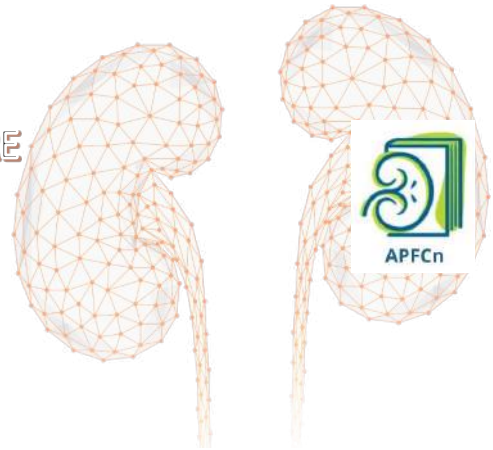
FMC TRANSPLANTATION 25.09.2026

GESTION du RISQUE CARDIO-VASCULAIRE CHEZ LE TRANSPLANTÉ RÉNAL

Pr Bruno MOULIN
Service de **Néphrologie Dialyse** et **Transplantation**
Hôpitaux Universitaires de Strasbourg



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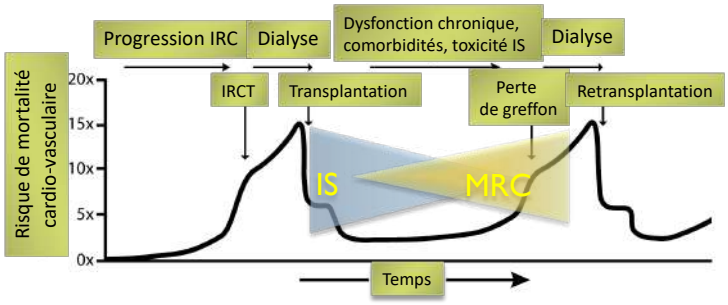
Objectifs



- Connaître l'épidémiologie des maladies cardio-vasculaires et de l'hypertension artérielle après transplantation rénale
- Evaluer le risque CV du transplanté rénal
- Savoir détecter l'hypertension artérielle post-transplantation
- Savoir adapter le traitement anti-hypertenseur à la spécificité du transplanté rénal
- Savoir prendre en charge la dyslipidémie du transplanté

2

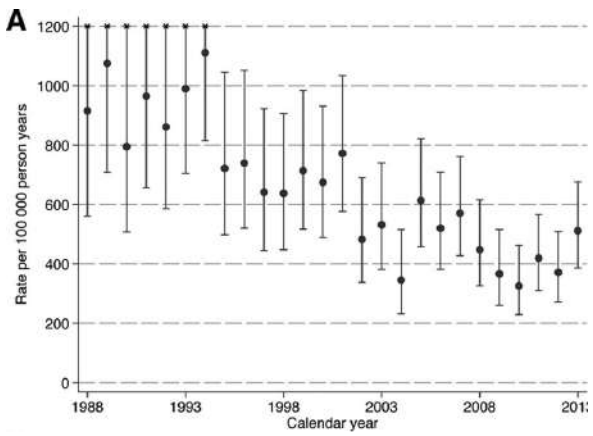
Prise en charge du suivi du transplanté au long cours



Un suivi néphrologique à long terme

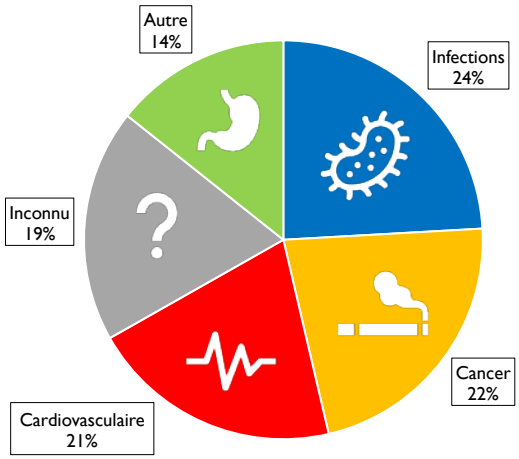
- 41 000 transplantés (+ 3000 / an)
- **Facteurs de risque cardio-vasculaires**
- IRC (anémie, P-Ca, …)
- Complications infectieuses
- Détection des complications néoplasiques

