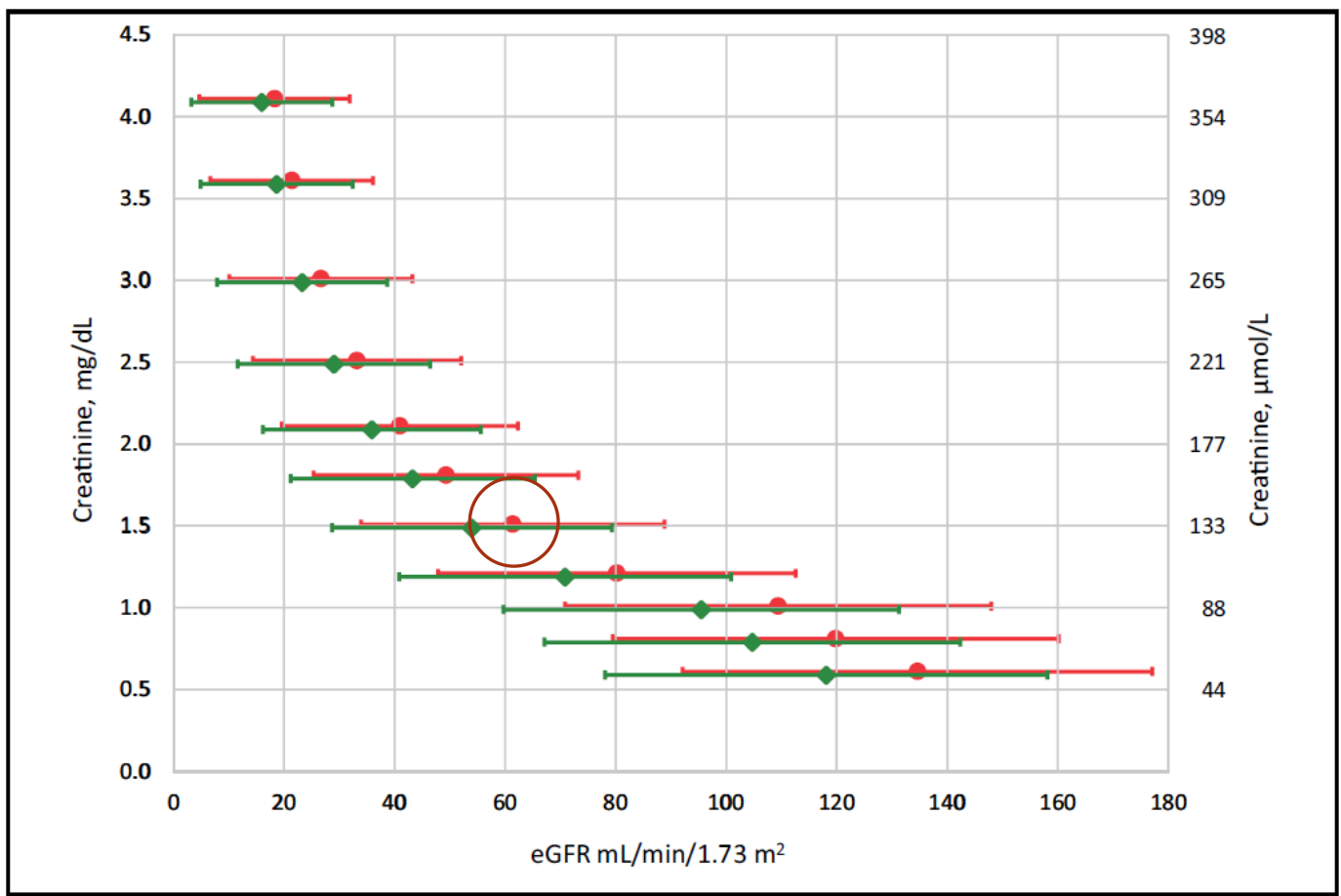


Fig. 1. Uncertainty of eGFR calculated using the CKD-EPI equations for African-Americans and non-African-Americans at various creatinine concentrations for a 50-year-old male. Circles (red, larger values) indicate African-American and diamonds (green, lower values) indicate non-African-American equations. Plot symbols are the eGFR values and error bars represent the 95% CI for each eGFR value.

$$\begin{aligned}
 \text{DFGe} &= 60,25 \text{ ml/min/1.73m}^2 \\
 &= 60 \text{ ml/min/1.73m}^2 \quad (\text{CI } 95\%: 33-87)
 \end{aligned}$$

The applicability of eGFR equations to different populations

Pierre Delanaye and Christophe Mariat



RETOUR à une mesure du DFG

Delanaye P, Nature Rev Nephrol, 2013, 9, p513

Ebert N, Clin Kidney J, 2021, 14, p1861

Agarwal R, Nephrol Dial Transplant, 2019, 34, p2001

Shafi T, Ann Intern Med, 2022, 175, p1073

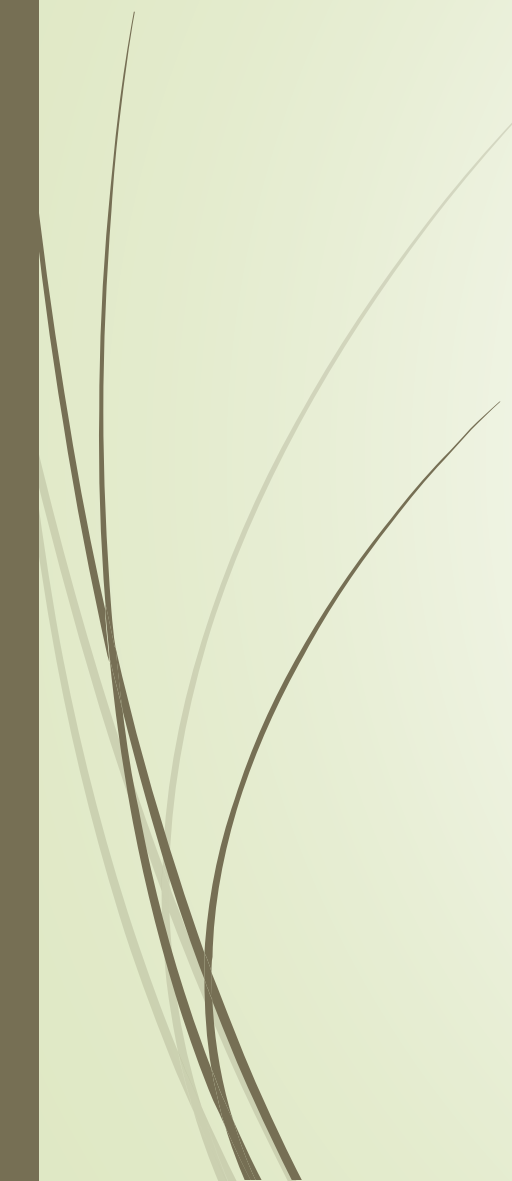


Retour au genre: Conclusions (essai)

