Prise en charge du diabète de type 2, le sport c'est bien. Et pour le rein ?

Samy HADJADJ

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Nantes, France

Association des enseignants en biochimie et biologie moléculaire des facultés de pharmacie - Le Touquet , 1°-3 Octobre 2025

Déclaration d'intérêt : 2022-2025

	Speeking fees	Honorarium	Investigator fees	Invitations to congress	Other research supports
AstraZeneca	x	x	x	x	
Abbott		x			x
Boehringer Ingelheim	x	x	x		
Bayer	x	x	x	x	x
Eli-Lilly		x	x		
Novartis	x				
Novo Nordisk	x	x	x		
Sanofi	x	x	x	x	
Servier	x	x			
Asten					x
Homeperf					x
Vitalaire					x
LVL					x
NHC		x			x
Valbiotis		x		x	x

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SYNDROME CARDIORÉNOMÉTABOLIQUE

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Syndrome cardiorénométabolique

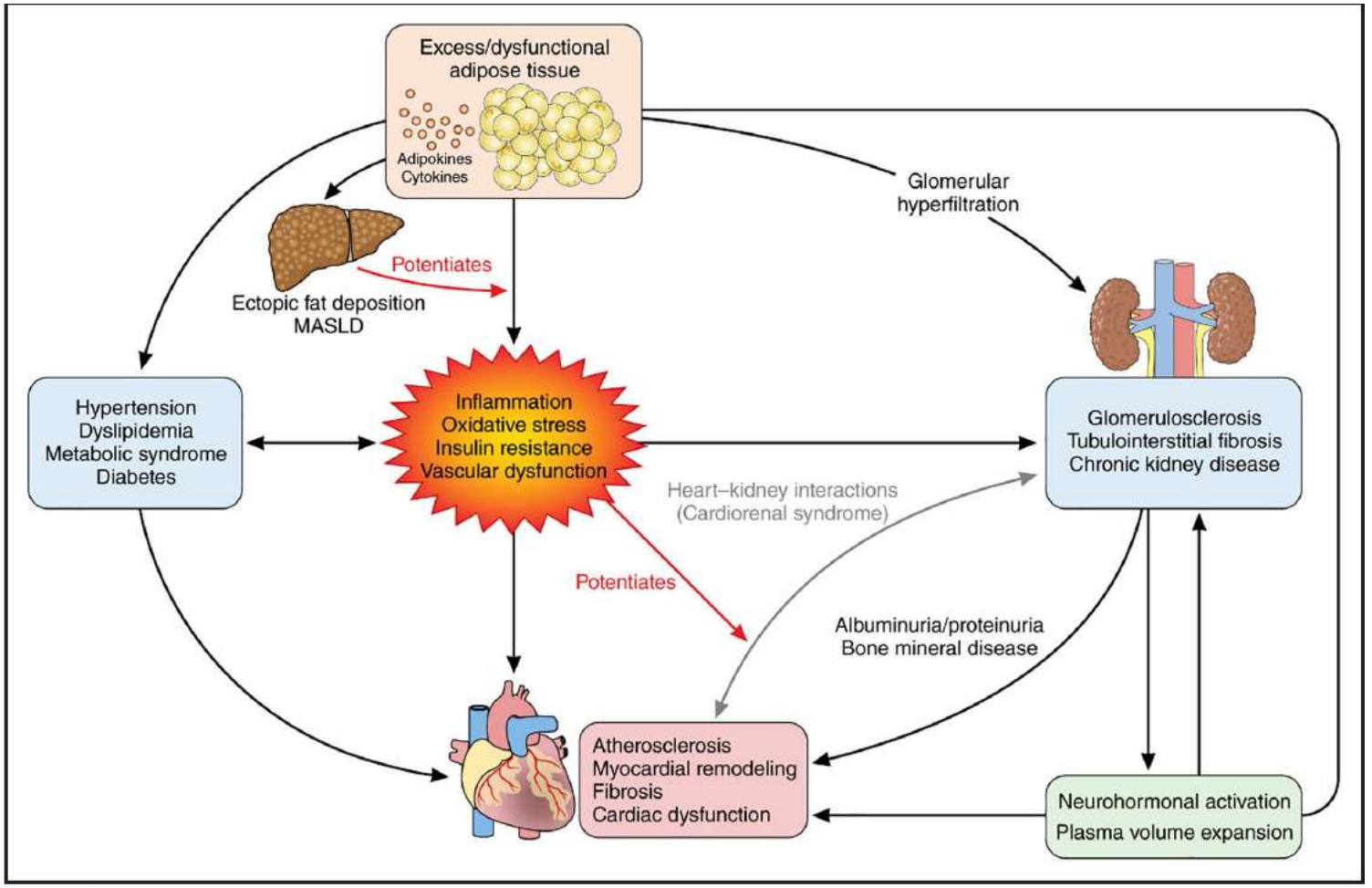

Figure 1. Conceptual diagram for CKM syndrome.

AHA SCIENTIFIC STATEMENT

Circulation. 2023;148:1636–1664.

A Synopsis of the Evidence for the Science and Clinical Management of Cardiovascular-Kidney-Metabolic (CKM) Syndrome: A Scientific Statement From the American Heart Association

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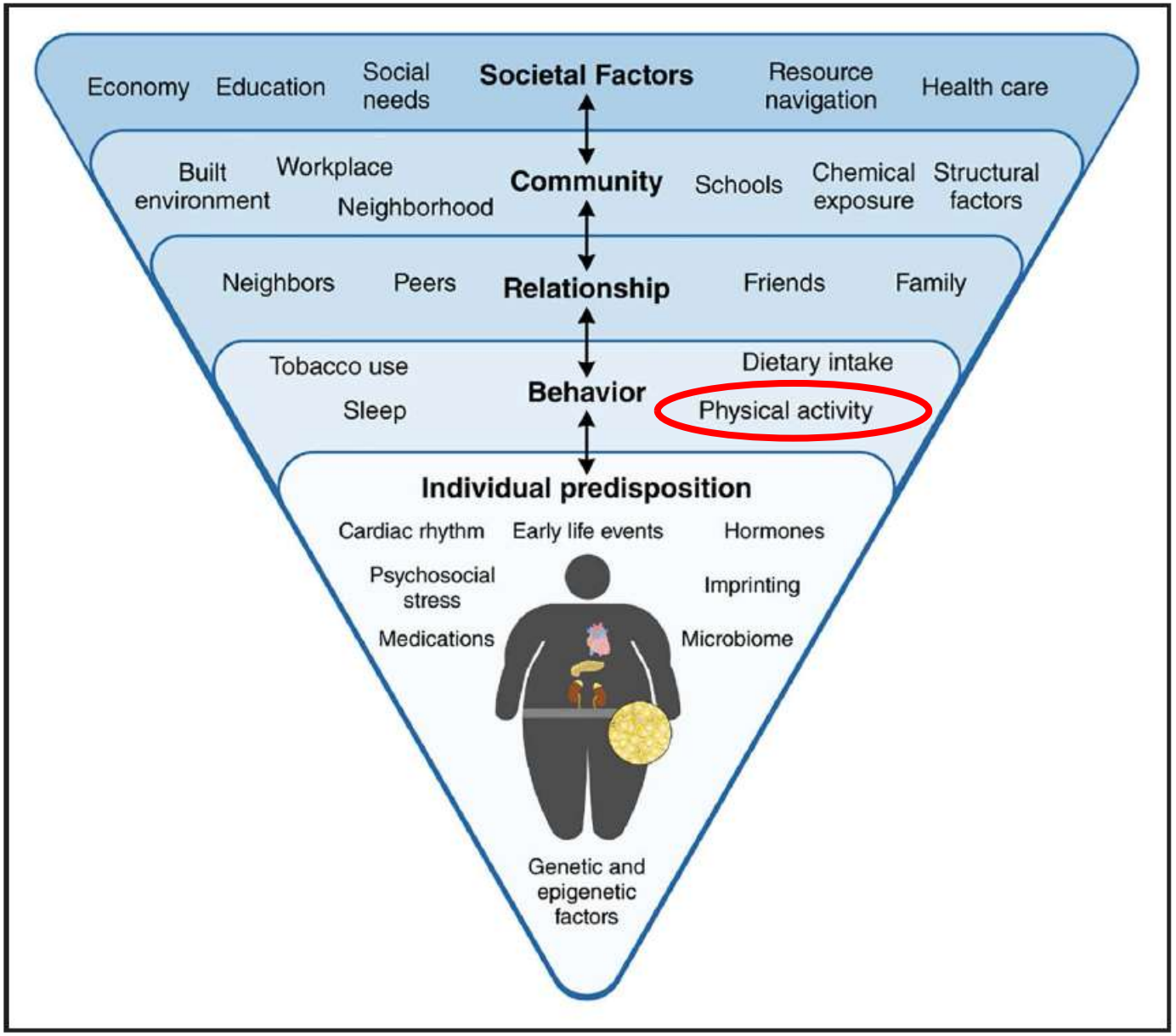

Figure 2. Socioecological framework for CKM syndrome.

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Circulation. 2023;148:1636–1664.

ACTIVITÉ PHYSIQUE ET SÉDENTARITÉ
2 NOTIONS DIFFÉRENTES ET COMPLÉMENTAIRES

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SÉDENTARITÉ -

JAMA | Original Investigation

Trends in Sedentary Behavior Among the US Population, 2001-2016

Lin Yang, PhD; Chao Cao, MPH; Elizabeth D. Kantor, MPH, PhD; Long H. Nguyen, MD, MS; Xiaobin Zheng, MD; Yikyung Park, ScD; Edward L. Giovannucci, MD, ScD; Charles E. Matthews, PhD; Graham A. Colditz, MD, DrPH; Yin Cao, MPH, ScD

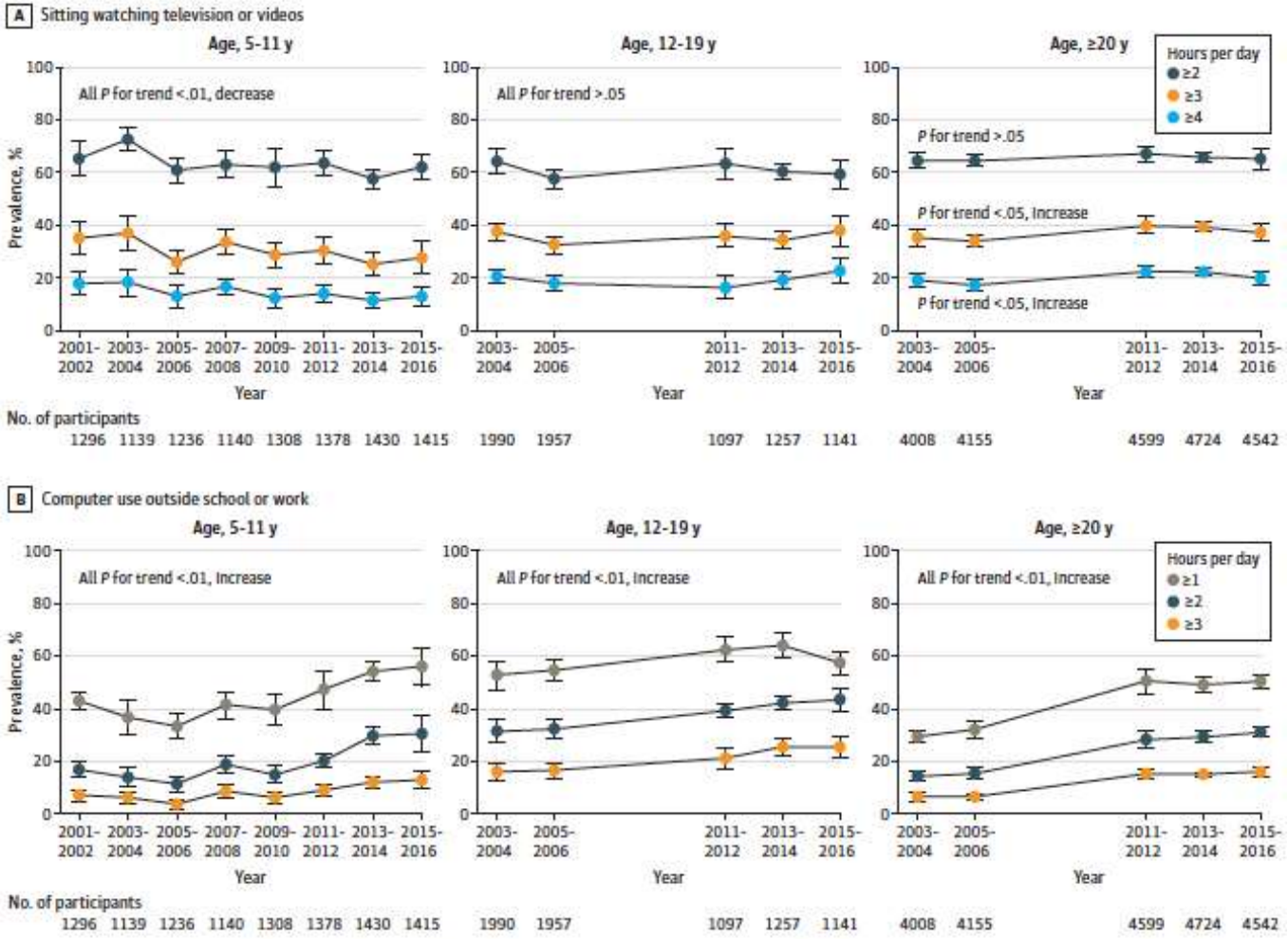
Table 2. Crude Weighted Trends in Sedentary Behaviors Among the US Population, NHANES 2001-2016[a,b]

Age, y	Trends in Sedentary Behaviors NHANES Cycle Years								β (95% CI)[c]	P for Trend[c]	2015-2016 vs First Cycle, Difference (95% CI)[d]
	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2011-2012	2013-2014	2015-2016			
Total Sitting Time (h/d), Weighted Mean (95% CI)											
12-19				7.0 (6.7 to 7.4)	7.2 (6.7 to 7.6)	7.9 (7.5 to 8.4)	8.4 (8.0 to 8.7)	8.2 (7.9 to 8.4)	0.3 (0.3 to 0.4)	<.001	1.1 (0.7 to 1.5)
≥20				5.5 (5.2 to 5.7)	5.6 (5.5 to 5.7)	6.2 (6.0 to 6.5)	7.0 (6.7 to 7.2)	6.4 (6.2 to 6.6)	0.3 (0.3 to 0.4)	<.001	1.0 (0.7 to 1.3)
20-64				5.5 (5.2 to 5.7)	5.7 (5.5 to 5.8)	6.3 (6.0 to 6.5)	7.0 (6.8 to 7.2)	6.5 (6.2 to 6.7)	0.3 (0.3 to 0.4)	<.001	1.0 (0.6 to 1.3)
≥65				5.3 (4.9 to 5.6)	5.3 (5.0 to 5.7)	6.0 (5.7 to 6.4)	6.8 (6.4 to 7.1)	6.1 (5.8 to 6.4)	0.3 (0.2 to 0.4)	<.001	0.9 (0.4 to 1.3)

JAMA. 2019;321(16):1587-1597.

SÉDENTARITÉ -

Figure 1. Crude Weighted Trends in Screen-Based Sedentary Behaviors Among the US Population, NHANES 2001-2016



Data were weighted to be nationally representative. Error bars indicate 95% CIs; NHANES, National Health and Nutrition Examination Survey.

JAMA. 2019;321(16):1587-1597.