Causes de Décès et Evènements coronaires en transplantation rénale



Evolution des taux de mortalité cardiovasculaire au cours du temps

Wyld et al., Cardiac Mortality in Kidney Transplant Patients: A Population-based Cohort Study 1988-2012 in Australia and New Zealand. Transplantation. 2021



Causes de mortalité 2008-2014, cohorte Astre-Divat (1324 décès)

Beaudrey et al. under review

ANTÉCÉDENTS

- Mr X…, 58 ans, NIgA,
- BMI=31 Kg/m², non diabétique,
- Tabac (15 pa),
- IDM (2016) – HTA

- Janvier 2021 - TR D DCD (CE)
- HTA post-TR -> + URAPIDIL
- Mars 2021 M3 : RA ¢

- Janvier 2022 (M12):
  - HTA persistante (170/100 mmHg), Tabac (10 cig/j)

BILAN BIOLOGIQUE

- Créat S : 130 µmol/L (DFGe 48mL/min).
- Kaliémie = 5,2 mmol/L
- Ratio PU/Créat U = 0,8g/g
- LDL c = 1,60 g/L

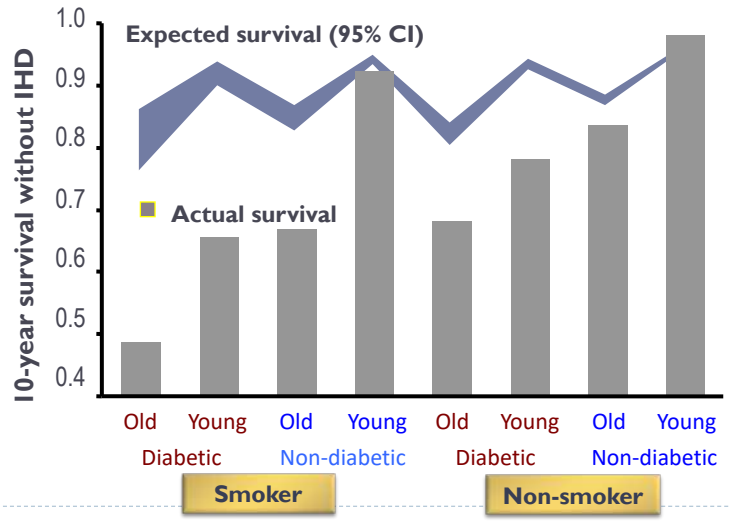
TRAITEMENTS

- Tacrolimus : 10mg/j ; Pred: 5mg/j; MMF= 2g/j
- Urapidil LP 60mg x2/j; Amlodipine 5mg/j

QUESTIONS

1. Quel est le niveau de risque CV de ce patient ?
2. Prévalence et conséquences de l'HTA
3. Quel traitement approprié de l'HTA
4. L'hyperlipidémie un facteur de risque à corriger ?

Risque observé et attendu (Framingham) de cardiopathie ischémique après TxR



Kasiske, JASN 2000

Facteurs de risque cardio-vascula

- FRCV TR
  - Age: > 5
  - Sexe ma
  - Cardiop
  - HTA : C
  - Hyperlip
  - Diabète
  - IRC (<6
  - Tabac C
  - Obésité
  - HVG : C



Risk Factors for Post-Transplant CVE in Kidney Transplant Recipients Maintained on Tacrolimus

KIDNEY360
Accessing Our World From Every Angle
Clinical Research

RETROSPECTIVE

King Chulalongkorn Memorial Hospital (Bangkok, Thailand)

Kidney Transplant recipients (KTR) who received tacrolimus and mycophenolic acid (MPA) as maintenance
n=553

January 1, 2010 to December 31, 2022

Kidney allograft biopsies
(part of surveillance protocol at 6 months, 1 year, and 2 years post-transplantation)

15.88
per 1000 patient years
Incidence of Post-transplant Cardiovascular Events (CVE)

Key factors significantly associated with post-transplant CVE

- Recipient age
- 24 hour Urine CrCl
- Diabetes Mellitus
- Post-transplant serum calcium
- Post-transplant HbA1C
- Rejection

3.0-fold
(95% CI 1.22-7.37)
p 0.016
History of T cell-mediated rejection
Risk for post-transplant CVE

3.38-fold
(95% CI 1.13-10.09)
p 0.029
History of Antibody-mediated rejection
Risk for post-transplant CVE

Compared to models using pre-transplant factors alone, models that included both pre- & post-transplant variables demonstrated significantly higher prediction performance

Conclusions: Allograft rejections significantly increased the risk of post-transplant CVE. Surveillance protocols for post-transplant CVE should include KTR with a history of allograft rejection, in addition to the traditional high-risk groups.