- ▶ C'est pas si simple...
- ▶ DFGm il y a des différences, sont-elles cliniquement "relevantes"?
- ▶ Seule la précision du DFGm autorise de se poser la question
- ▶ Créatinine : oui, il y a des différences donc genre doit être intégré dans la formule
- ▶ Cystatine C: oui, il y a des différences mais elles sont minimales et ne pas intégrer dans une formule aboutit à une perte négligeable de performance
- ▶ Parallèle intéressant avec le débat sur la « race » et le DFG aux USA avec des questions ou des implications sociétales voire philosophiques?

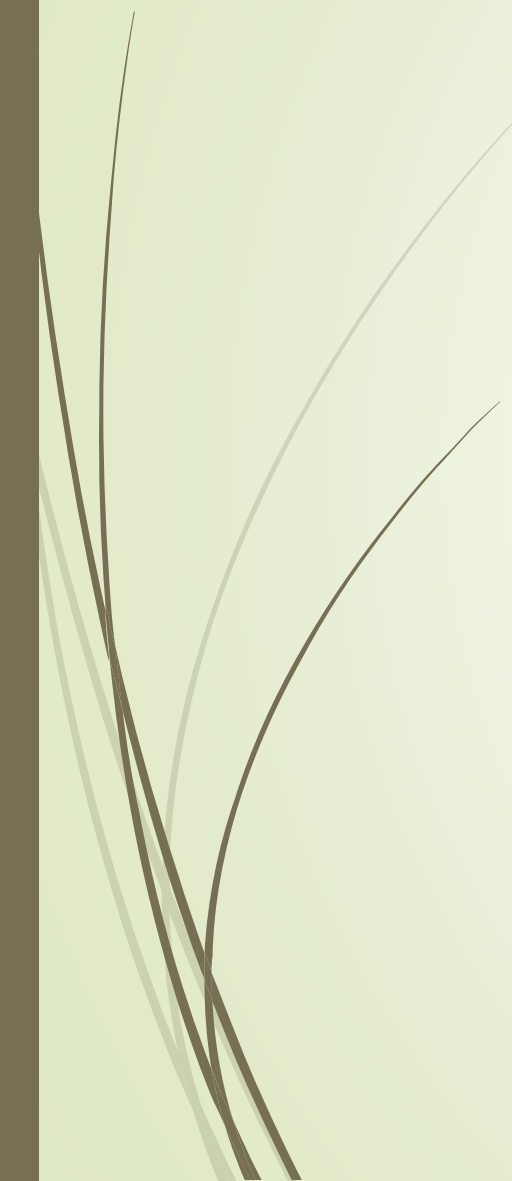


Population transgenre

- DFG mesuré
 - Créatinine
 - Cystatine C
- 



Population transgenre

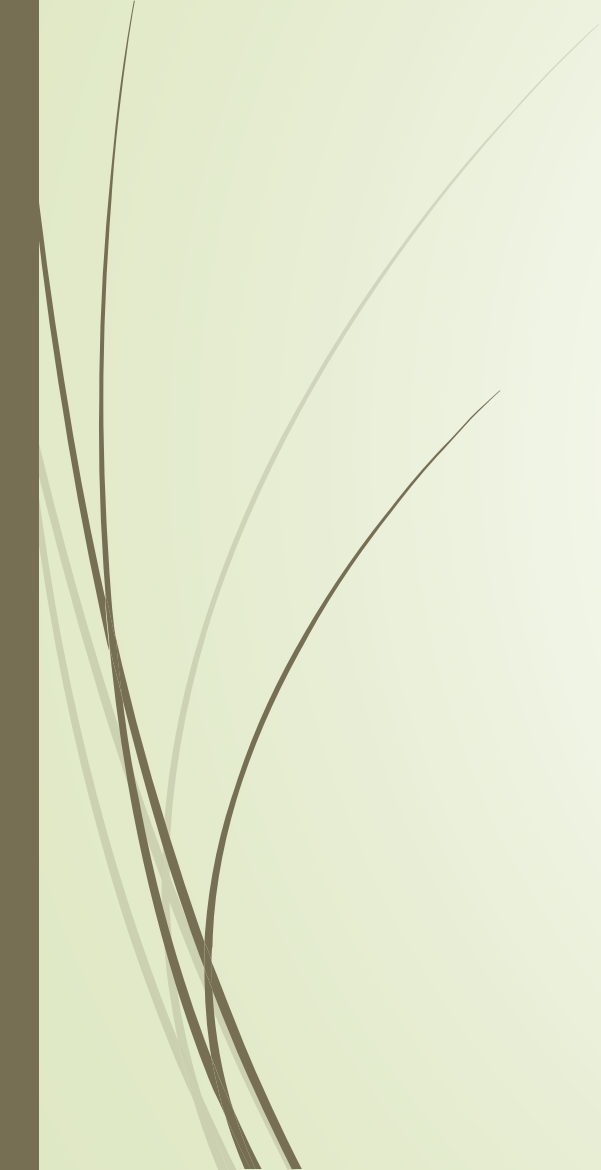
- DFG mesuré
 - Créatinine
 - Cystatine C
 - En l'occurrence ici transgenre = sujets prenant un traitement
- 



Voici un résumé de nos certitudes sur le sujet:



Il faut bien s'accrocher ...



Il faut bien s'accrocher ...





DFG “vrai”

- Une seule étude...