ACTIVITÉ PHYSIQUE

www.thelancet.com **Published online September 21, 2017**

The effect of physical activity on mortality and cardiovascular disease in 130 000 people from 17 high-income, middle-income, and low-income countries: the PURE study

Scott A Lear, Weihong Hu, Sumathy Rangarajan, Danijela Gasevic, Darryl Leong, Romaina Iqbal, Amparo Casanova, Sumathi Swaminathan, R M Anjana, Rajesh Kumar, Annika Rosengren, Li Wei, Wang Yang, Wang Chuangshi, Liu Huaxing, Sanjeev Nair, Rafael Diaz, Hany Swidon, Rajeev Gupta, Noushin Mohammadifard, Patricio Lopez-Jaramillo, Aytekin Oguz, Katarzyna Zatonska, Pamela Seron, Alvaro Avezum, Paul Poirier, Koon Teo, Salim Yusuf

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	Overall (n=130 843)	Low physical activity* (n=23 631)	Moderate physical activity† (n=49 348)	High physical activity‡ (n=57 864)
Age (years)	50·2 (9·7)	51·0 (10·1)	50·5 (9·7)	49·7 (9·5)
Male	54 621 (41·7%)	11 080 (46·9%)	18 224 (36·9%)	25 317 (43·8%)
Urban resident	69 993 (53·5%)	12 983 (54·9%)	28 525 (57·8%)	28 485 (49·2%)
Country income level				
High	13 546 (10·4%)	1435 (6·1%)	4991 (10·1%)	7120 (12·3%)
Upper middle	34 625 (26·5%)	7479 (31·6%)	11 922 (24·2%)	15 224 (26·3%)
Lower middle	53 841 (41·1%)	8620 (36·5%)	22 648 (45·9%)	22 573 (39·0%)
Low	28 831 (22·0%)	6097 (25·8%)	9787 (19·8%)	12 898 (22·4%)
Education				
None, primary, or unknown	54 635 (41·9%)	10 642 (45·2%)	19 085 (38·8%)	24 908 (43·1%)
Secondary	50 500 (38·7%)	9035 (38·3%)	19 746 (40·1%)	21 719 (37·6%)
Trade, college, or university	25 396 (19·5%)	3885 (16·5%)	10 412 (21·1%)	11 099 (19·2%)
Family history of heart disease or stroke	36 812 (31·3%)	4911 (23·5%)	13 605 (30·5%)	18 296 (35·0%)
Hypertension	47 752 (39·0%)	9053 (42·6%)	18 364 (39·7%)	20 335 (36·9%)
Diabetes	12 740 (9·7%)	2898 (12·3%)	5102 (10·3%)	4740 (8·2%)
Smoker (current and former)	40 955 (31·5%)	7093 (30·3%)	13 695 (28·0%)	20 167 (35·0%)
Alternate Healthy Eating Index score	35·1 (8·0)	34·9 (7·6)	35·5 (7·9)	34·8 (8·3)
Body-mass index (kg/m^2)	25·7 (5·1)	25·9 (5·4)	25·9 (5·0)	25·4 (5·1)

Data are mean (SD) or n (%). MET=metabolic equivalents. *Low physical activity=<600 MET x min per week and <150 min per week of moderate intensity physical activity. †Moderate physical activity=600–3000 MET x min per week and 150–750 min per week of moderate intensity physical activity. ‡High physical activity=>3000 MET x min per week and >750 min per week of moderate intensity physical activity.

***Table 1*: Participant characteristics stratified by total physical activity**

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ACTIVITÉ PHYSIQUE

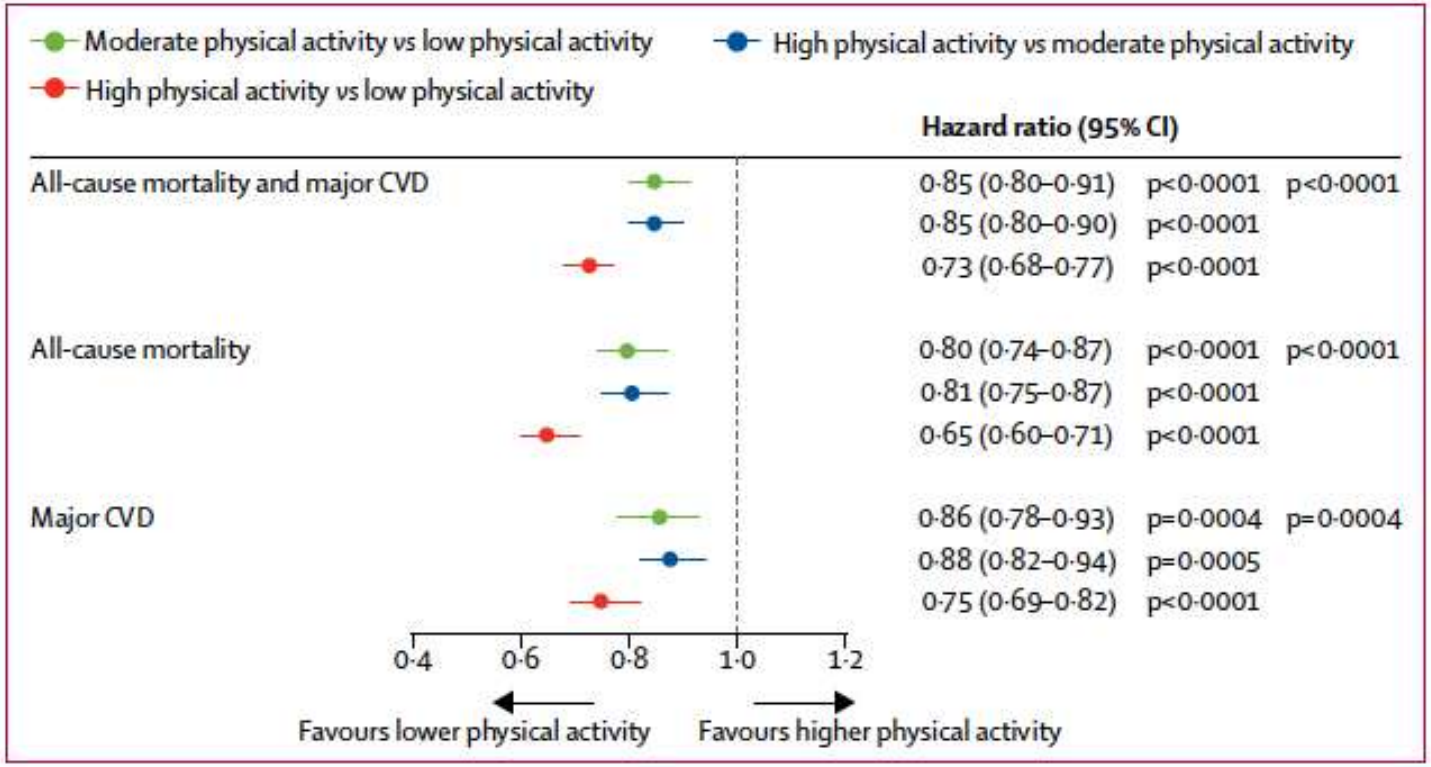

***Figure 1*: Hazard ratios and 95% CI for all-cause mortality and major CVD, all-cause mortality, or major CVD by level of physical activity**

Data adjusted for age, sex, education, country income level, urban or rural residency, family history of CVD, and smoking status; taking into account household, community, and country clustering. There were 3155 events for all-cause mortality and major CVD, 2041 events for all-cause mortality, and 1723 events for major CVD. The p values of the first column show the significance of each comparison. p values of the second column show the significance of the overall effect of physical activity. Low physical activity=<600 MET × min per week. Moderate physical activity=600–3000 MET × min per week. High physical activity=>3000 MET × min per week. CVD=cardiovascular disease. Major CVD=CVD mortality plus incident myocardial infarction, stroke, or heart failure. MET=metabolic equivalents.

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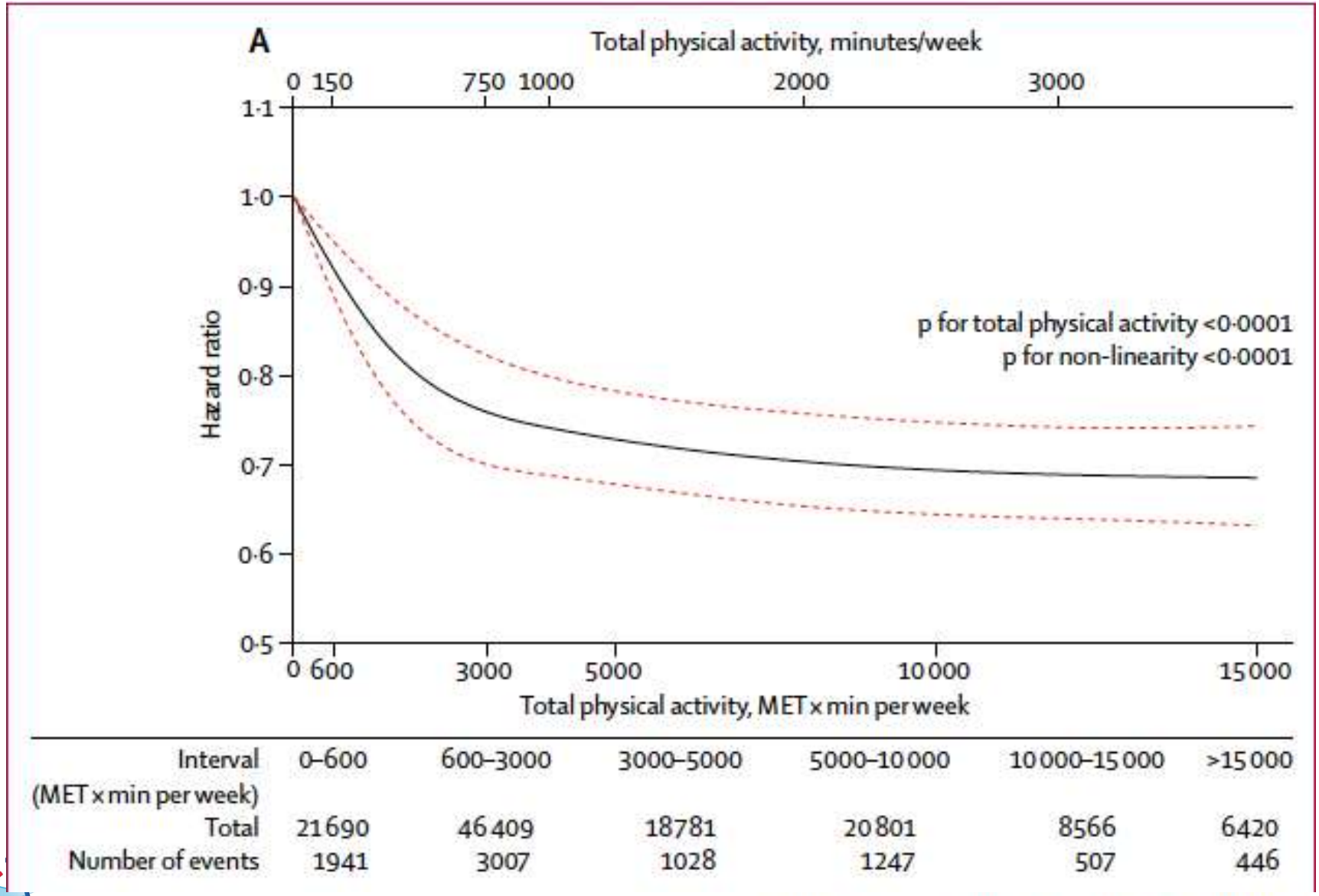
ACTIVITÉ PHYSIQUE



Interval (MET x min per week)	0–600	600–3000	3000–5000	5000–10 000	10 000–15 000	>15 000
Total	21 690	46 409	18 781	20 801	8566	6420
Number of events	1941	3007	1028	1247	507	446

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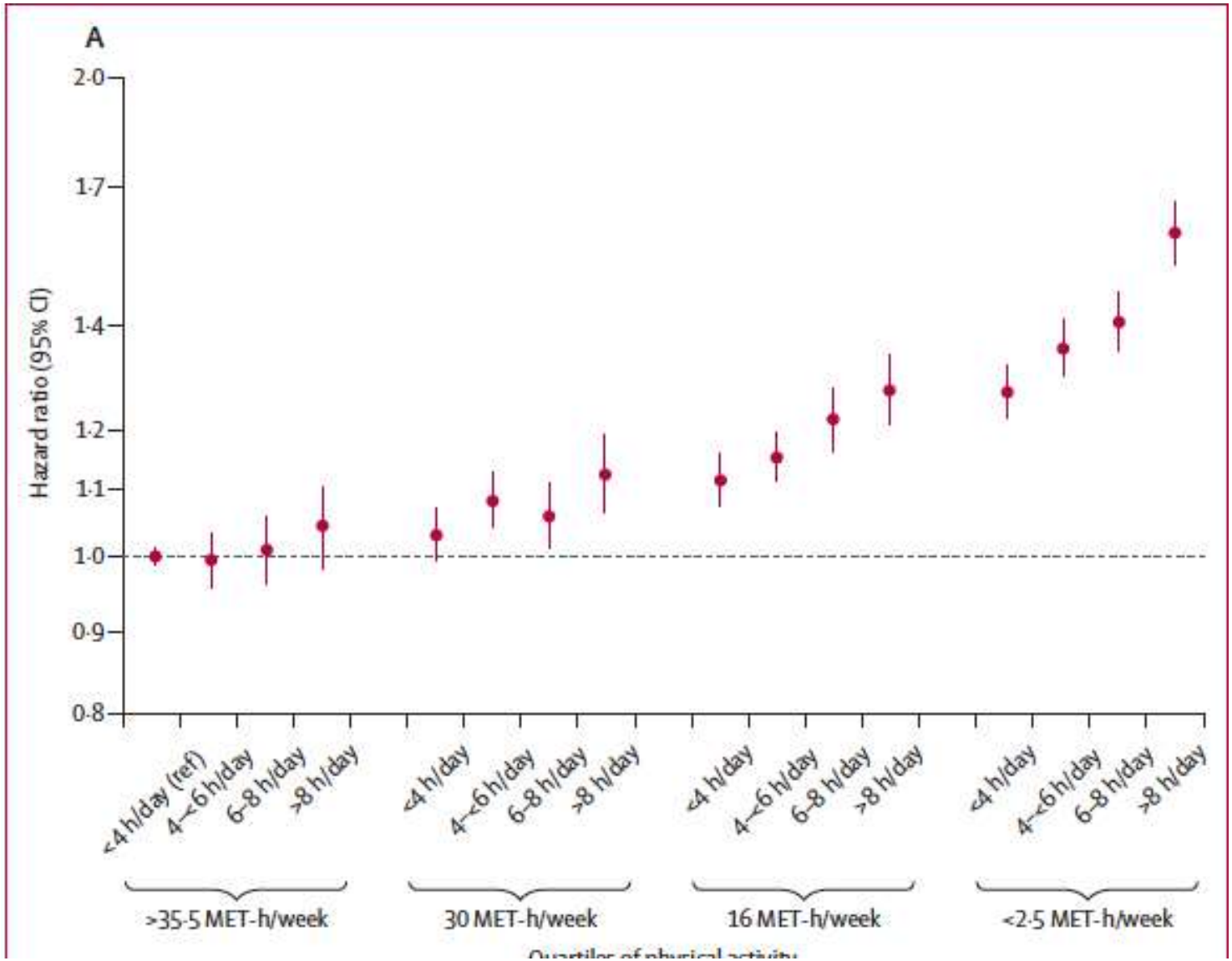
ACTIVITÉ PHYSIQUE ET SÉDENTARITÉ

Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality? A harmonised meta-analysis of data from more than 1 million men and women

Ulf Ekelund, Jostein Steene-Johannessen, Wendy J Brown, Morten Wang Fagerland, Neville Owen, Kenneth E Powell, Adrian Bauman, I-Min Lee, for the Lancet Physical Activity Series 2 Executive Committe and the Lancet Sedentary Behaviour Working Group**