Peemal Amornkanjanawat, Stephen J Kerr, Thunyatorn Wuttiputhanun, et al. ***Kidney Allograft Rejection as an Independent Non-traditional Risk Factor for Posttransplant Cardiovascular Events.*** *Kidney360.* DOI: 10.34067/KID.0000000773

Visual Abstract by Edgar Lerma, MD, FASN

Effets des agents IS sur les facteurs de RCV ?

HTA ? DYSLIPIDEMIE ? DIABETE ?

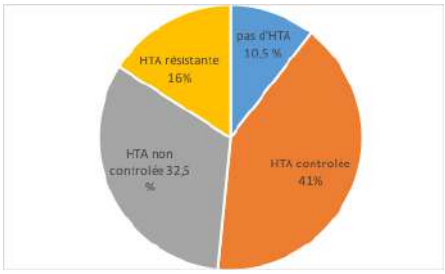
	AZA ou MMF	CS	CICLO	TACRO	Anti-mTOR	BELATACEPT
HTA	-	↑↑	↑↑	↑	-	-
DYSLIPIDÉMIE	-	↑↑	↑↑	↑	↑↑↑	-
DIABÈTE	-	↑↑	↑	↑↑	↑	-

QUESTIONS

1. Quel est le niveau de risque CV de ce patient ?
2. Prévalence et conséquences de l'HTA
3. Quel traitement approprié de l'HTA
4. L'hyperlipidémie un facteur de risque à corriger ?

Une prévalence ÉLEVÉE de l' HTA résistante ou non contrôlée

- Epidémiologie: 50 à 90% selon séries et définitions
- HTA contrôlée < 50% des patients
- HTA résistante : 15 à 25 % des cas



Etude monocentrique transversale, Montpellier, 811 patients : facteurs associés à l'HTA résistante

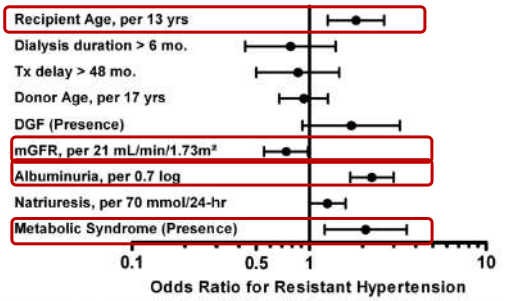


FIGURE 1. Risk factors for RH in the multivariate analysis. RH, resistant hyper tension.

- *Vetromile Transplantation 2015; 1016*

Mécanismes de l'HTA post-TR

Dysfonction chronique du greffon
- RDF
- Rejet aigu ou chronique

Facteurs « immunologiques »

Immunosuppression
- CsA, Tacrolimus
- Corticostéroïdes

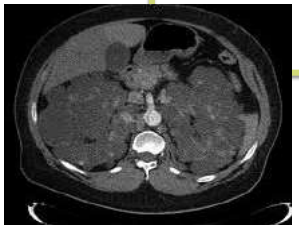
HTA Post TR

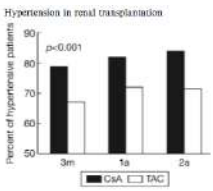
Facteurs non-immunologiques

Donneur
- Rein NAS
- HTA familiale



Receveur
- HTA préexistante
- Récidive de néphropathie
- Apports en Na
- Syndrome métabolique
- SARG
- SAS
- Reins natifs (PKR ++)
- Hyperactivité sympathique



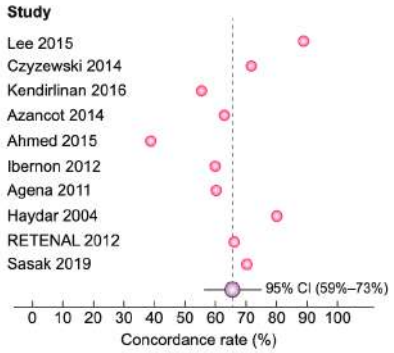


- D'après Tantisattamo et al, Frontiers in Medicine 2020

Nephrol Dial Transplant (2021) 36: 1326–1346
doi: 10.1093/ndt/gfab076
Advance Access publication 25 March 2021