Unveiling mechanisms underlying kidney function changes during sex hormone therapy

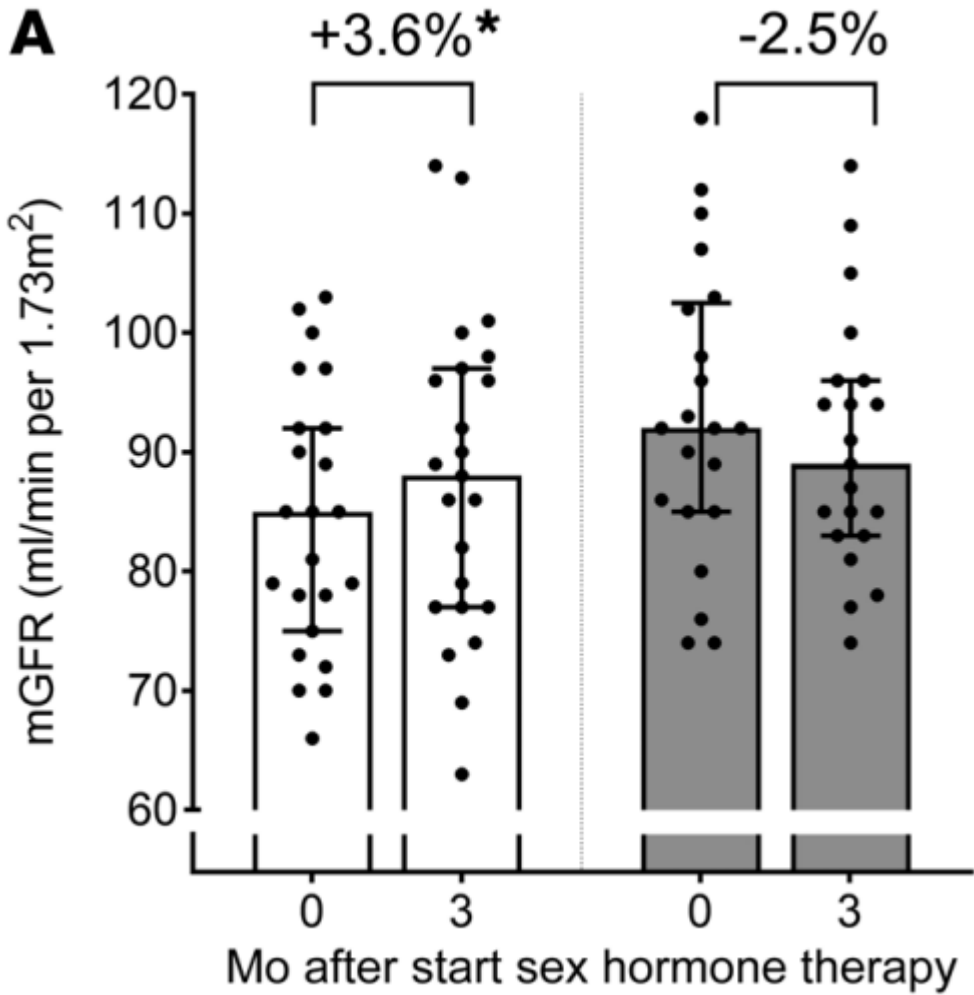
Sarah A. van Eeghen,^{1,2,3} Laura Pyle,^{4,5} Phoom Narongkiatikhun,^{4,6} Ye Ji Choi,^{4,5} Wassim Obeid,⁷ Chirag R. Parikh,⁷ Taryn G. Vosters,⁸ Irene G.M. van Valkengoed,⁸ Merle M. Krebber,⁹ Daan J. Touw,¹⁰ Martin den Heijer,^{1,2,3} Petter Bjornstad,⁴ Daniël H. van Raalte,^{3,11,12} and Natalie J. Nokoff⁵

J Clin Invest. 2025;135(9):e190850.

N=23 femmes transgenre

N= 21 hommes transgenre

Iohexol plasma clearance (infusion rate)



+3,6% = 85.0 à 87,9 mL/min/1.73m² p=0,041
-2,5% = 91,9 à 89,1 mL/min/1.73m² p=0,20


- During feminizing hormone therapy
- During masculinizing hormone therapy

- 
- Résultats à 3 mois
 - DFG mesuré indexé...
 - Statistiquement significative mais cliniquement???



Créatinine





Dynamic Impact of Hormone Therapy on Laboratory Values in Transgender Patients over Time

Amber N. Allen,^a Rhoda Jiao,^a Philip Day,^b Patti Pagels,^b Nora Gimpel,^b and Jeffrey A. SoRelle^{c,*}