Lancet 2016; 388: 1302–10

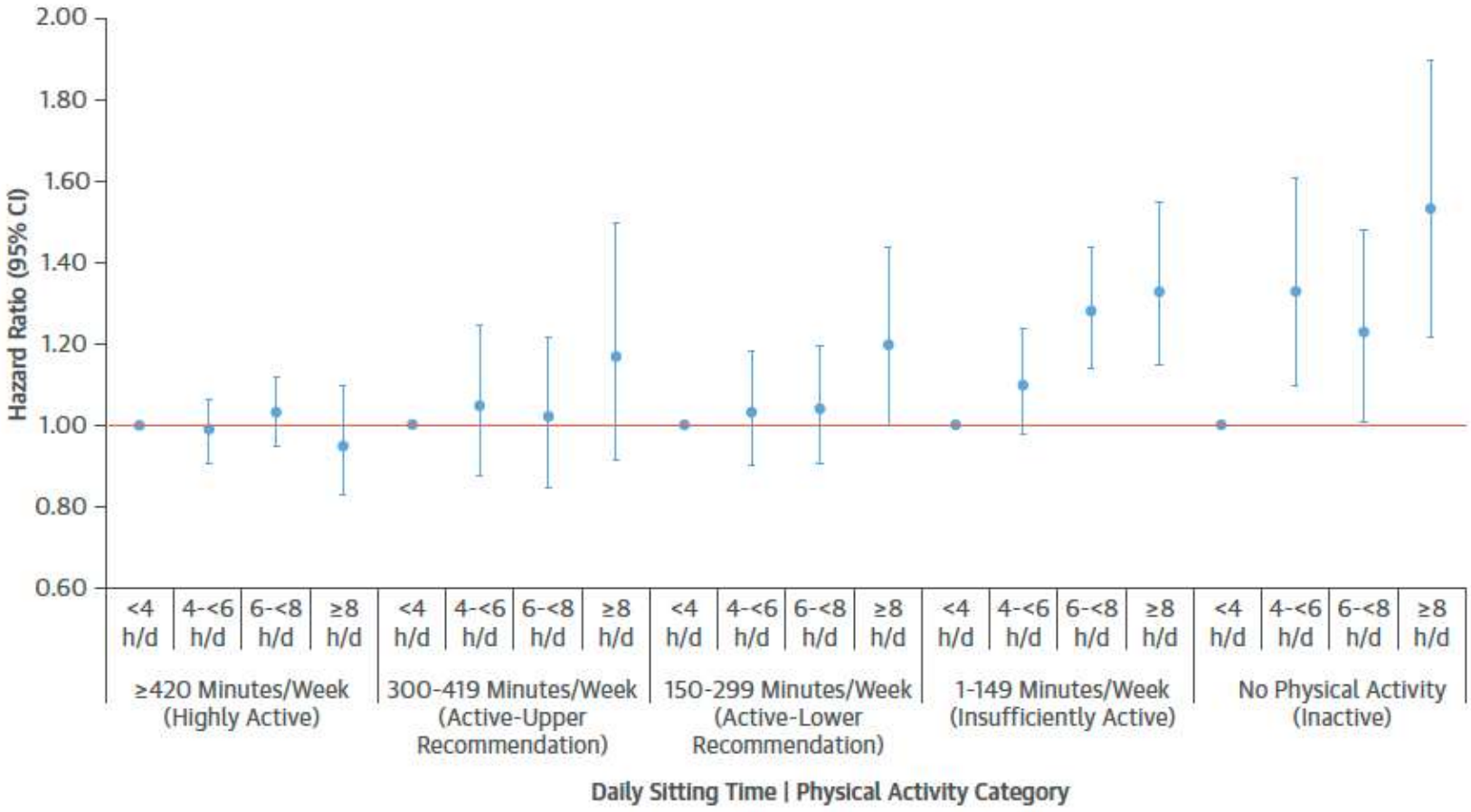
sitting time and physical activity with all-cause mortality



Lancet 2016; 388: 1302–10

JACC VOL. 73, NO. 16, 2019
APRIL 30, 2019:2062-72

FIGURE 3 The Stratified Associations of Sitting and All-Cause Mortality Events Within Each Physical Activity Category



ACTIVITÉ PHYSIQUE ET DIABÈTE
PIERRE ANGULAIRE DE LA PRISE EN CHARGE

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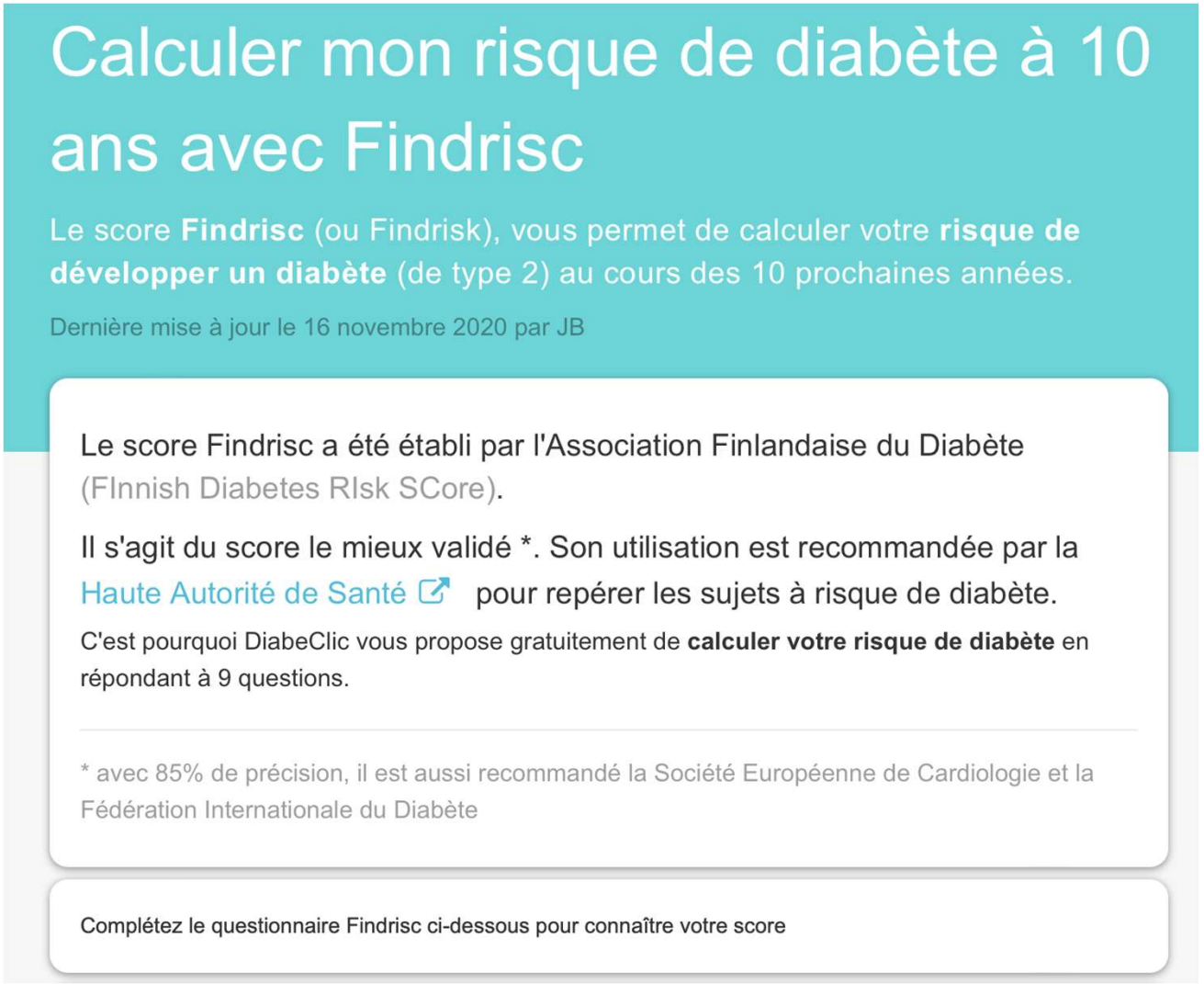
AU STADE DE DÉPISTAGE DU DIABÈTE DE TYPE 2



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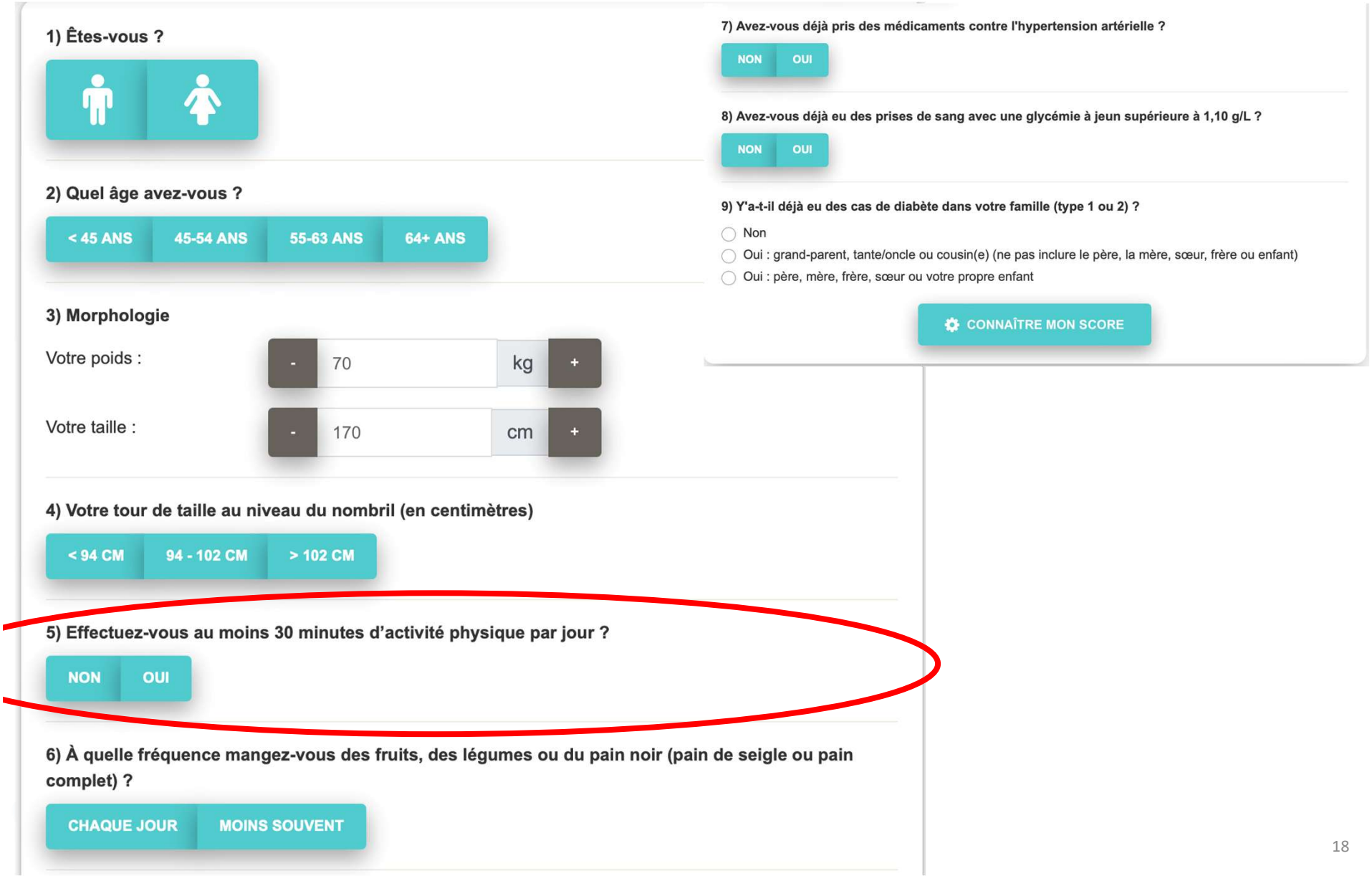
AU STADE DE DÉPISTAGE DU DIABÈTE DE TYPE 2



1) Êtes-vous ?

2) Quel âge avez-vous ?

< 45 ANS | 45-54 ANS | 55-63 ANS | 64+ ANS

3) Morphologie

Votre poids : - 70 kg +

Votre taille : - 170 cm +

4) Votre tour de taille au niveau du nombril (en centimètres)

< 94 CM | 94 - 102 CM | > 102 CM

5) Effectuez-vous au moins 30 minutes d'activité physique par jour ?

NON | OUI

6) À quelle fréquence mangez-vous des fruits, des légumes ou du pain noir (pain de seigle ou pain complet) ?

CHAQUE JOUR | MOINS SOUVENT

7) Avez-vous déjà pris des médicaments contre l'hypertension artérielle ?

NON | OUI

8) Avez-vous déjà eu des prises de sang avec une glycémie à jeun supérieure à 1,10 g/L ?

NON | OUI

9) Y'a-t-il déjà eu des cas de diabète dans votre famille (type 1 ou 2) ?

- Non
- Oui : grand-parent, tante/oncle ou cousin(e) (ne pas inclure le père, la mère, sœur, frère ou enfant)
- Oui : père, mère, frère, sœur ou votre propre enfant

CONNAÎTRE MON SCORE

LORS DU BILAN INITIAL DU DIABÈTE DE TYPE 2

HAS HAUTE AUTORITÉ DE SANTÉ — L'Assurance Maladie — RECOMMANDER LES BONNES PRATIQUES

SYNTHESE

Parcours de soins du patient adulte vivant avec un diabète de type 2 : les points critiques du parcours

Validée par le Collège le 26 juin 2025

Check-list synthétique du bilan initial

Le bilan initial peut être réalisé en plusieurs consultations. Il ne doit pas retarder la mise en œuvre du traitement.