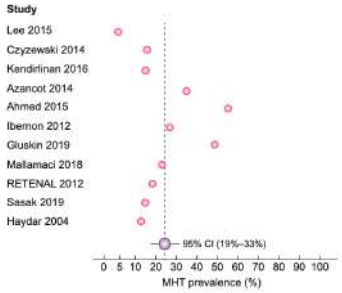
Diagnostic : Blood pressure monitoring in kidney transplantation: a systematic review on hypertension and target organ damage

Une concordance **modeste** entre la PA de consultation vs MAPA (-> 66%)

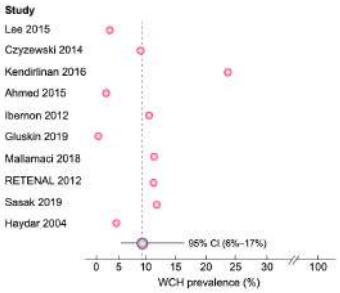


Une prévalence élevée de l'HTA masquée et de l'HTA blouse blanche

HTA Masquée (25%)



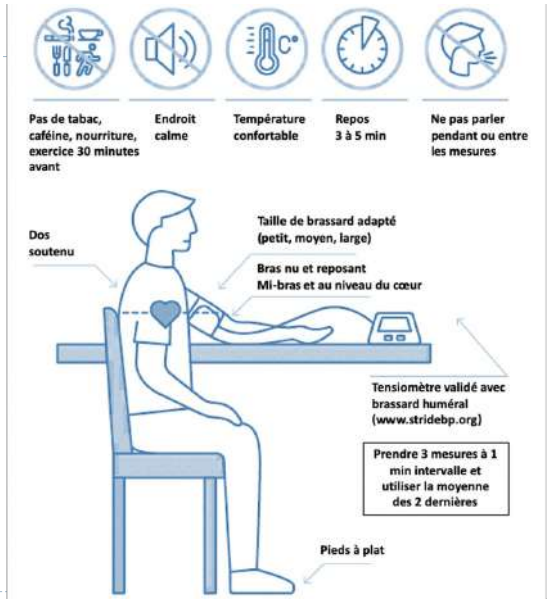
HTA « blouse blanche » (10%)



- Pisano CKJ 2022

MESSAGE

- Si vous prenez la PA en CS faites le en mesure standardisée (ou sinon rien !!)
- Recourir à l'automesure ++ voire à la MAPA (intérêt pour détecter les non-dippers ou les « reverse » dippers)



Questions

Observation



- Mr X..., 58 ans, NIgA, BMI=31 Kg/m², non diabétique, tabac (15 pa), IDM (2014) – HTA (urapidil + ß-B)
- Janvier 2018 - TR D DCD (rein à CE); Arrêt TT anti HT: HTA post-TR -> + Amlodipine
- Avril 2018 (M3): Rejet -> bolus MPS (PBG: Rejet ¢, récidive IgA)
- Janvier 2019 (M12):
  - HTA persistante (170/100 mmHg), Tabac (10 cig/j), BMI=33 Kg/m²
  - Tacrolimus : 10mg/j ; Pred: 5mg/j; MMF= 2g/j
  - Urapidil LP 60mg x2/j; Amlodipine 5mg/j
- Créatininémie stable: 140 µmol/L (DFGe =45mL/min).
- Kaliémie = 5,7mmol/L
- Ratio PU/Créat U = 1g/g
- LDL c = 1,75 g/L

QUESTION

1. Quel est le niveau de risque CV de ce patient ?
2. Prévalence et conséquences de l'HTA
3. Quelle cible et quel traitement approprié de l'HTA
4. L'hyperlipidémie un facteur de risque à corriger ?

Quels objectifs tensionnels chez le TR: KDIGO 2012 et 2021 – ESC-ERA 2026

2017 ACC/AHA/AAPA/ABC/ACPM/ AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults

< 140/90 mmHg

COR	LOE	RECOMMENDATIONS
IIa	SBP: B-NR DBP: C-EO	1. After kidney transplantation, it is reasonable to treat patients with hypertension to a BP goal of less than 130/80 mm Hg (S9.3.1-1).
IIa	B-R	2. After kidney transplantation, it is reasonable to treat patients with hypertension with a calcium antagonist or [illegible] improved GFR and kidney survival (S9.3.1-2).