JALM | 27-40 | 06:01 | January 2021

N=126 femmes transgenres
N= 91 hommes transgenres

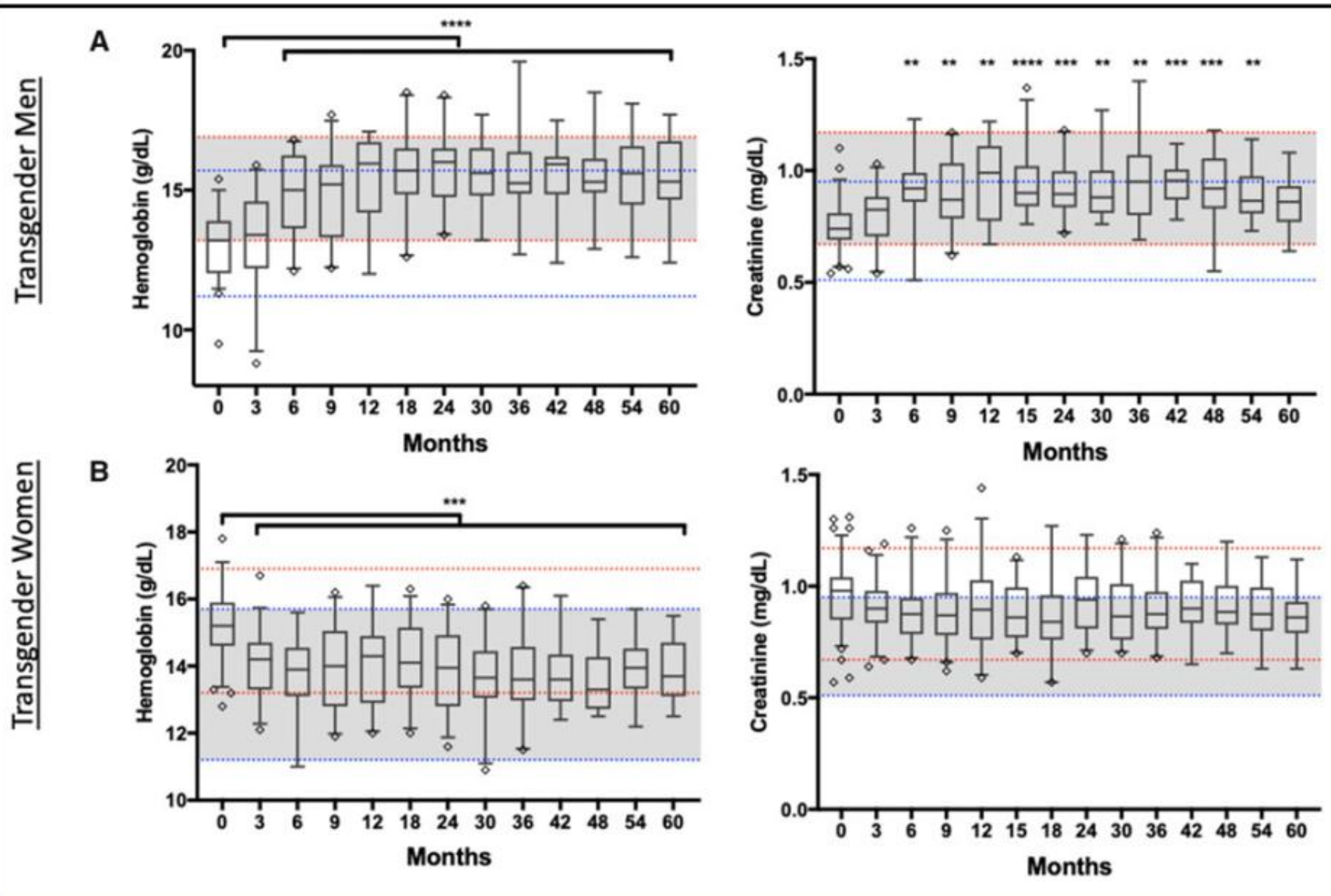


Fig. 1. Hemoglobin and creatinine analyte changes on HT. Absolute concentration of hemoglobin and creatinine. Reference intervals for cisgender women (blue) and cisgender men (red) are within the dotted lines. Box and whiskers indicate 50th and 95th percentiles, respectively; dots are outliers, and the central line is the median. Significance compared with baseline: * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, **** $P < 0.0001$.

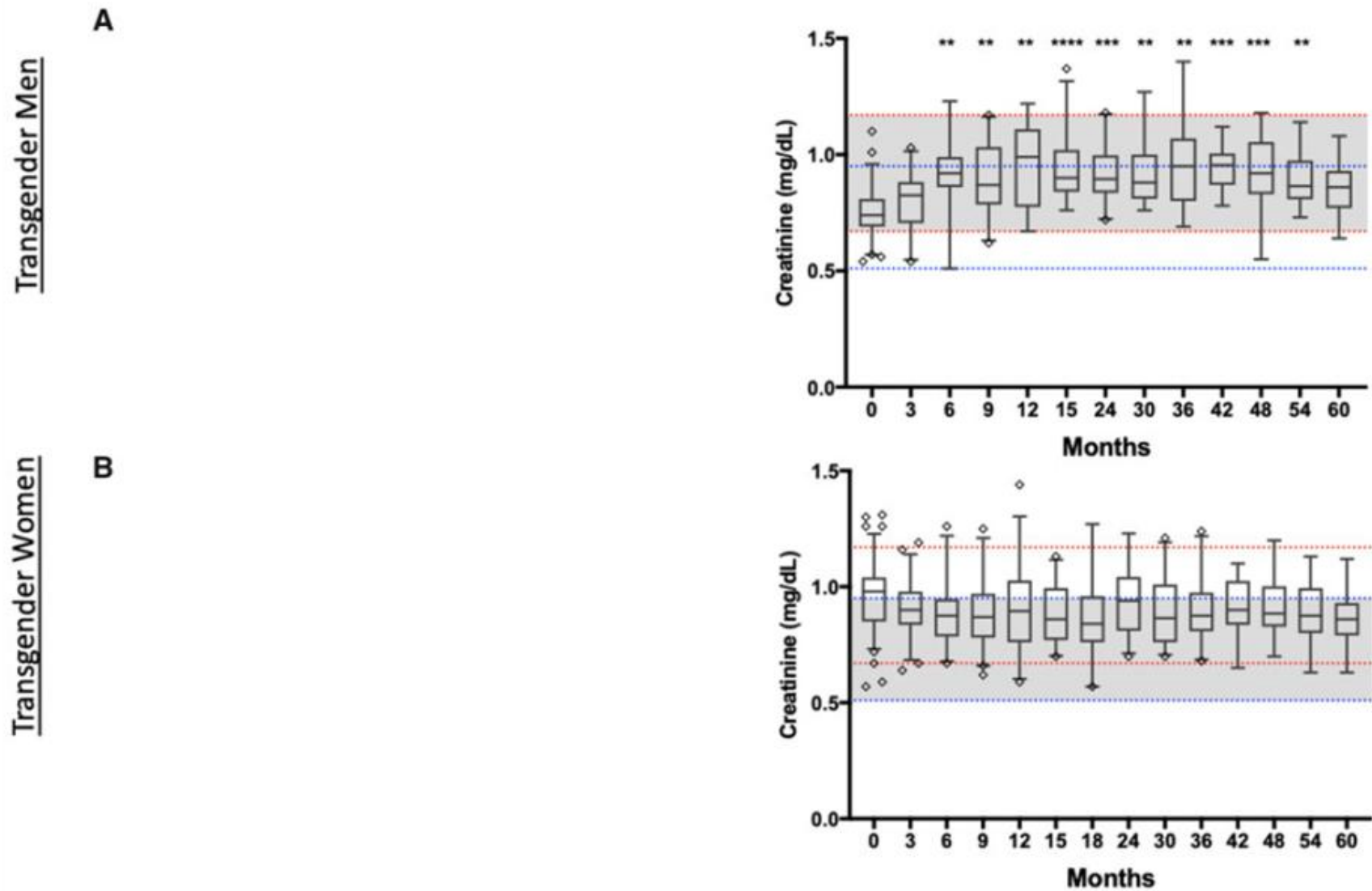


Fig. 1. Hemoglobin and creatinine analyte changes on HT. Absolute concentration of hemoglobin and creatinine. Reference intervals for cisgender women (blue) and cisgender men (red) are within the dotted lines. Box and whiskers indicate 50th and 95th percentiles, respectively; dots are outliers, and the central line is the median. Significance compared with baseline: * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, **** $P < 0.0001$.