	Médecin généraliste ou IDE en collaboration avec MG (IDE, IDE sous protocole de coopération dont ASALÉE, IPA, selon les cas)	Recours complémentaire en fonction du profil du patient : avis spécialisé
Facteurs de risque		
Âge	X	
ATCD familiaux CV	X	
Tabagisme	X	Structures d'aide au sevrage tabagique
Consommation alcool	X	Addictologue en cas de dépendance si échec des interventions de 1re intention
Sédentarité, activité physique	Appréciation du niveau de sédentarité et du niveau d'activité physique	Professionnels de l'APA, médecin MPR pour les cas complexes
Alimentation	Habitudes alimentaires	Diététicien : bilan diététique
Mesures anthropométriques, statut nutritionnel	Poids, taille, calcul de l'IMC et historique des variations pondérales volontaires ou non, périmètre abdominal[2]	
Pression artérielle	Mesure de la PA : au cabinet et automesure à domicile en respectant le protocole 3 jours de la SFHTA ou MAPA le cas échéant	
Évaluation du risque cardiovasculaire global	Score de risque, tel que SCORE2-*Diabetes*	

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DT2 ET PERFORMANCE A L'EFFORT

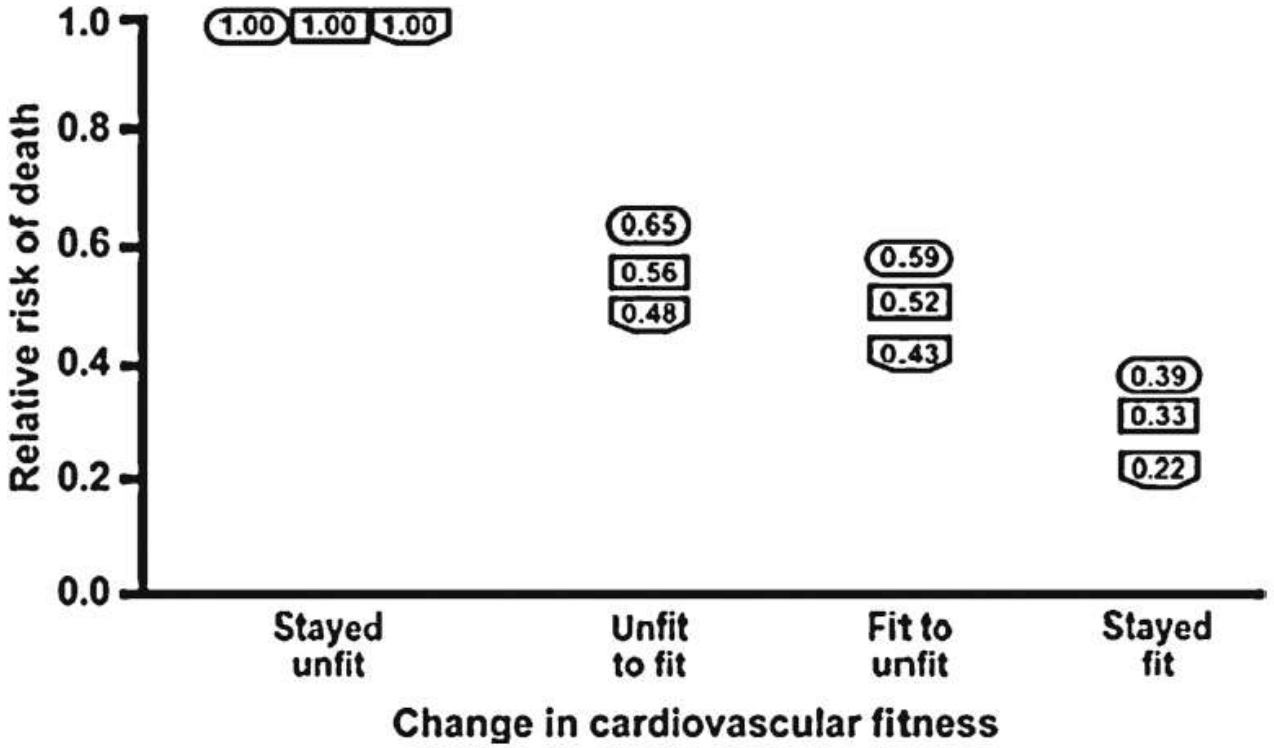

Fig. 1.
Fitness and relative risk of death: Relative risk of death is expressed as a function of the maintenance of, or the change in, cardiorespiratory fitness (CRF) level occurring between two CRF determinations that were made years apart. Deaths were recorded for 5 or 8 years following the second test. Results for maintenance or change in CRF are divided into four groups including: 1) stayed unfit; 2) became fit after being unfit; 3) became unfit after being fit; and 4) stayed fit. Three sets of data using this experimental strategy were obtained from two publications. The publications by Blair's group provided data sets for all-cause mortality (shown in *rectangles*) and cardiovascular disease (shown in *hexagons*) for men [13, 14, 87]. The publication by Kokkonis and Myers had a male data set (shown in *ovals*) [15]. Note the essential similarity of data sets. Figure and legend reprinted with permission

Rev Endocr Metab Disord. 2013 March ; 14(1): 77–86. doi:10.1007/s11154-012-9234-4.

Type 2 diabetes mellitus and exercise impairment

DT2 ET PERFORMANCE A L'EFFORT

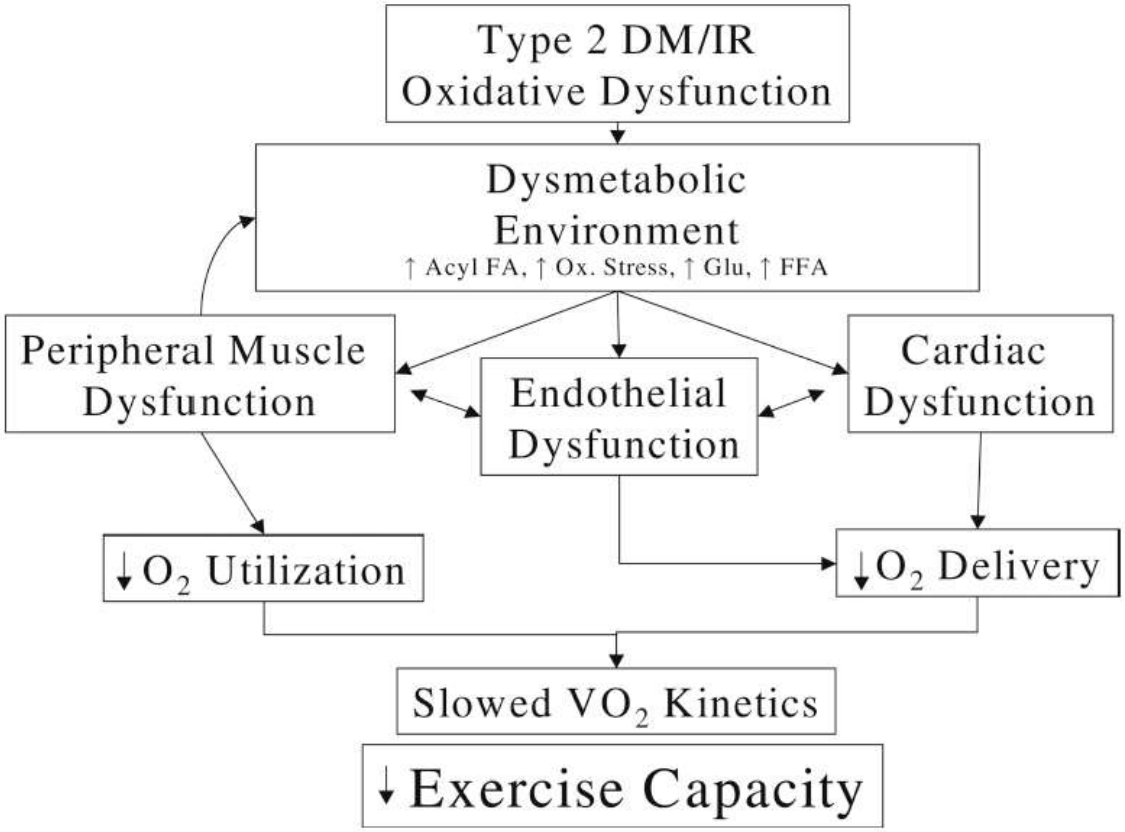

Fig. 2.
Working model of the role of endothelial dysfunction in exercise defect in diabetes: Proposed factors contributing to exercise dysfunction in T2D: T2D and prediabetic conditions such as insulin resistance are associated with an abnormal metabolic environment that induces endothelial, cardiac, and peripheral dysfunction. Target organ dysfunction feeds back to exacerbate these defects. Ultimately these factors result in defects in functional exercise capacity

Rev Endocr Metab Disord. 2013 March ; 14(1): 77–86. doi:10.1007/s11154-012-9234-4.

Type 2 diabetes mellitus and exercise impairment

DT2 ET PERFORMANCE A L'EFFORT

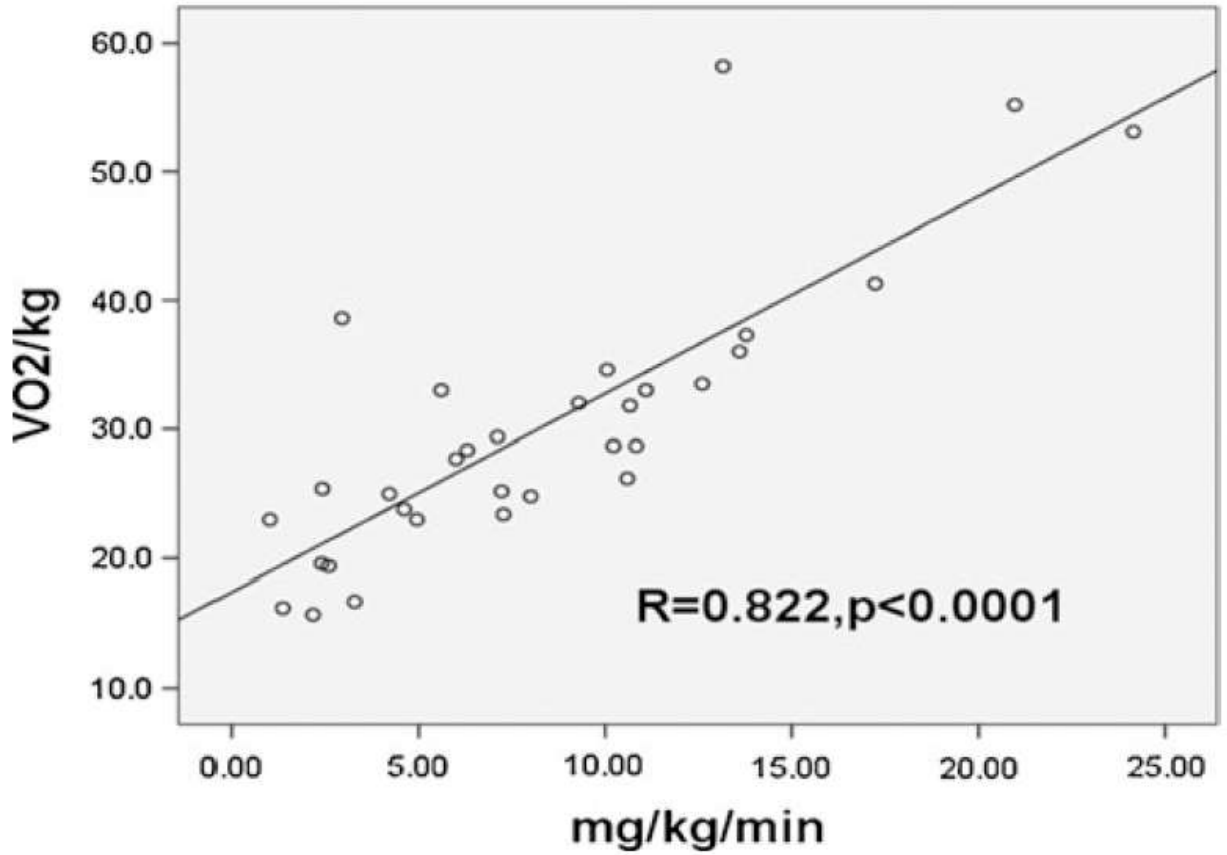

Fig. 3.
Insulin resistance correlates with VO2 Peak: The relationship of insulin resistance to VO2 peak was assessed a graded cycle ergometer (Lode, Groningen, The Netherlands) protocol to exhaustion and insulin sensitivity was assessed with a 3-hour hyperinsulinemic-euglycemic clamp (80 mU/m^{2}min insulin). Glucose disposal rate was expressed as milligrams per kilogram body mass and milligrams per kilogram fat-free mass. Reprinted with permission *J Clin Endocrinol Metab, 95*(2), 513–521 [6]

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Rev Endocr Metab Disord. 2013 March ; 14(1): 77–86. doi:10.1007/s11154-012-9234-4.

Type 2 diabetes mellitus and exercise impairment

DT2 ET PERFORMANCE A L'EFFORT

Cardiovascular Determinants of Aerobic Exercise Capacity in Adults With Type 2 Diabetes

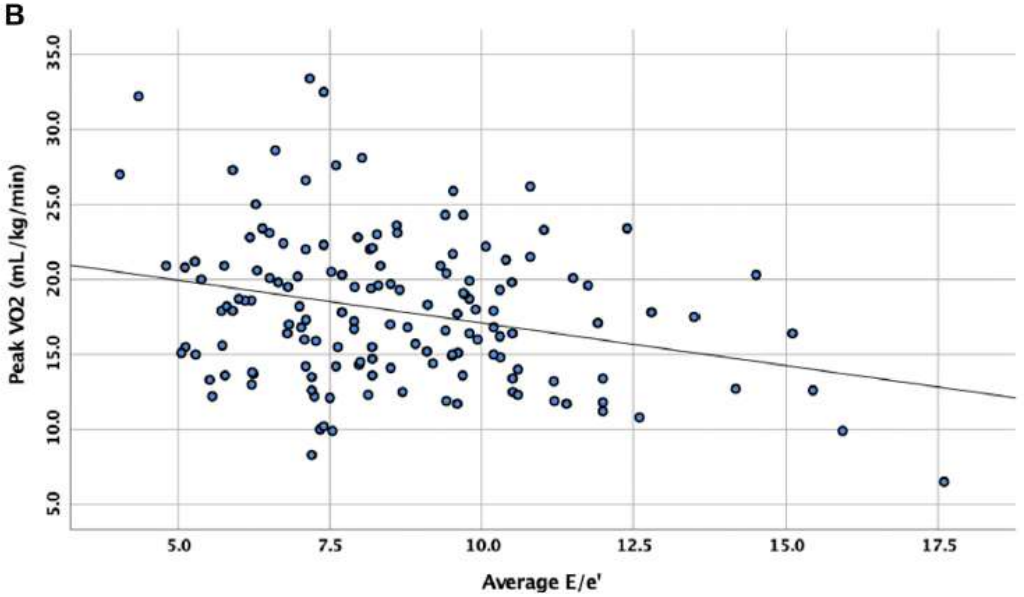
Diabetes Care 2020;43:2248–2256 | https://doi.org/10.2337/dc20-0706

Gaurav S. Gulsin,[1] Joseph Henson,[2] Emer M. Brady,[1] Jack A. Sargeant,[2] Emma G. Wilmot,[3] Lavanya Athithan,[1] Zin Z. Htike,[3] Anna-Marie Marsh,[1] John D. Biglands,[4] Peter Kellman,[5] Kamlesh Khunti,[2] David Webb,[2] Melanie J. Davies,[2] Thomas Yates,[2] and Gerry P. McCann[1]

Diabetes Care 2020;43:2248–2256

Table 1—Demographic, clinical, and bioanthropometric characteristics of subjects with T2D and control subjects

	Subjects with T2D (n = 247)	Control subjects (n = 78)	P value
Demographics			
Age, years	51.8 ± 11.9	51.5 ± 12.3	0.898
Sex, n (%)			
Male	136 (55)	42 (54)	0.851
Female	111 (45)	36 (46)	
Ethnic origin, n (%)			
Caucasian	155 (63)	53 (68)	0.405
Black or other minority ethnicity	92 (37)	25 (32)	
Anthropometrics			
Height, cm	168 ± 10	170 ± 10	0.111
Weight, kg	96.9 ± 19.1	72.0 ± 13.6	**<0.001**
BMI, kg/m^2	34.2 ± 6.0	24.8 ± 3.1	**<0.001**
Systolic blood pressure, mmHg	138 ± 16	129 ± 18	**<0.001**
Diastolic blood pressure, mmHg	87 ± 8	81 ± 9	**<0.001**
Heart rate, bpm	76 ± 12	63 ± 11	**<0.001**



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Cochrane Library

Cochrane Database of Systematic Reviews

Exercise for type 2 diabetes mellitus (Review)

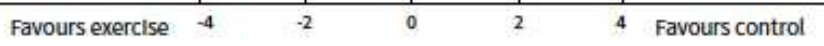
Thomas D, Elliott EJ, Naughton GA

Analysis 1.1. Comparison 1 Exercise vs no exercise, Outcome 1 Glycated haemoglobin (%).