130/80

Chapter 4: Blood pressure management in kidney transplant recipients (CKD G1T–G5T)

Practice Point 4.1: Treat adult kidney transplant recipients with high BP to a target BP of <130 mm Hg systolic and <80 mm Hg diastolic using standardized office BP measurement (see Recommendation 1.1).

Recommendation 4.1: We recommend that a dihydropyridine calcium channel blocker (CCB) or an ARB be used as the first-line antihypertensive agent in adult kidney transplant recipients *(1C)*.

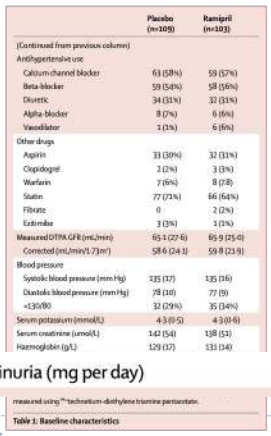
Quelles classes d'antihypertenseurs utiliser chez le transplanté ?

Antihypertenseur	Avantages	Inconvénients
Inhibiteur calcique	↑DSR, ↓ NTX	Œdèmes, hyperplasie gingivale
IEC ou ARA2 (BSRA)	↓ Protéinurie, Polyglobulie	IRAF, anémie, hyperK
ß-Bloquants	Cardioprotection, ↓ act. ∑	↑ Lipides
Diurétiques HCTZ	HTA sensible au sel, +BSRA	IRAF, ↑ Lipides, K cutanés (?)
Diurétiques de l'anse	HTA volodépendante +BSRA	IRAF, hypomagnésémie
MRA (Spironolactone)	Dysfonction systolique	HyperK (Si + IEC/ARA2)
Bloqueurs alpha-1 (central et périph)	Effet rénal et métabolique « neutre ». , ↓ act. ∑.	

Ramipril versus placebo in kidney transplant patients with proteinuria: a multicentre, double-blind, randomised controlled trial

Greg A Knoll*, Dean Fergusson*, Michaël Chassé, Paul Hebert, George Wells, Lee Anne Tibbles, Darin Treleaven, David Holland, Christine White, Norman Muirhead, Marcelo Cantarovich, Michel Paquet, Bryce Kiberd, Sita Gourishankar, Jean Shapiro, Ramesh Prasad, Edward Cole, Helen Pilmore, Valerie Cronin, Debora Hogan, Tim Ramsay, John Gill

Lancet Diabetes Endocrinol 2016; 4: 318–26



	Placebo (n=105)	Ramipril (n=103)
(Continued from previous column)		
Antihypertensive use		
Calcium channel blocker	61 (58%)	59 (57%)
Beta-blocker	59 (54%)	58 (56%)
Diuretic	34 (31%)	32 (31%)
Alpha-blocker	8 (7%)	6 (6%)
Vasodilator	1 (1%)	6 (6%)
Other drugs		
Aspirin	33 (30%)	32 (31%)
Clopidogrel	2 (2%)	3 (3%)
Warfarin	7 (6%)	8 (78)
Statin	77 (71%)	66 (64%)
Fibrate	0	2 (2%)
Ezetimibe	3 (3%)	1 (1%)
Measured DTPA GFR (mL/min)	65·1 (27·6)	65·9 (25·0)
Corrected (mL/min/1·73m²)	58·6 (24·1)	59·8 (23·9)
Blood pressure		
Systolic blood pressure (mm Hg)	135 (17)	135 (16)
Diastolic blood pressure (mm Hg)	78 (10)	77 (9)
<130/80	32 (29%)	35 (34%)
Serum potassium (mmol/L)	4·3 (0·5)	4·3 (0·6)
Serum creatinine (μmol/L)	142 (54)	138 (51)
Haemoglobin (g/L)	129 (17)	131 (14)
Proteinuria (mg per day)	400 (270–720)	430 (270–813)

measured using ⁹⁹ᵐtechnetium-diethylene triamine pentaacetate.