Reference Intervals for Clinical Chemistry Analytes for Transgender Men and Women on Stable Hormone Therapy

Robert M. Humble,^a Dina N. Greene ,^b Robert L. Schmidt ,^c Gabrielle Winston McPherson,^b Jessica Rongitsch,^d Katherine L. Imborek,^e Nicole Nisly,^f Nancy J. Dole,^f Susan K. Dane,^a Janice Frerichs,^a and Matthew D. Krasowski ^{a,*}

N=93 femmes transgenre
N= 82 hommes transgenre

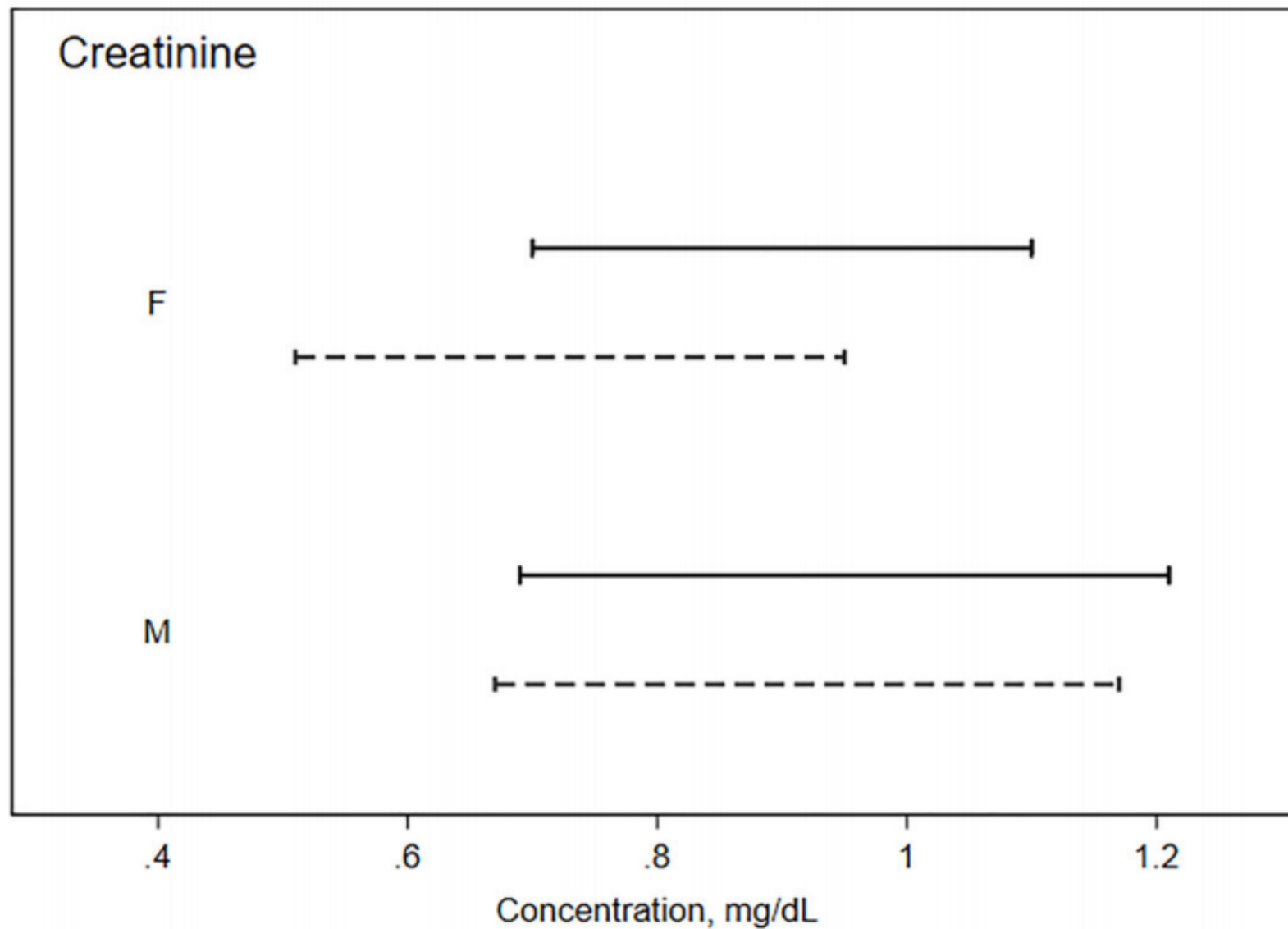







Fig. 3. Comparison of creatinine levels in cisgender and transgender people. F = cisgender female or transgender estradiol cohort, M = cisgender men or transgender testosterone cohort. Solid line = transgender references ranges from the current study, dashed line = cisgender reference ranges from University of Iowa. Data is for Roche cobas analyzers.

- 
- Transition femmes => homme: créatinines augmentent pour être comparable aux hommes cisgenres
 - Transition hommes => femmes: créatinines stables et restent supérieures aux valeurs des femmes cisgenres
 - Les modifications ont lieu les 3 à 6 premiers mois

The Effect of Gender-Affirming Hormone Therapy on Measures of Kidney Function

A Systematic Review and Meta-Analysis

Emily Krupka,¹ Sarah Curtis,¹ Thomas Ferguson,¹ Reid Whitlock ,¹ Nicole Askin,² Adam C. Millar,^{3,4} Marshall Dahl ,⁵ Raymond Fung,^{4,6} Sofia B. Ahmed,⁷ Navdeep Tangri,^{1,8} Michael Walsh ,^{9,10,11} and David Collister ^{1,8,11,12}

Clin J Am Soc Nephrol. 2022 Sep;17(9):1305-1315.