Study or subgroup	Exercise N	Exercise Mean(SD)	Control N	Control Mean(SD)	Mean Difference Fixed, 95% CI	Weight	Mean Difference Fixed, 95% CI
Wing 1988b	13	8.2 (1.1)	15	9 (1.2)		11.95%	-0.8[-1.63,0.03]
Baldi 2003	9	8.4 (1.8)	9	8.4 (1.8)		2.98%	0[-1.66,1.66]
Cuff 2003	10	6.8 (1.3)	9	6.9 (1.2)		6.73%	-0.07[-1.18,1.04]
Dela 2004	9	8.2 (1.8)	7	8.5 (1.6)		2.97%	-0.3[-1.96,1.36]
Dunstan 1998	11	8 (1.7)	10	8.3 (2.2)		2.9%	-0.3[-1.98,1.38]
Dunstan 2002	16	6.9 (1)	13	7.1 (1.1)		13.78%	-0.2[-0.97,0.57]
Lolmaala 2003	24	7.6 (1.4)	25	8.3 (1.4)		13.4%	-0.7[-1.48,0.08]
Maiorana 2002	16	7.9 (1.2)	16	8.5 (1.6)		8.58%	-0.6[-1.58,0.38]
Mourier 1997	10	6.2 (0.6)	11	7.7 (1.3)		10.7%	-1.5[-2.38,-0.62]
Raz 1994	19	11.7 (2.6)	19	12.9 (4.2)		1.67%	-1.2[-3.42,1.02]
Ronnemaa 1986	13	8.6 (1.9)	12	9.9 (1.7)		4.14%	-1.3[-2.71,0.11]
Tessler 2000	19	7.6 (1.2)	20	7.8 (1.5)		11.39%	-0.2[-1.05,0.65]
Tsujiuchi 2002	16	7.3 (1.1)	10	8.2 (1.3)		8.82%	-0.84[-1.81,0.13]
Total ***	**185**		**176**			**100%**	**-0.62[-0.91,-0.33]**

Heterogeneity: $Tau^2=0$; $Chi^2=9.27$, df=12(P=0.68); $I^2=0\%$

Test for overall effect: Z=4.25(P<0.0001)



Cochrane Library

Cochrane Database of Systematic Reviews

Exercise for type 2 diabetes mellitus (Review)

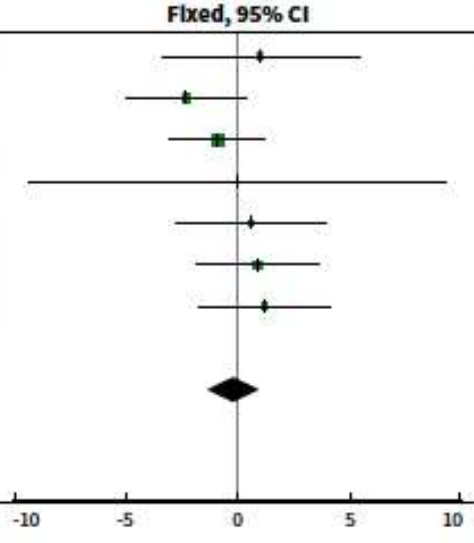
Thomas D, Elliott EJ, Naughton GA

Analysis 1.11. Comparison 1 Exercise vs no exercise, Outcome 11 Body Mass index (kg/m2).

Study or subgroup	Exercise N	Exercise Mean(SD)	Control N	Control Mean(SD)	Mean Difference Fixed, 95% CI	Weight	Mean Difference Fixed, 95% CI
Dela 2004	9	31 (3)	7	30 (5.3)		6.75%	1[-3.38,5.38]
Dunstan 1998	11	28.1 (2.7)	10	30.4 (3.5)		18.23%	-2.3[-4.97,0.37]
Lolmaala 2003	24	28.9 (3.8)	25	29.8 (3.7)		29.33%	-0.9[-3,1.2]
Malorana 2002	16	29.6 (13.2)	16	29.6 (13.6)		1.5%	0[-9.29,9.29]
Mourier 1997	10	30.6 (1.9)	11	30 (5.3)		11.53%	0.6[-2.75,3.95]
Raz 1994	19	31.5 (4.3)	19	30.6 (4.2)		17.73%	0.9[-1.8,3.6]
Tessler 2000	19	30.6 (5.4)	20	29.4 (3.8)		14.94%	1.2[-1.74,4.14]
Total ***	**108**		**108**			**100%**	**-0.21[-1.35,0.93]**

Heterogeneity: $Tau^2=0$; $Chi^2=4.82$, df=6(P=0.57); $I^2=0\%$

Test for overall effect: Z=0.36(P=0.72)



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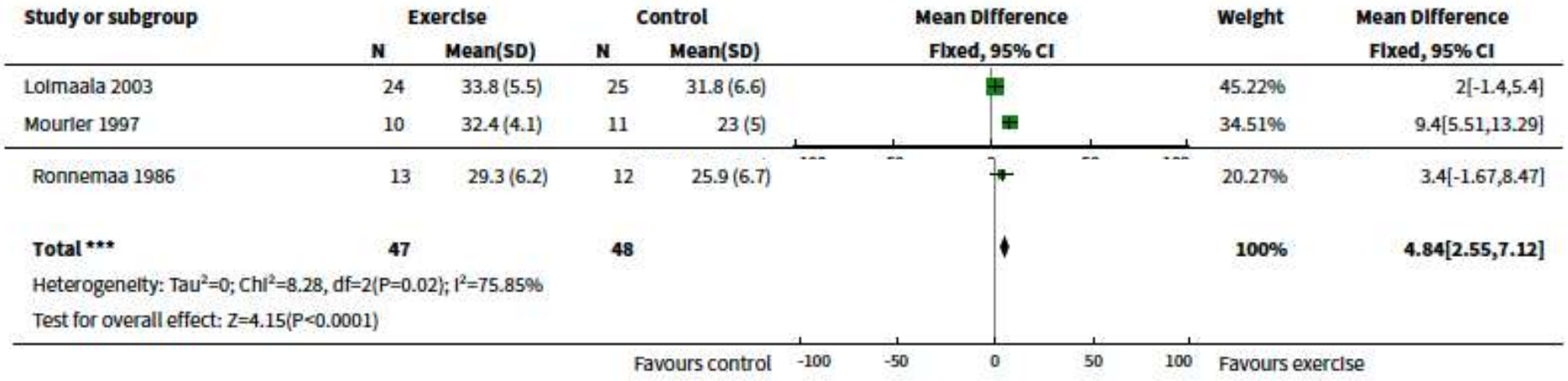
Cochrane Library

Cochrane Database of Systematic Reviews

Exercise for type 2 diabetes mellitus (Review)

Thomas D, Elliott EJ, Naughton GA

Analysis 1.6. Comparison 1 Exercise vs no exercise, Outcome 6 Maximal exercise capacity (VO2max)(ml/(kg*min)).



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Physical Activity/Exercise and Diabetes: A Position Statement of the American Diabetes Association

Diabetes Care 2016;39:2065–2079 | DOI: 10.2337/dc16-1728

Sheri R. Colberg,[1] Ronald J. Sigal,[2] Jane E. Yardley,[3] Michael C. Riddell,[4] David W. Dunstan,[5] Paddy C. Dempsey,[5] Edward S. Horton,[6] Kristin Castorino,[7] and Deborah F. Tate[8]

Activité physique et diabète de type 2

Référentiel de la Société francophone du diabète (SFD), 2011

Texte établi par le groupe de travail « Activité physique et Diabète » de la SFD, décembre 2011.

Martine Duclos[1], Jean-Michel Oppert[2], Bénédicte Vergès[3], Vincent Coliche[4], Jean-François Gautier[5], Charles-Yannick Guezennec[6], Gérard Reach[7], Georges Strauch[8], pour le groupe de travail « Activité physique et Diabète » de la Société francophone du diabète (SFD)

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Physical activity and type 2 diabetes mellitus

Expert consensus, SFD, 2011

PHYSICAL ACTIVITY AND TYPE 2 DIABETES

Recommendations

- Daily exercise, or at least not allowing more than 2 days to elapse between exercise sessions, is recommended to enhance insulin action. **B**
- Adults with type 2 diabetes should ideally perform both aerobic and resistance exercise training for optimal glycemic and health outcomes. **C**
- Children and adolescents with type 2 diabetes should be encouraged to meet the same physical activity goals set for youth in general. **C**
- Structured lifestyle interventions that include at least 150 min/week of physical activity and dietary changes resulting in weight loss of 5%–7% are recommended to prevent or delay the onset of type 2 diabetes in populations at high risk and with prediabetes. **A**

• **La prescription d'activité physique devra se faire selon les règles suivantes.**

– Il faut rappeler que les patients DT2 sont, le plus souvent, obèses et physiquement inactifs. **Il faut donc démarrer l'activité physique progressivement et de façon personnalisée.**

– **Le type d'activité :** la prescription la plus adaptée va associer les exercices d'endurance (marche à pied, vélo, natation) aux exercices contre résistance (renforcement musculaire)[3].

– Pour le renforcement musculaire, les haltères ne sont pas indispensables : une bouteille d'eau (250 ml = 250 grammes, 500 ml = 500 grammes, etc.) ou un sac de riz peuvent être utilisés dans la vie de tous les jours.

– **L'intensité :** pour les exercices d'endurance, il faut privilégier les exercices d'intensité modérée (40 à 60 % de la VO_{2max}, ou 3-6 METs) et de durée prolongée (≥ 30 minutes). Les exercices intenses (> 60 % de la VO_{2max}, ou > 6 METs, ce qui correspond pour le patient à un exercice qui fait transpirer et qui induit un essoufflement ; par exemple, certaines phases des jeux de balle) peuvent se concevoir de façon isolée ou en association à une activité d'endurance d'intensité modérée. Ils permettent de diminuer la durée d'activités physiques (3 fois 20 minutes à intensité élevée *versus* 5 fois 30 minutes d'intensité modérée par semaine).

– **La durée de l'exercice :** l'objectif est d'atteindre une durée d'au moins 150 minutes par semaine (en 3 à 7 fois) pour une activité physique d'intensité modérée ou 90 minutes par semaine (en 3 fois) pour une activité physique d'intensité plus importante. Chaque session, en particulier pour les activités physiques d'intensité modérée, peut être répartie en fractions de 10 minutes chacune.

– **La fréquence minimale recommandée** est de trois séances d'exercice par semaine, avec pas plus de deux jours consécutifs sans activité physique[4].

LUTTER CONTRE LA SÉDENTARITÉ :

assis < 7 heures/jour + *breaks* d'au moins une minute toutes les heures

AUGMENTER L'ACTIVITÉ PHYSIQUE

de la vie quotidienne

ACTIVITÉS PHYSIQUES OU SPORTIVES STRUCTURÉES

➔ **Endurance :** intensité modérée 5 x 30min/semaine
ou forte intensité « vigoureux » 3 x 20 min/semaine

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ACTIVITÉS PHYSIQUES OU SPORTIVES STRUCTURÉES

➔ Renforcement musculaire: au moins 2 x/semaine

- Masses musculaires importantes
- Mouvements variés, activités souvent ludiques
- Intensité
  - charges légères (30 à 50 % de la force maximale développée en une fois)
  - 8 à 10 séries de 10 répétitions
- Mouvement complet sans blocage musculaire ni respiratoire

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Une nouvelle modalité d'activité physique – HIIT

High-intensity interval training and cardiorespiratory fitness in adults: An umbrella review of systematic reviews and meta-analyses

Eric Tsz-Chun Poon[1] | Hong-Yat Li[1] | Martin J. Gibala[2] | Stephen Heung-Sang Wong[1] | Robin Sze-Tak Ho[1]

Inclusion

- ✓ **24** systematic reviews with meta-analysis
- ✓ Including **429** primary studies and **12,967** unique participants
- ✓ **Participants' background**: healthy adults, individuals with overweight/obesity, older adults, high-level athletes etc.
- ✓ **HIIT modalities**: SIT, low-volume HIIT, whole-body HIIT, home-based HIIT, aquatic HIIT etc.

Meta-analysis results: CRF improvements (indicated as VO_2max or VO_2peak)

HIIT vs non-exercise control	HIIT vs MICT
SMD range: 0.28 to 4.31	SMD range: 0.18 to 0.99
WMD range: 3.25 to 5.5 mL/kg/min	WMD range: 0.52 to 3.76 mL/kg/min

Potential for incorporating HIIT into current physical activity promotion programs among the general population

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Scand J Med Sci Sports. 2024;34:e14652.

ACTIVITÉ PHYSIQUE ET DIABÈTE ET MALADIE RÉNALE
QUE PENSER ?

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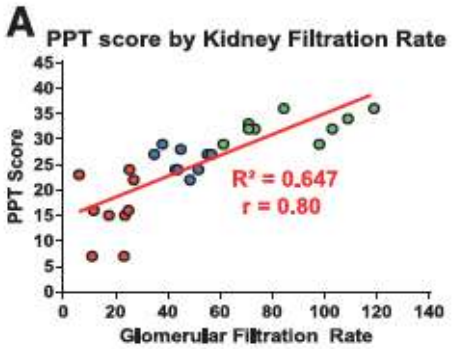
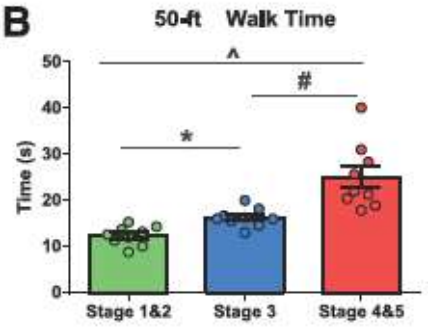
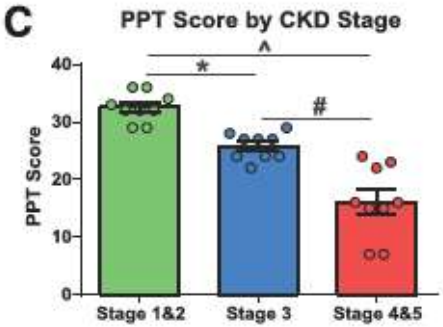
Altération fonction musculaire proportionnelle à la dégradation de la fonction rénale

Deficits in the Skeletal Muscle Transcriptome and Mitochondrial Coupling in Progressive Diabetes-Induced CKD Relate to Functional Decline

Daniel C. Bittel,[1] Adam J. Bittel,[1] Arun S. Varadhachary,[2] Terri Pietka,[3] and David R. Sinacore[1,4]

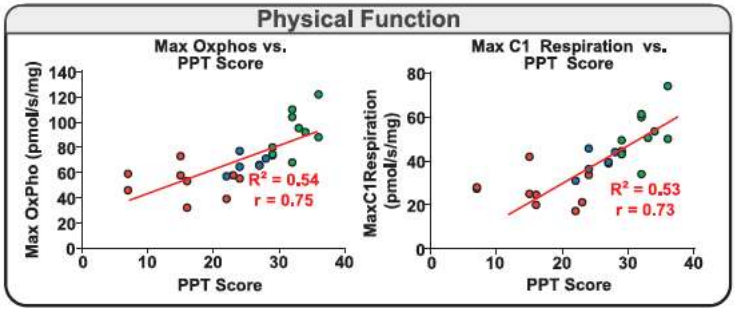


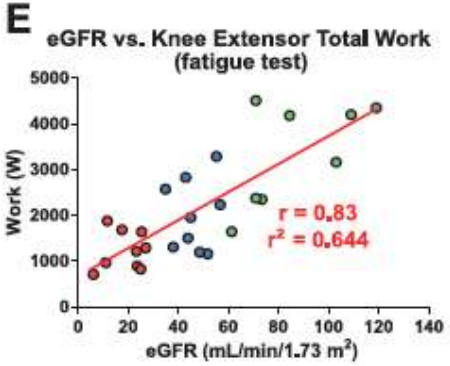




D

	BUN	PPT Score	Hip Extensor Torque (30°/s)	Knee Extensor Torque (30°/s)	Knee Extensor Work (fatigue)	eGFR	Chair Rise Score	50-ft walk time
eGFR	r=-.768 p<.001	r=.805 p<.001	r=.821 p<.001	r=.795 p<.001	r=.83 p<.001	r=1 p=—	r=.761 p=.005	r=-.681 p<.001
BUN		r=-.877 p<.001	r=-.55 p<.001	r=-.55 p<.001	r=-.635 p<.001	r=-.768 p<.001	r=-.697 p<.001	r=.821 p<.001