Table 1: Baseline characteristics

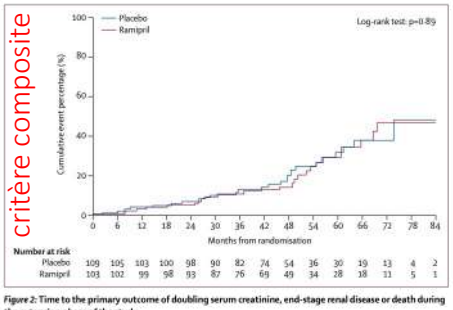
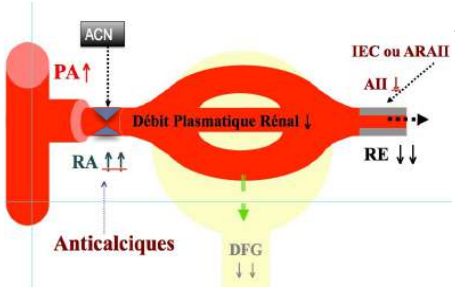


Figure 2: Time to the primary outcome of doubling serum creatinine, end-stage renal disease or death during the extension phase of the study

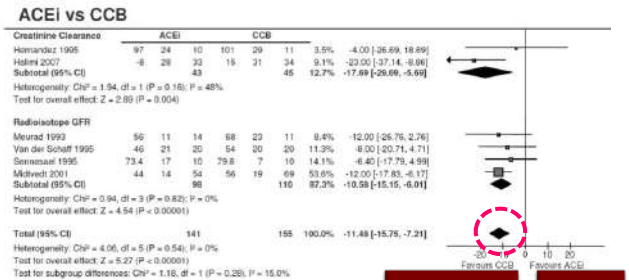
- 14 centres
- 231 patients randomisés
- GFR>20 ml/min et Purie> 0,2 g/j
- Pas de différence critère composite
  - Perte du greffon
  - DC
  - Fonction rénale
- + effets 2^{daires} dans le bras ramipril

Anticalciques vs IEC : fonction du greffon



- Rationnel physiopathologique: VD de l'artériole afférente
- Effet néphroprotecteur à long terme ?

AntiCa DHP Vs IEC



Pas de différence concernant la survie patient ou greffon ni les ECV (peu d'études)

AntiCa ← →IEC

AntiCa + 12 ml/min

- *Cross Transplantation 2009*

ICa vs IEC / ARA2

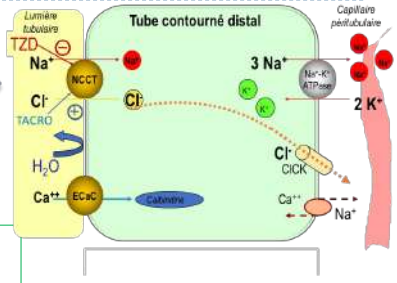
CCBs versus ACEIs treatment			
eGFR/CrCl (mL/min)	MD 11.07 (6.04–16.09)	179 (4)	⊕⊕⊕○[d,f] Moderate
SCr (mg/dL)	MD −0.12 (−0.22 to −0.03)	287 (5)	⊕⊕⊕○[c] Moderate
SBP (mmHg)	MD −2.65 (−6.46–1.17)	200 (3)	⊕⊕⊕○[c] Moderate
DBP (mmHg)	MD −0.61 (−2.86–1.63)	200 (3)	⊕⊕⊕○[c] Moderate
MAP (mmHg)	MD 0.74 (−1.85–3.34)	206 (4)	⊕⊕⊕○[c] Moderate
Serum potassium (mEq/L)	MD −0.18 (−0.31 to −0.05)	164 (4)	⊕⊕⊕○[c] Moderate
CCBs versus ARBs treatment			
SCr (mg/dL)	MD 0.09 (−0.08–0.26)	194 (3)	⊕⊕○○[c] Low
CCBs versus RAS blockade treatment			
Any rejection episodes	RR 0.54 (0.06–5.18)	241 (3)	⊕⊕○○[d] Low
eGFR/CrCl (mL/min)	MD 11.07 (6.04–16.09)	179 (4)	⊕⊕⊕○[d,f] Moderate
SCr (mg/dL)	MD −0.05 (−0.16–0.06)	427 (7)	⊕⊕⊕○[c] Moderate
MAP (mmHg)	MD 1.76 (−1.96–5.48)	273 (5)	⊕⊕○○[f] Low
Serum potassium (mEq/L)	MD −0.24 (−0.38 to −0.10)	274 (5)	⊕⊕⊕○[c] Moderate
ACEIs versus ARBs treatment			
SCr (mg/dL)	MD −0.02 (−0.13–0.08)	173 (3)	⊕⊕⊕○[c] Moderate
Serum potassium (mEq/L)	MD 0.02 (−0.09–0.13)	173 (3)	⊕⊕⊕○[c] Moderate

Conclusions. CCBs could be the preferred first-step antihypertensive agents in kidney transplant patients, as they improve graft function and reduce graft loss.