9 études
488 hommes transgenres
598 femmes transgenres

Table 2. The change in serum creatinine over time in transgender men treated with gender-affirming hormone therapy

Time, mo	Change in Serum Creatinine, mg/dl	SEM	<i>P</i> Value	95% Confidence Interval
3	0.14	0.11	0.19	−0.07 to 0.35
6	0.13	0.14	0.34	−0.14 to 0.41
12	0.15	0.07	0.05	0.00 to 0.29

Random effects using estimated within-study and between-study correlations using PROC MIXED with autoregressive within-study and between-study covariance matrices (14).

Table 3. The change in serum creatinine over time in transgender women treated with gender-affirming hormone therapy

Time, mo	Change in Serum Creatinine, mg/dl	SEM	<i>P</i> Value	95% Confidence Interval
3	0.00	0.06	0.94	−0.12 to 0.13
6	−0.05	0.10	0.57	−0.24 to 0.13
12	−0.05	0.05	0.29	−0.16 to 0.05

Random effects using estimated within-study and between-study correlations using PROC MIXED with autoregressive within-study and between-study covariance matrices (14).



Cystatine C



Cystatin C–based eGFR changes during gender-affirming hormone therapy in transgender individuals

Research Question

Are there changes in the filtration markers serum creatinine and cystatin C during 1 year of gender-affirming hormone therapy (GAHT)?

Methods

European Network for the Investigation of Gender Incongruence (ENIGI)



260 transgender women

GAHT with estradiol + cyproterone acetate



285 transgender men

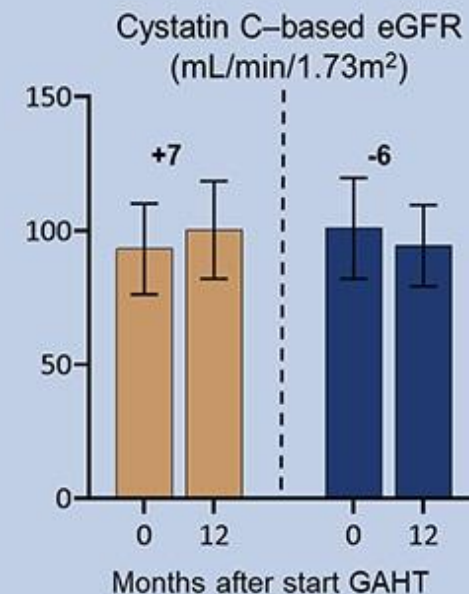
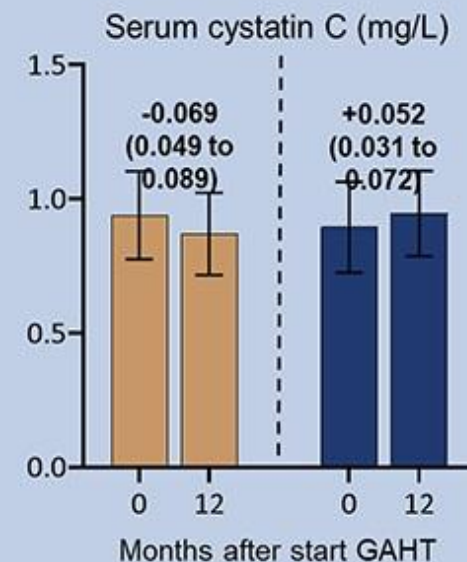
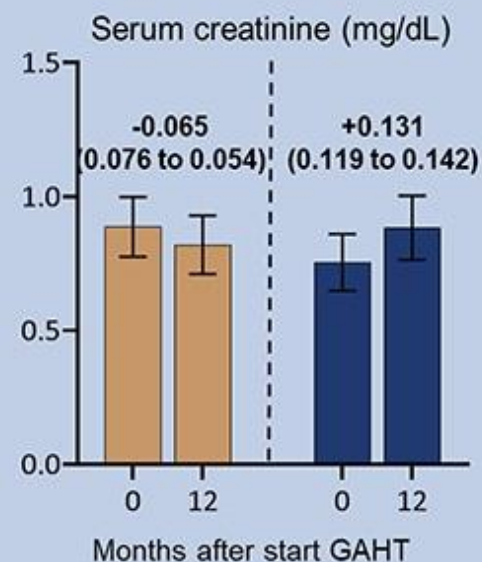
GAHT with testosterone



Serum creatinine and cystatin C were measured before and 1 year after initiating GAHT


Results

Serum creatinine, serum cystatin C, and, accordingly, cystatin C–based eGFR change significantly during 1 year of GAHT



Conclusions: In this cohort of transgender individuals, cystatin C–based eGFR increased with estradiol and anti-androgen therapy and decreased with testosterone therapy.

Sarah A. van Eeghen, Chantal M. Wiepjes, Guy T'Sjoen, et al. *Cystatin C–Based eGFR Changes during Gender-Affirming Hormone Therapy in Transgender Individuals*. CJASN doi: 10.2215/CJN.000000000000289. Visual Abstract by Nayan Arora, MD



Que peut on anticiper sur l'estimation du DFG (et donc l'association DFGm / biomarqueurs) ?

- ▶ mGFR ne bouge pas (ce qui n'est pas sûr)
- ▶ Créatinine augmente chez les sujets transgenres hommes (testostérone) jusqu'à une valeur similaire (ou un peu moindre) que les hommes cisgenres
- ▶ Utiliser les équations avec le « gender identity » devrait être correct alors que utiliser le « sex assigned at birth » va surestimer franchement

Glomerular filtration rate estimation in transgender and gender-diverse adults using gender-affirming hormone therapy: an exploratory cross-sectional study



OPEN

Keila Turino Miranda¹, Sandra M. Dumanski^{2,3,4}, Nathalie Saad^{2,3}, Lesley A. Inker⁵, Christine A. White⁶, Pierre Delanaye^{7,8}, David Collister⁹, Dina N. Greene¹⁰, Cameron T. Whitley¹¹, Tyrone G. Harrison^{2,3,4}, Chantal L. Rytz^{2,3}, Lindsay Peace¹², Darlene Y. Sola³ and Sofia B. Ahmed^{2,9,13}

Kidney International (2024) **106**, 753–756;


N=14 femmes transgenre

N=10 hommes transgenre

Clairance plasmatique iohexol (single!!!!)