Diabetes 2021;70:1130-1144

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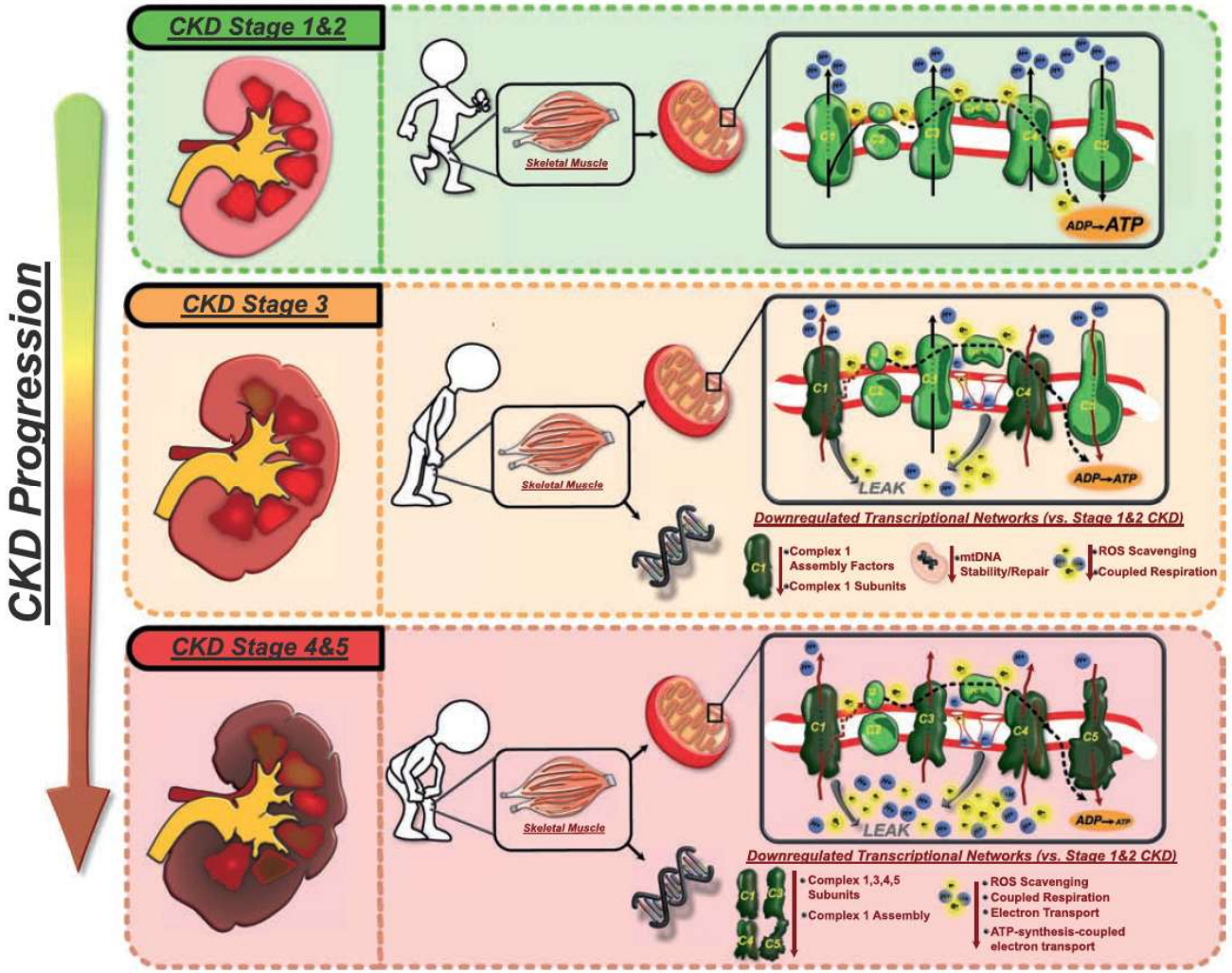
Diabetes 2021;70:1130-1144



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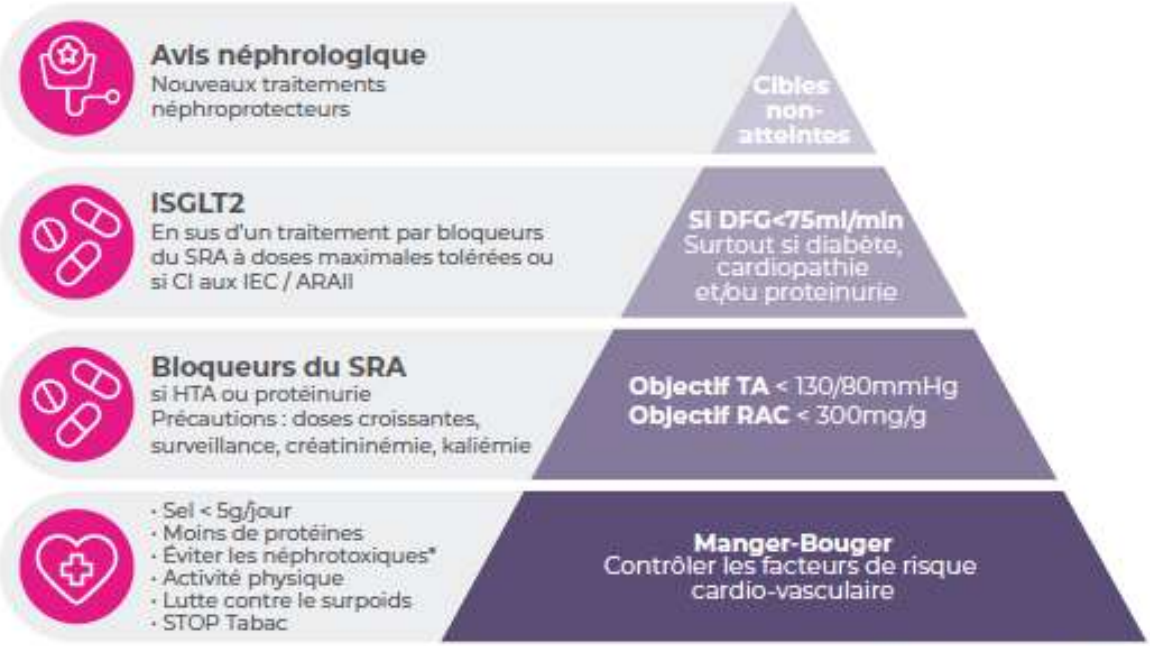
Maladie rénale chronique

Je dépiste simplement, je protège efficacement

CNP Néphrologie · CMG collège de la médecine générale · FRANCE REIN

Je protège efficacement

En consultation, je peux montrer la courbe du DFG au patient pour évaluer la stabilité de son état rénal. **La dégradation n'est pas inéluctable.**



*AINS, produits de contraste iodés

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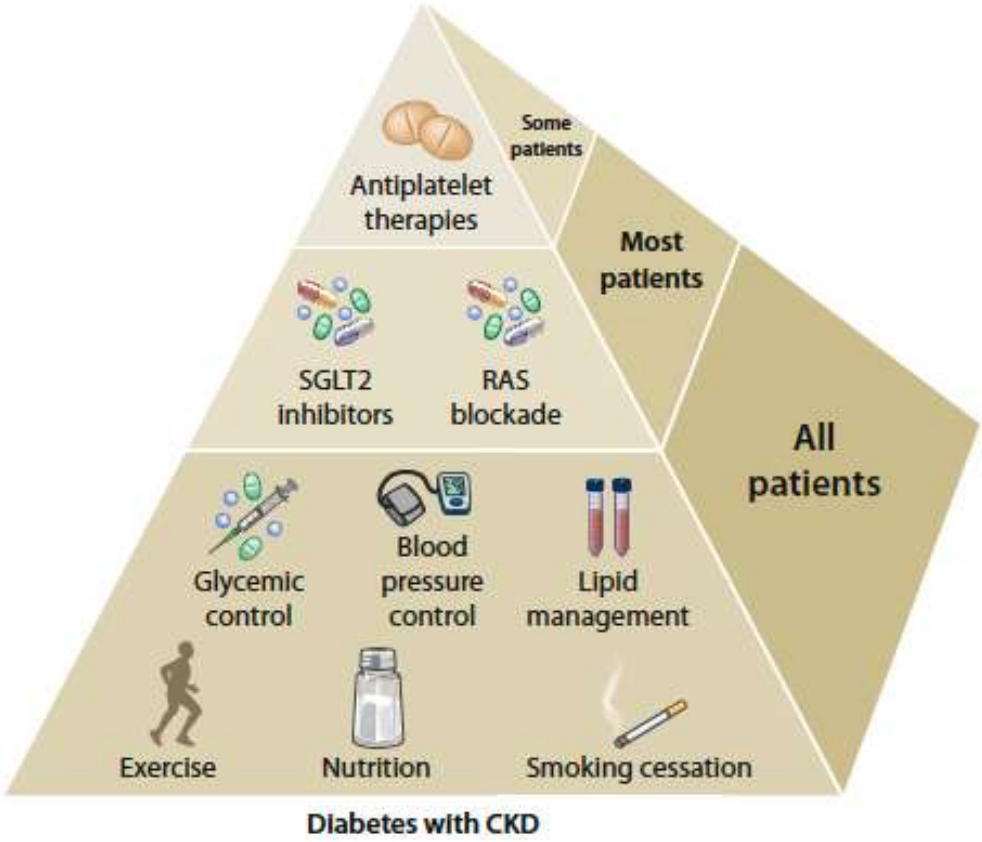

Figure 2 | Kidney–heart risk factor management. Glycemic control is based on insulin for type 1 diabetes and a combination of metformin and sodium–glucose cotransporter-2 (SGLT2) inhibitors for type 2 diabetes, when estimated glomerular filtration rate is ≥30 ml/min per 1.73 m^2. SGLT2 inhibitors are recommended for patients with type 2 diabetes and chronic kidney disease. Renin–angiotensin system (RAS) inhibition is recommended for patients with albuminuria and hypertension. Aspirin should generally be used lifelong for secondary prevention among those with established cardiovascular disease and may be considered for primary prevention among high-risk individuals, with dual antiplatelet therapy used in patients after acute coronary syndrome or percutaneous coronary intervention.

Effect of a long-term behavioural weight loss intervention on nephropathy in overweight or obese adults with type 2 diabetes: a secondary analysis of the Look AHEAD randomised clinical trial

*The Look AHEAD Research Group**

Lancet Diabetes Endocrinol 2014; 2: 801–09

The ILI aimed to achieve and maintain weight loss of at least 7% through reduced caloric intake and increased physical activity.[9] Strategies consisted of a calorie goal of 1200–1800 kcal per day (with <30% of calories from fat and >15% from protein), meal-replacement products, and at least 175 min of moderate-intensity physical activity per week. DSE group sessions focused on diet, exercise, and social support. Goals were not set for

type 2 diabetes and that prevent or delay the onset of nephropathy.[4,6,19–21] A lifestyle intervention focused on weight loss and increasing physical activity should be considered as additional treatment to prevent advanced kidney disease in overweight or obese people with type 2 diabetes.

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Effect of a long-term behavioural weight loss intervention on nephropathy in overweight or obese adults with type 2 diabetes: a secondary analysis of the Look AHEAD randomised clinical trial

*The Look AHEAD Research Group**

Lancet Diabetes Endocrinol 2014; 2: 801–09

	Number at risk at baseline	Diabetes support and education		Intensive lifestyle intervention		Hazard ratio (95% CI)	p value
		Events*	Rate†	Events*	Rate†		
Very-high-risk CKD‡	4831	173	0·91	123	0·63	0·69 (0·55–0·87)	0·0016
Very-high-risk CKD twice or last§	4831	147	0·76	104	0·53	0·68 (0·53–0·88)	0·0028
Very-high-risk CKD twice¶	4831	109	0·75	69	0·46	0·63 (0·47–0·86)	0·0031
Urine albumin-to-creatinine ratio ≥300 mg/g‖	4713	187	1·00	155	0·82	0·81 (0·66–1·01)	0·057
eGFR <45 mL/min per 1·73m²‖	4976	246	1·26	201	1·01	0·79 (0·66–0·96)	0·015
Renal replacement therapy (dialysis or transplantation)**	5111	36	0·16	29	0·13	0·80 (0·49–1·30)	0·37
Serum creatinine concentration at least two times the baseline value‖	5000	109	0·54	91	0·45	0·81 (0·61–1·07)	0·13

CKD=chronic kidney disease. eGFR=estimated glomerular filtration rate.*The first occurrence of this condition after randomisation, in those without the condition at baseline. †First events per 100 person-years at risk. Time to event is based on the date of the first occurrence. ‡Primary renal outcome. §First occurrence of very-high-risk CKD confirmed at the next examination or first occurrence of very-high-risk CKD at the final examination. ¶First occurrence of very-high-risk CKD confirmed at the next examination. ‖Also includes people with history of renal replacement therapy regardless of laboratory test results. **Of the 65 initial reports of renal replacement therapy, 32 for were for chronic renal failure and 33 were for replacement therapy of acute or unknown duration.

Table 2: **Renal outcomes**

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Efficacy and durability of multifactorial intervention on mortality and MACEs: a randomized clinical trial in type-2 diabetic kidney disease

Ferdinando Carlo Sasso[1*], Pia Clara Pafundi[1], Vittorio Simeon[2], Luca De Nicola[1], Paolo Chiodini[2], Raffaele Galiero[1], Luca Rinaldi[1], Riccardo Nevola[1], Teresa Salvatore[3], Celestino Sardu[1], Raffaele Marfella[1], Luigi Elio Adinolfi[1] and Roberto Minutolo[1] on behalf of NID-2 Study Group Investigators

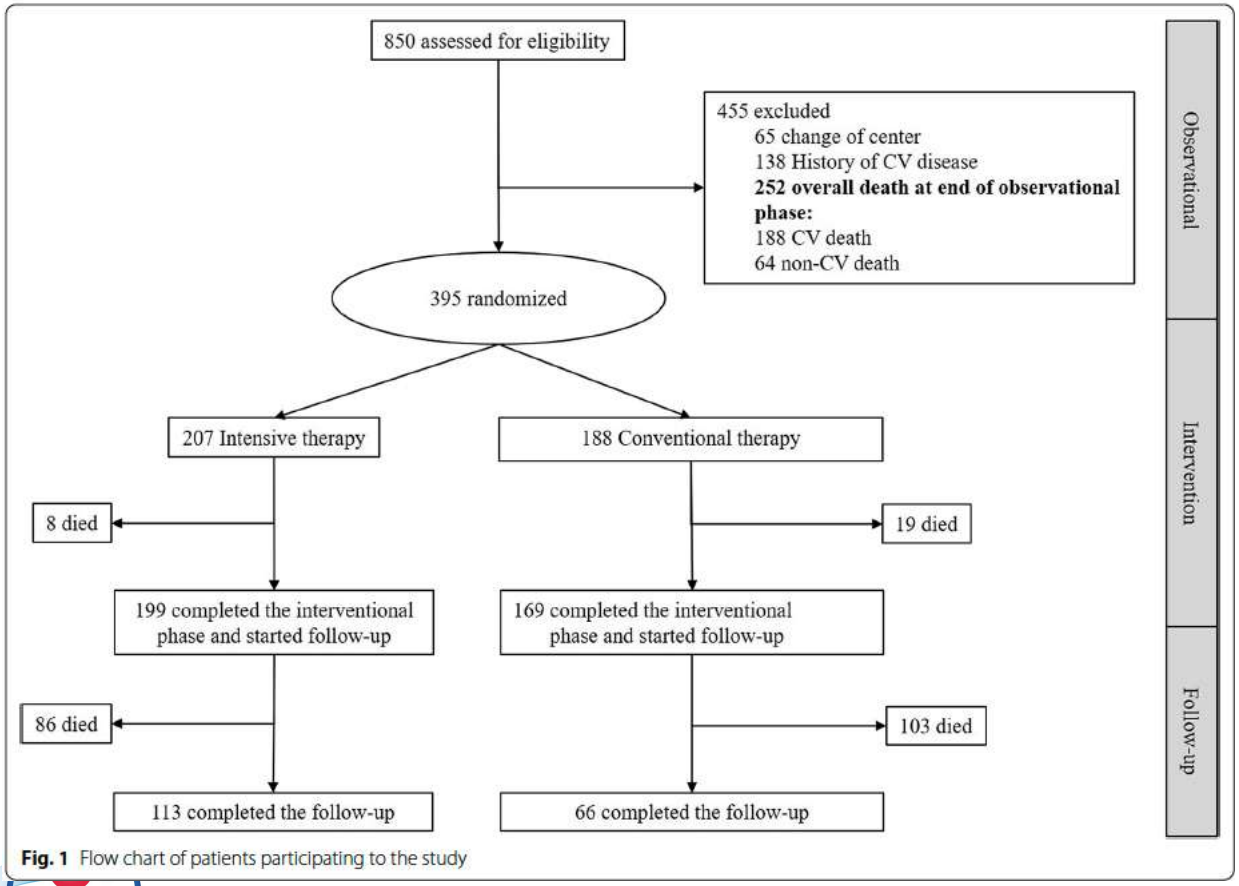

Fig. 1 Flow chart of patients participating to the study

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Sasso et al. Cardiovasc Diabetol (2021) 20:145