- Pisano et al., NDT, 2019

Autres anti hypertenseurs

- **Diurétiques thiazidiques** (ou TZD-like) ++ (si hyperK et hypoMg)
- Diurétiques de l'anse si surcharge
- ß-Bloquant si indication cardiaque
- Si désir de grossesse:
  1. Alphaméthyldopa
  2. Labetolol
  3. Clonidine, nifédipine
  4. Betabloquants, furosémide



Urgence hypertensive: labetalol IV, urapidil IV, [nicardipine IV -> ⚠ interactions ++ !]

Antihypertenseurs chez le transplanté :

Messages pratiques

1. **Début greffe: plutôt -> Anticalciques pour prévenir la néphrotoxicité des anticalcineurines (Attention aux interactions métaboliques (CyP450): Vérapamil, Diltiazem, Nicardipine…)**
2. **Si indications spécifiques (Protéinurie >1g/g, HTA sévère, Indications CV…) -> IEC/ARA2 à manier avec prudence …**
3. **Place de thiazidiques à préciser (théoriquement justifiée), risque augmenté de carcinomes cutanés x 2 (*Letellier CJASN 2020*)**
4. **Penser aux causes d'HTA secondaire (notamment si HTA résistante ou altération de la fonction du greffon)**
5. **Place des iSGLT2 encore à définir (essais en cours)**

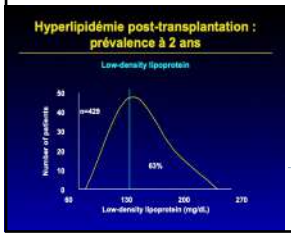
- Créatininémie stable à 140 µmol/L (**DFGe =45mL/min**).
- **Kaliémie = 5,7mmol/L**
- Ratio PU/Créat U = **1g/g**
- LDL c = 1,75 g/L

QUESTION

1. Quel est le niveau de risque CV de ce patient ?
2. Prévalence et conséquences de l'HTA
3. Quel traitement approprié de l'HTA
4. L'hyperlipidémie un facteur de risque à corriger ?

Dyslipidémie fréquente chez le transplanté rénal

		Prévalence
Cholestérol	↑	60%
LDL-c	↑	60%
TG	↑	35%
Lp (a)	↑	25%
HDL-c	↓	>15%
Non-HDL-c	↑	20-50%



Causes de l'hyperlipidémie post-TR

- Corticostéroïdes++
- Ciclosporine++
- Anti-mTOR +++
- Insuffisance rénale+
- Protéinurie++
- Diurétiques/ß-B
- Surpoids
- Age
- Diabète +
- Hyperlipidémie prétransplantation

TRAITEMENT PHARMACOLOGIQUE : DIALYSES et TRANSPLANTES

GRADE	
2A	Chez les dialysés adultes, **ne pas débuter** un traitement par statines ou une combinaison Statine/ezetimibe
2C	Chez les patients déjà traités par statines ou une combinaison Statine/ezetimibe au démarrage de la dialyse, **poursuivre** ces agents
2A	Chez les transplantés de rein adultes, **traiter** par statines

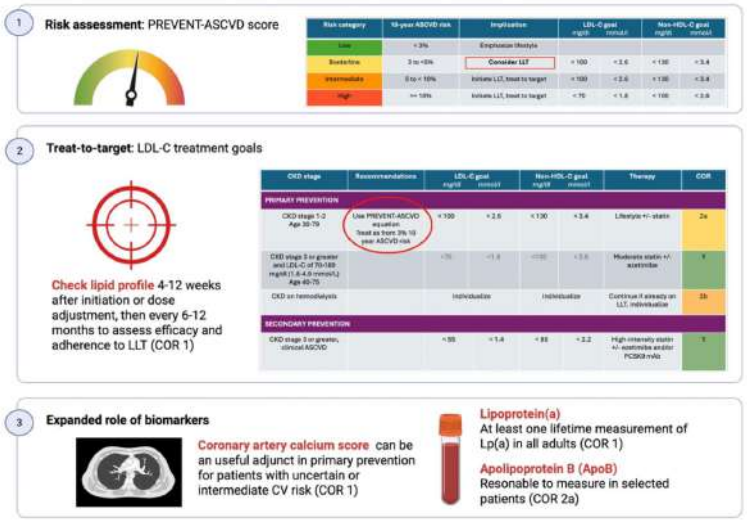
4D - AURORA

SHARP 2141 pts (34%) from non-dialysis status to dialysis

ALERT

KDIGO 2013
STATINES POUR TOUS ??