Bias was calculated as the median of the difference between mGFR and eGFR


				Transgender Men		
				eGFR _{Cr}		
				Measured	CKD-EPI _{Cr}	EKFC _{Cr}
Female Sex Assigned at Birth						
Median GFR (Range)	91 (77-116)			89 (71 – 125)	81* (66 – 109)	
Bias (95% CI)	-			0.6† (-12, 10)	12† (2, 14)	
Precision (95% CI)	-			24 (9, 38)	12 (3, 30)	
Accuracy P ₃₀ % within (95% CI)	-			100 (100, 100)	100 (100, 100)	
	P ₁₅	-		70 (40, 100)	60 (30, 90)	
Masculine Gender Identity						
Median GFR (Range)	91 (77-116)			117* (95 – 133)	105* (88 – 118)	
Bias (95% CI)	-			-28 (-36, -16)	-13 (-16, -8)	
Precision (95% CI)	-			21 (8, 34)	8 (4, 23)	
Accuracy P ₃₀ % within (95% CI)	-			50 (20, 80)	90 (70, 100)	
	P ₁₅	-		10 (0, 30)	60 (30, 90)	



Que peut on anticiper sur l'estimation du DFG (et donc l'association DFGm / biomarqueurs) ?

- ▶ mGFR ne bouge pas (ce qui n'est pas sûr)
- ▶ Créatinine stable (ou diminue un peu) chez les sujets transgenres femmes
- ▶ Utiliser les équations avec le "sex assigned at birth" devrait être plus correcte alors que le "gender identity" devrait sous-estimer le DFG

			eGFR _{Cr}	
			Measured	CKD-EPI _{Cr}
Male Sex Assigned at Birth				
Median GFR (Range)	99 (76-128)	118** (97 – 142)	110* (86 – 126)	
Bias (95% CI)	-	-23‡ (-27, -15)	-12‡ (-17, -4)	
Precision (95% CI)	-	15 (7, 28)	16 (7, 34)	
Accuracy P ₃₀ % within (95% CI)	-	71 (43, 93)	86 (64, 100)	
P ₁₅	-	29 (7, 57)	64 (36, 86)	
Feminine Gender Identity				
Median GFR (Range)	99 (76-128)	95 (79 – 132)	87* (69 – 116)	
Bias (95% CI)	-	-2 (-6, 2)	8 (2, 14)	
Precision (95% CI)	-	10 (5, 29)	13 (7, 30)	
Accuracy P ₃₀ % within (95% CI)	-	93 (79, 100)	100 (100, 100)	
P ₁₅	-	79 (57, 100)	79 (57, 100)	



Que peut on anticiper sur l'estimation du DFG (et donc l'association DFGm / biomarqueurs) ?

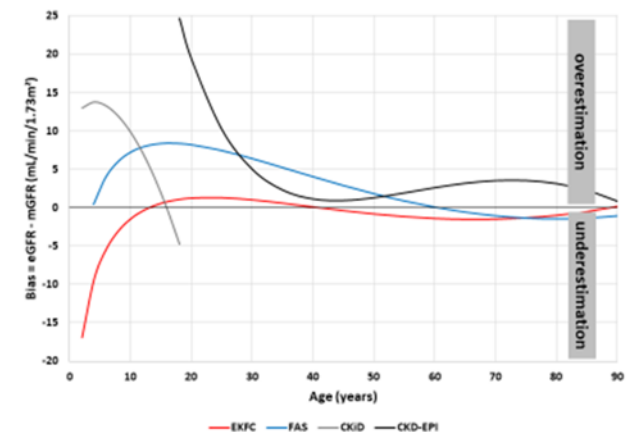
- ▶ mGFR ne bouge pas (ce qui n'est pas sûr)
- ▶ Cystatine bouge moins
- ▶ Il devrait y avoir moins de différence (et pas du tout pour EKFC)

Bias was calculated as the median of the difference between mGFR and eGFR

			Transgender Men						
			eGFR _{Cr}		eGFR _{Cys}			eGFR _{Cr-Cys}	
Measured			CKD-EPI _{Cr}	EKFC _{Cr}	2021 CKD-EPI _{Cys}	EKFC _{Cys} ^a	2023 CKD-EPI _{Cys} ^a	CKD-EPI _{Cr-Cys}	EKFC _{Cr-Cys}
Female Sex Assigned at Birth									
Median GFR (Range)	91 (77-116)		89 (71 – 125)	81* (66 – 109)	97 (77 – 113)	97 (80 – 109)	102* (81 – 118)	95 (79 – 112)	90 (75-105)
Bias (95% CI)	-		0.6† (-12, 10)	12† (2, 14)	-5† (-11, 4)	-6 (-14, 1)	-9 (-16, 0)	-2† (-15, 4)	2† (-5, 6)
Precision (95% CI)	-		24 (9, 38)	12 (3, 30)	16 (6, 27)	17 (7, 22)	17 (6, 28)	19 (6, 27)	12 (4, 22)
Accuracy % within (95% CI)	P ₃₀	-	100 (100, 100)	100 (100, 100)	100 (100, 100)	100 (100, 100)	90 (70, 100)	100 (100, 100)	100 (100, 100)
	P ₁₅	-	70 (40, 100)	60 (30, 90)	80 (50, 100)	70 (40, 100)	70 (40, 90)	70 (40, 100)	90 (70, 100)
Masculine Gender Identity									
Median GFR (Range)	91 (77-116)		117* (95 – 133)	105* (88 – 118)	104 (83 – 121)	97 (80 – 109)	102 (81 – 118)	113* (94 – 124)	101* (84-110)
Bias (95% CI)	-		-28 (-36, -16)	-13 (-16, -8)	-11 (-18, -2)	-6 (-14, 1)	-9 (-16, 0)	-20 (-27, -10)	-9 (-15, -4)
Precision (95% CI)	-		21 (8, 34)	8 (4, 23)	17 (5, 29)	17 (7, 22)	17 (6, 28)	14 (5, 28)	11 (5, 21)
Accuracy % within (95% CI)	P ₃₀	-	50 (20, 80)	90 (70, 100)	90 (70, 100)	100 (100, 100)	90 (70, 100)	80 (50, 100)	100 (100, 100)
	P ₁₅	-	10 (0, 30)	60 (30, 90)	60 (30, 90)	70 (40, 100)	70 (40, 90)	20 (0, 50)	60 (30, 90)