Table 1 Baseline characteristics of the study population (n = 395)

Parameter	SoC (n = 188)	Intervention (n = 207)	p	SDiff (%)
Male Sex, No. (%)	83(44.1)	103 (49.8)	0.382	11.3
Age, mean (SD), y	68.2 (8.8)	66.1 (9)	0.046	24.1
BMI (kg/m^2), mean (SD)	29.4 (4.9)	28.5 (4.7)	0.288	19.1
Blood pressure (mmHg), mean (SD)				
Systolic	134.7 (12.6)	133.8 (14.3)	0.791	6.1
Diastolic	78.3 (7.7)	80.8 (7.4)	0.002	−32.8
Systolic BP target, No. (%)	95 (50.5)	112 (54.1)	0.142	−17.0
Diastolic BP target, No. (%)	150 (79.8)	136 (65.7)	0.274	19.2
Blood Pressure Target, No. (%)	90 (47.9)	105 (55.3)	0.193	−14.8
Creatinine (mg/dL), mean (SD)	1.16 (0.5)	1.17 (0.5)	0.564	−1.4
eGFR EPI-CKD (mL/min/m^2), mean (SD)	62.7 (21.2)	65.4 (23)	0.350	−12.1
eGFR EPI-CKD stage, No. (%)				
1	20 (10.6)	45 (21.7)	0.600	−31.1
2	80 (42.6)	77 (37.2)		
3	76 (40.4)	71 (34.3)		
4	10 (5.3)	11 (5.3)		
5	2 (1.1)	3 (1.5)		
Albuminuria (mg/day), median [IQR]	57.3 [35—158.1]	120.5 [75.8 – 223.8]	0.115	−25.2
Haemoglobin (mg/dL), mean (SD)	13.4 (1.3)	12.9 (1.5)	0.377	36.8
Glycemia (mg/dL), mean (SD)	152.7 (49)	155.9 (43.1)	0.924	−6.9
HbA1c (%), mean (SD)	7.3 (1.1)	7.5 (1.1)	0.345	−18.2

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Sasso et al. Cardiovasc Diabetol (2021) 20:145

Table 2 Differences in demographic, clinical and laboratory parameters and pharmacological treatment between SoC and Intensive therapy group at end of intervention

Parameter	End of treatment		
	SoC Group (n = 169)	Intervention group (n = 199)	p**
Systolic blood pressure (mmHg)	135.1 (15.2)	127.3 (8.7)	0.004
Diastolic blood pressure (mmHg)	78.8 (8.8)	78.1 (5.6)	0.110
BP < 130/80 mmHg (%)	132 (74.2)	163 (84.5)	0.045
Laboratory tests			
eGFR EPI-CKD (mL/min)	60.7 (22.9)	60.4 (22.5)	0.920
Albuminuria (mg/day)	90.2 (38–160)	54 (11–180)	0.179
Albuminuria < 30 mg/day (%)	18 (13.0)	62 (37.6)	0.047
Fasting plasma glucose (mg/dL)	153.6 (44.8)	147.4 (39.4)	0.199
HbA1c (%)	7.4 (1.1)	6.9 (0.6)	0.009

Table 3 Clinical outcome in the two groups (n = 395)

Event	SoC group (n = 188)	Intervention group (n = 207)	p*
End of follow-up			
MACEs, No. (%)	146 (77.8)	116 (56.1)	< 0.001
All-cause death, No. (%)	103 (54.8)	86 (41.6)	0.046
Myocardial infarction, No. (%)	44 (23.4)	32 (15.5)	< 0.001
Stroke, No. (%)	28 (14.9)	19 (9.2)	0.002
Revascularization, No. (%)	13 (6.9)	16 (7.8)	0.33
Major amputation, No. (%)	3 (1.6)	2 (0.9)	0.5
Follow-up at end of intervention phase			
MACEs, No. (%)	50 (26.6)	24 (11.6)	0.002

MACE Major Adverse Cardiovascular Event

* p-value calculated with univariable Cox shared-frailty model. Multivariable estimates are reported in the manuscript

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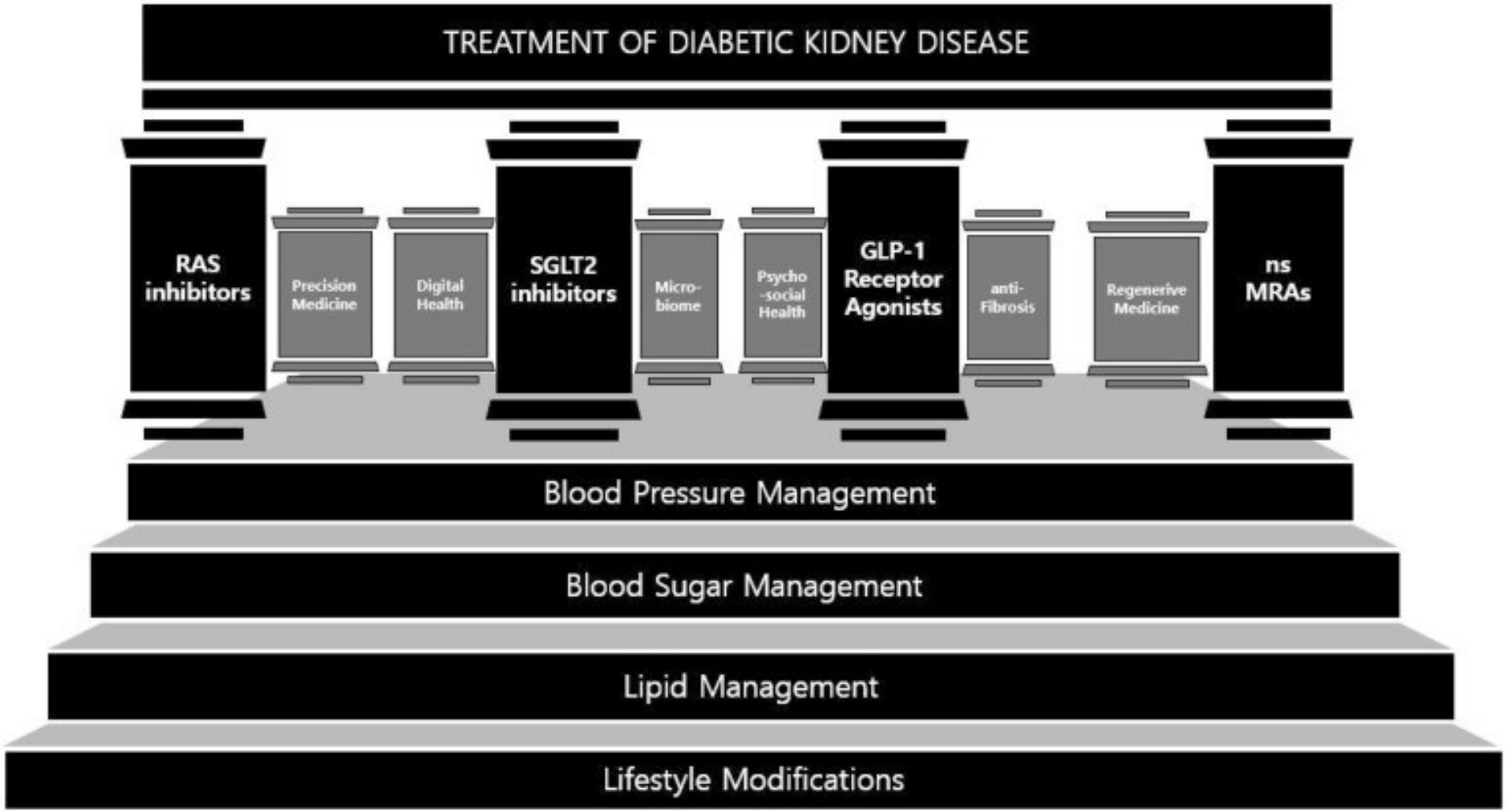

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Crédit Mutuel
macron
PROG/NOV
PROG/NOV

➢ MAIN STUDY OBJECTIVE

➢ To assess whether the decline in renal function is significantly different after 2 years of structured intervention with high-intensity physical activity (HIPA) compared to current recommendations on Physical Activity (SFD working group on PA) in patients with type 2 diabetes and a history of rapid renal function decline.

➢ PRINCIPAL STUDY OUTCOME

➢ **Decline in renal function, assessed by the slope of the estimated GFR using the CKD-EPI formula derived from cystatin (cystatin-eGFR).**

cystatin-C was measured at baseline (M0) and every 6 months (M6, M12, M18, M24).
At least 3 measurements of estimated glomerular filtration rate were required to calculate the slope.

Selection of participants:

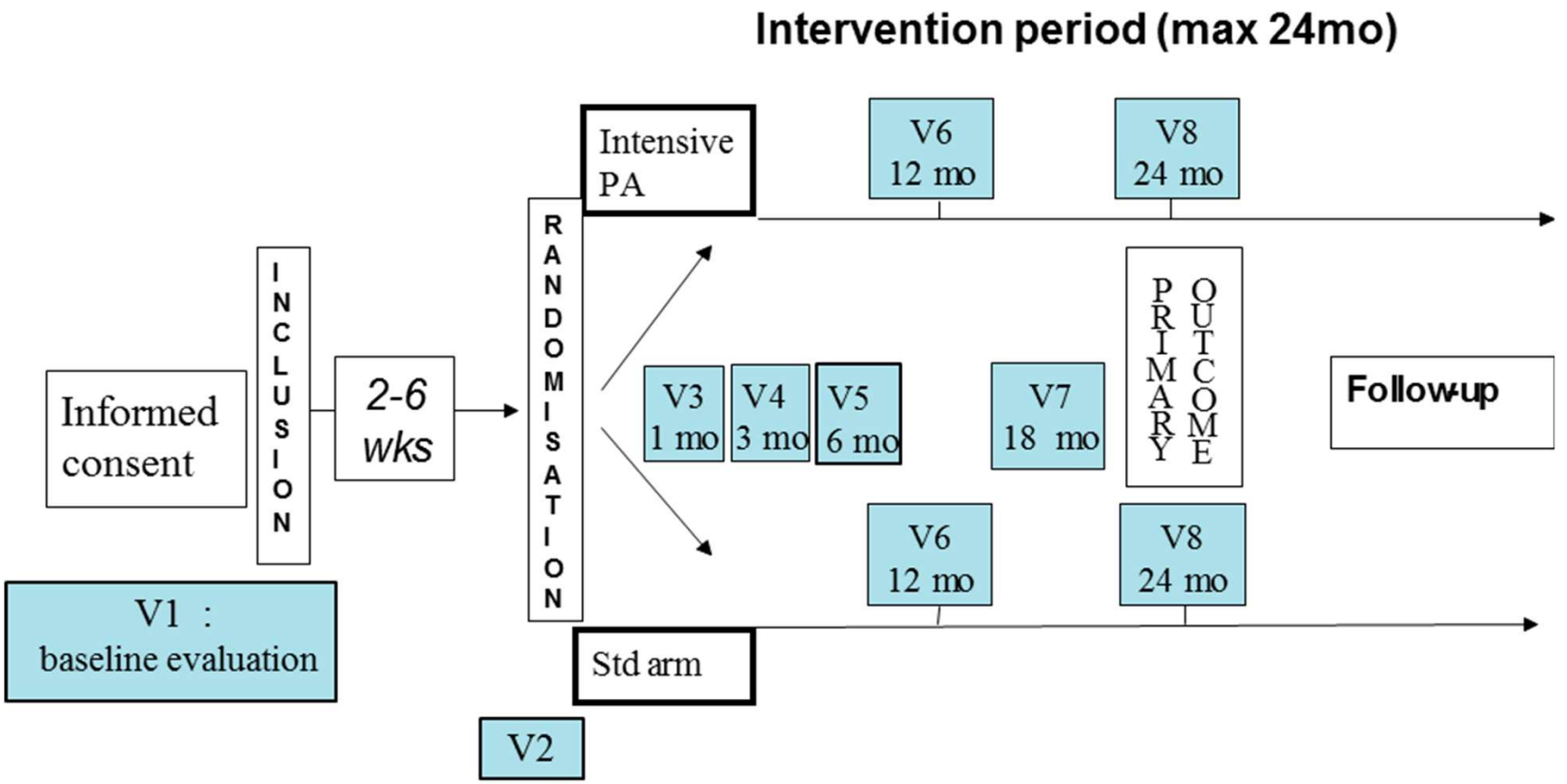
Inclusion

- Written informed consent (CPP Sud Méditerrannée IV & comité d'éthique hospitalo-facultaire universitaire de Liège – 707)
- 45 years, T2D for more than 1 yr
- eGFR ≥ 30 ml/m/1.73 m²
- Rapid renal function decline (inf-5 ml/min/yr), 3 creatinine over 6-24 months before screening visit
- Systematic cardiologist statement for HIPA before randomisation.
- TTT stable depuis 2 mois (anti-hypertenseur, hypolipidemiant and anti-diabetiques).

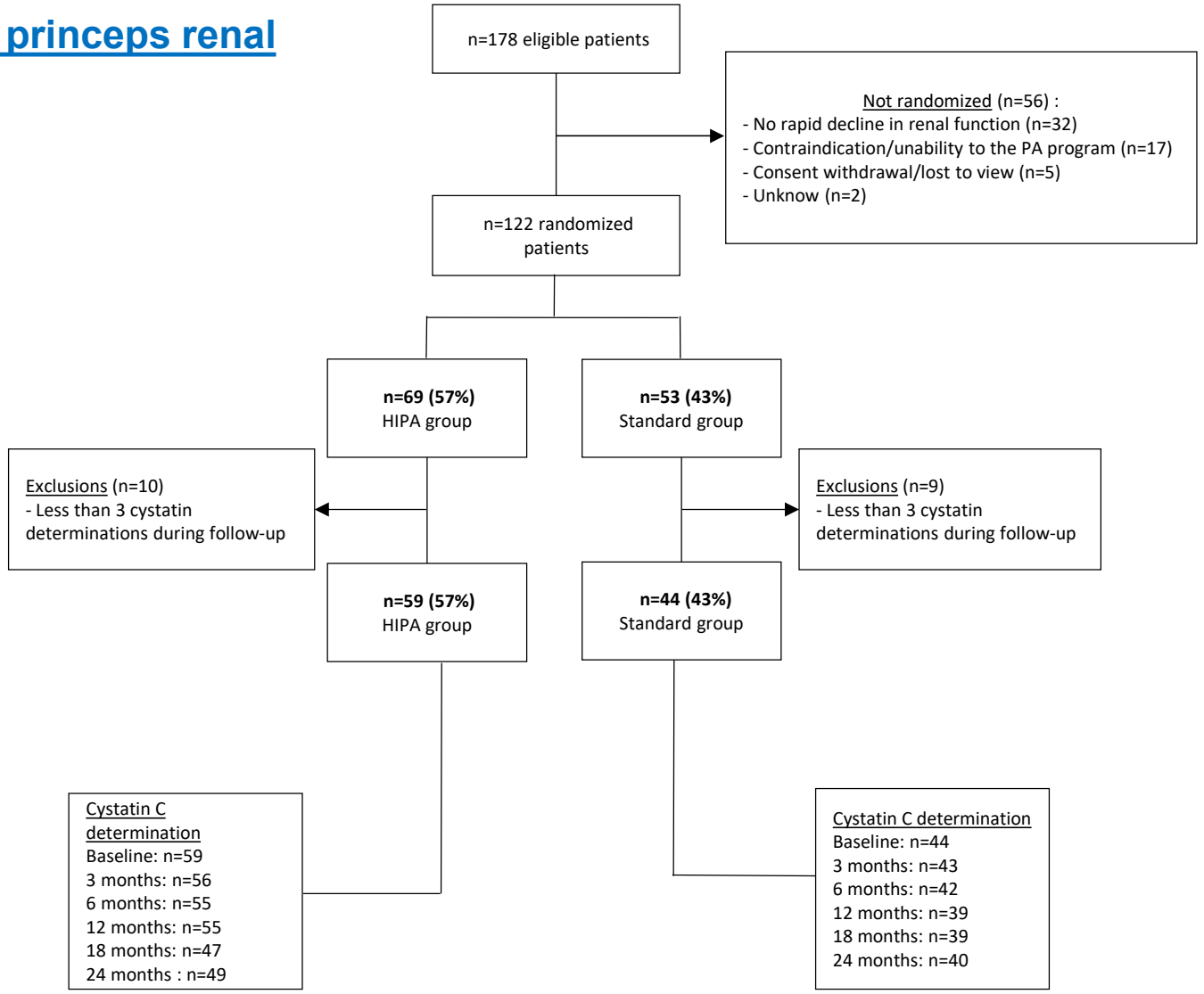
Non-inclusion

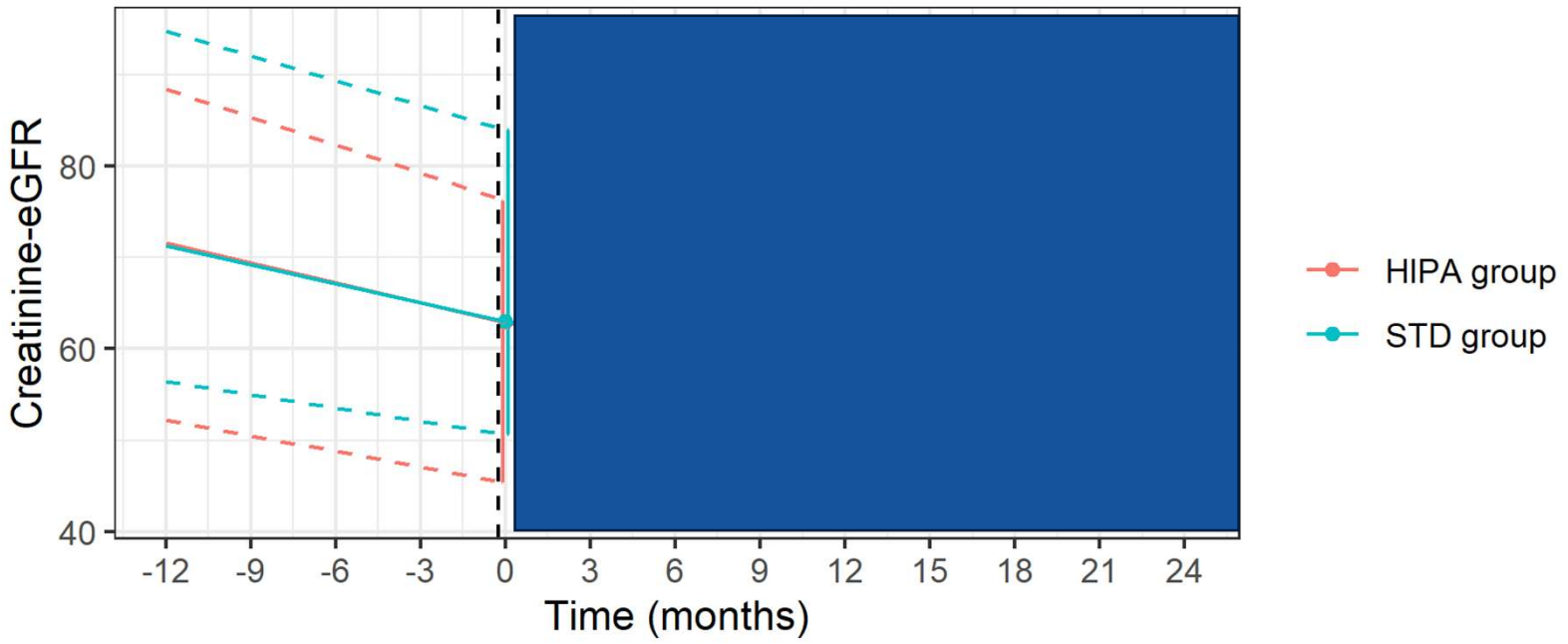
- Active proliferative retinopathy
- CI TO HIPA (NYHA st IV)

Study organisation:

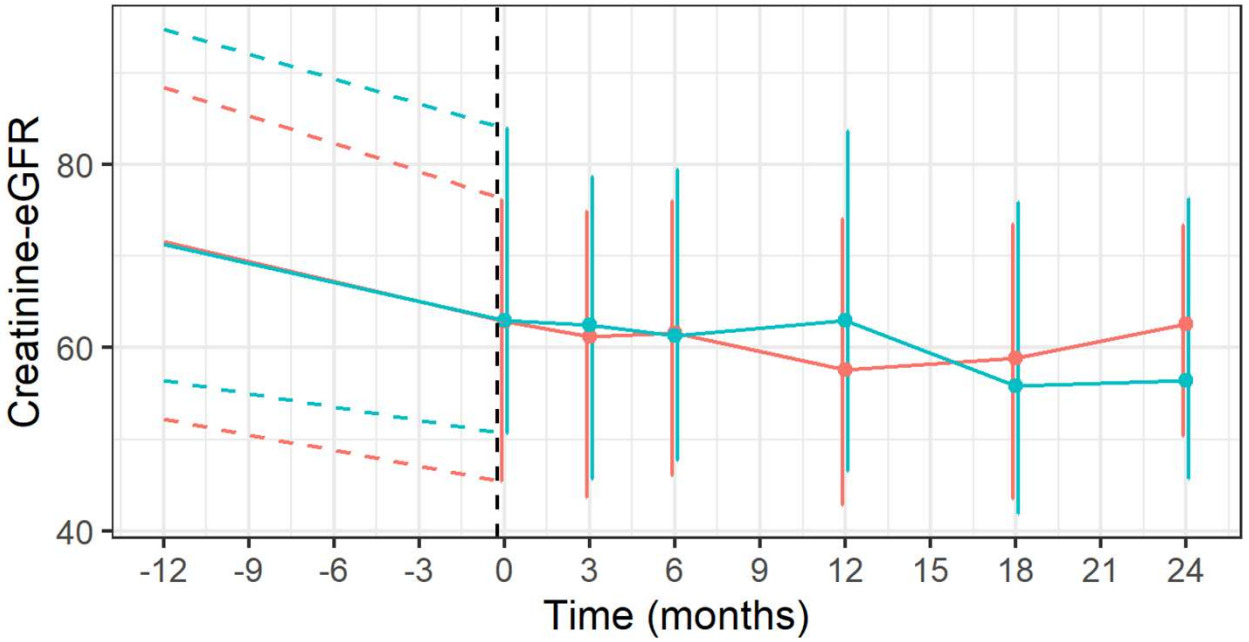


RESULTS princeps renal




Creatinine-eGFR
80
60
40
-12
-9
-6
-3
0
3
6
9
12
15
18
21
24
Time (months)
HIPA group
STD group

RESULTATS


Creatinine-eGFR
80
60
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12
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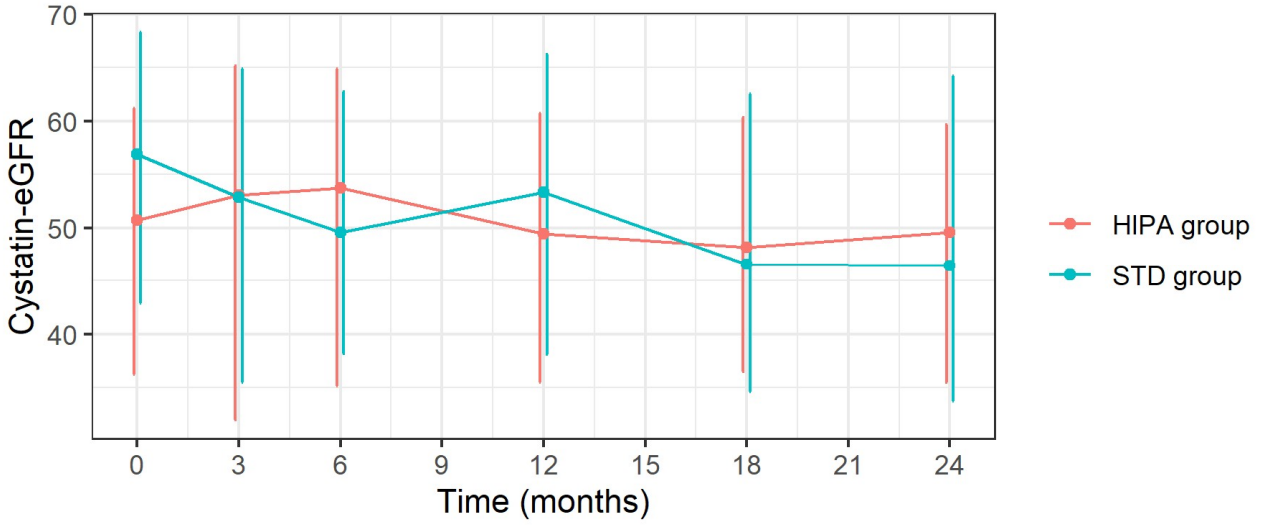
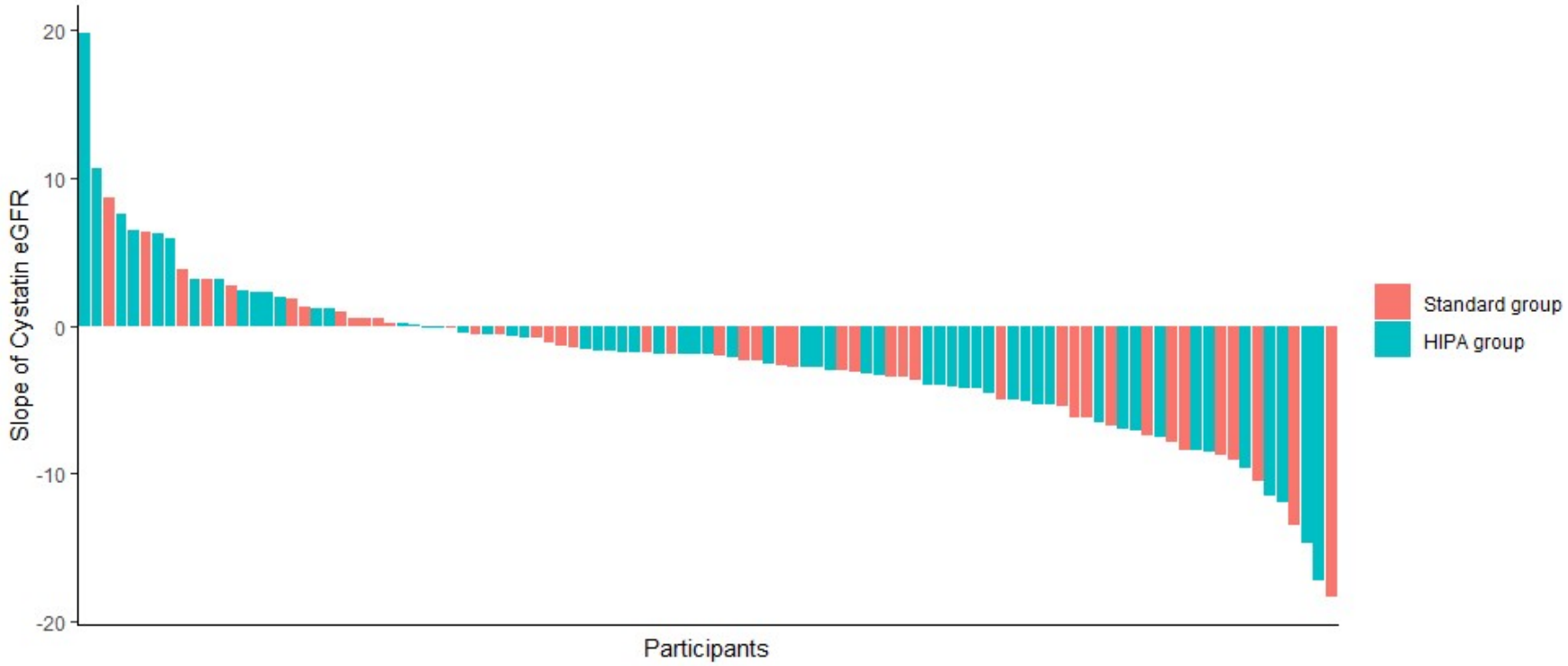
18
21
24
Time (months)
HIPA group
STD group


Cystatin-eGFR
70
60
50
40
0
3
6
9
12
15
18
21
24
Time (months)
HIPA group
STD group

	HIPA group	Std group	Mean difference (95% CI)	Univariate model: P value	Multivariate model: P value
cys C- eGFR slope (ml/min/yr)	-1.92 (-4.97-0.16)	-2.16 (-5.83-0.35)	0.72 (-1.43 to 2.88)	0.5124	0. 5960
cys C- eGFR (ml/min/1.73 m²)				0.4315	0.3231
M0	50.75 (35.62-61.36)	56.89 (42.74-68.29)			
M6	53.72 (35.06-65.31)	49.55 (37.80-64.28)			
M12	49.44 (35.41-61.77)	53.36 (36.67-69.22)			
M18	48.17 (36.46-60.92)	46.54 (34.58-64.13)			
M24	49.57 (35.50-59.68)	46.41 (33.70-64.67)			

RESULTS


20
10
0
-10
-20
Slope of Cystatin eGFR
Participants
Standard group
HIPA group

		CITY	Screened	Randomised	Analysable
02	CHU Nantes	Nantes	30	20	20
05	CHU Clermont-Ferrand	Cl Fd	17	15	11
14	CHU Strasbourg	Strasbourg	19	17	11
10	Hôpital Lariboisière AP-HP	Paris	11	10	9
01	CHU Poitiers	Poitiers	13	8	7
11	CHU Toulouse	Toulouse	10	8	7
16	Les Hospices Civils de Lyon	Lyon	17	11	7
04	CHU Bordeaux	Bordeaux	9	7	6
07	CHU Besançon	Besançon	14	5	3
12	CHU Tours	Tours	4	4	3
13	Hôpital Pitié-Salpêtrière AP-HP	Paris	5	4	3
20	CHU Liège	Liège	2	2	2
09	CHU Lille	Lille	3	2	2
08	CHU Nice	Nice	1	1	1
22	HEGP AP-HP	Paris	4	1	1
21	Hôpitaux de Chartres	Chartres	3	1	1
15	Hôpital Bichat AP-HP	Paris	9	5	0
03	Centre Hospitalier Sud Francilien	Corbeil	2	0	0
06	CHRU Nancy	Nancy	2	0	0
19	CHU Dijon Bourgogne	Dijon	1	0	0
18	CHU Montpellier	Montpellier	2	1	0