			Transgender Women						
			eGFR _{Cr}		eGFR _{Cys}		eGFR _{Cr-Cys}		
Measured			CKD-EPI _{Cr}	EKFC _{Cr}	2021 CKD-EPI _{Cys}	EKFC _{Cys} ^a	2023 CKD-EPI _{Cys} ^a	CKD-EPI _{Cr-Cys}	EKFC _{Cr-Cys}
Male Sex Assigned at Birth									
Median GFR (Range)	99 (76-128)		118** (97 – 142)	110* (86 – 126)	117** (90 – 144)	108* (86 – 123)	114** (88 – 137)	121** (103 – 147)	108* (86-124)
Bias (95% CI)	-		-23‡ (-27, -15)	-12‡ (-17, -4)	-16‡ (-22, -11)	-7 (-14, -3)	-13 (-18, -7)	-23‡ (-25, -20)	-10‡ (-16, -2)
Precision (95% CI)	-		15 (7, 28)	16 (7, 34)	13 (7, 23)	12 (5, 27)	14 (6, 23)	7 (6, 27)	15 (6, 28)
Accuracy % within (95% CI)	P ₃₀	-	71 (43, 93)	86 (64, 100)	93 (79, 100)	93 (79, 100)	93 (79, 100)	77 (54, 100)	93 (79, 100)
	P ₁₅	-	29 (7, 57)	64 (36, 86)	43 (21, 71)	79 (57, 100)	57 (29, 79)	15 (0, 39)	64 (36, 86)
Feminine Gender Identity									
Median GFR (Range)	99 (76-128)		95 (79 – 132)	87* (69 – 116)	109 (84 – 134)	108 (86 – 123)	114 (88 – 137)	104* (87 – 139)	97 (78-120)
Bias (95% CI)	-		-2 (-6, 2)	8 (2, 14)	-9 (-14, -2)	-7 (-14, -3)	-13 (-18, -7)	-8 (-11, -5)	-1 (-5, 3)
Precision (95% CI)	-		10 (5, 29)	13 (7, 30)	13 (6, 23)	12 (5, 27)	14 (6, 23)	7 (3, 20)	10 (5, 24)
Accuracy % within (95% CI)	P ₃₀	-	93 (79, 100)	100 (100, 100)	93 (79, 100)	93 (79, 100)	93 (79, 100)	92 (77, 100)	93 (79, 100)
	P ₁₅	-	79 (57, 100)	79 (57, 100)	71 (50, 93)	79 (57, 100)	57 (29, 79)	92 (77, 100)	86 (64, 100)

- Echantillons minuscules
- mGFR single donc avec le sexe...
- CKD-EPI créatinine surestime chez le jeune (et moyenne d'âge est **23 ans** chez hommes transgenres et **29 ans** chez femmes transgenres)



Conclusions et perspectives

CREATININE

- Je ne sais pas...
- Mais utiliser le « sex assigned at birth » n'est pas évident...
- Q spécifique pour les transgenres?

CYSTATINE C

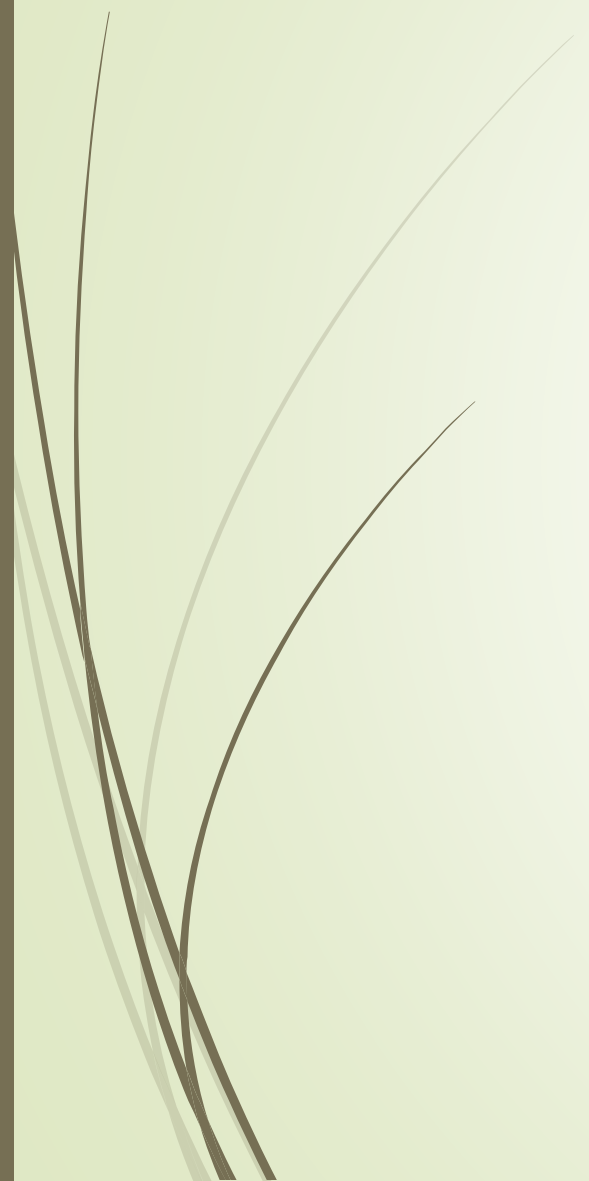
- Semble moins influencée que la créatinine (et le genre n'est pas dans l'équation!)

mGFR

- Tout cela sous réserve que le DFG mesuré n'est pas influencé par les traitements
- Le mesurer si décision thérapeutique importante en dépend



**Y'A ENCORE
DU BOULOT!**



Merci de votre attention