Filtering the 2026 ACC/AHA guidelines of dyslipidaemia management: what nephrologists need to know (Van Craenenbroeck et al, EuReCa-M WG of the ERA - NDT 2026)

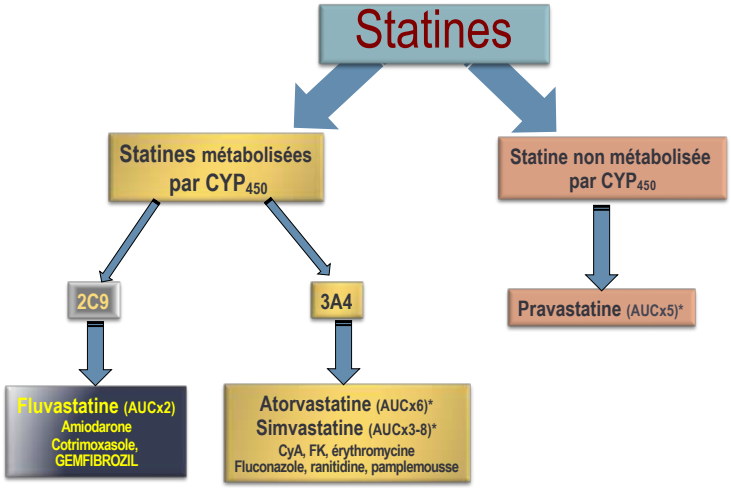


Quand débuter un traitement hypolipémiant chez le TR

- **RCV : âge (>50ans H, >60 ans F), ATCD CV familiaux (<55 ans père, <65 ans mère), diabète (++) associé, tabagisme actif, HTA non contrôlée (et contexte MRC/TR)**

Sujets > 50 ans		
Fonction du greffon : DFGe	LDL Cible	Situations particulières
>60 mL/min et RCV élevé	LDL-c <1g/L	LDL-c< 0,7g/L si 2 facteurs associés ou diabète
<60 mL/min	LDLc<0,70g/L	LDL-c< 0,55g/L si prévention secondaire
<30 mL/min	LDL-c <0,55 g/L	
Sujets jeunes (<50 ans)		
Fct du risque CV à 10 ans du patient (Echelle européenne Score2 , RCV à 10 ans)		DFGe <60 mL/min= RCV élevé

Quelles statines utiliser ? Interaction avec anticalcineurines



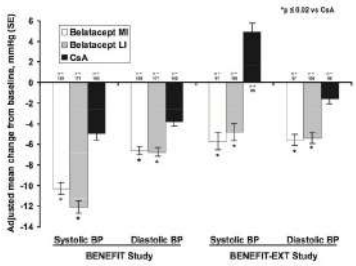
À retenir

- Utiliser à **faible dose** (AUC x 3 à 8 avec ACN)
- Eviter association avec **fibrates**
- Effet à long terme sur la **prévention des MCV**
- Pas d'effet démontré sur **progression IR** (SHARP) et sur **rejet ou fonction du greffon** (ALERT)
- Rosuvastatine non recommandée

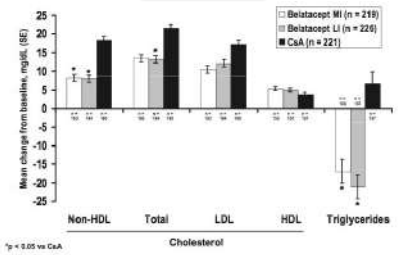
*AUC=AUC statine (interaction avec CsA)

Amélioration du profil CV après élimination de l'ACN (BENEFIT)

HTA



LIPIDES



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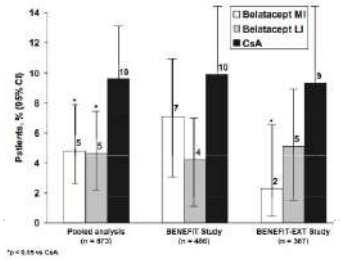
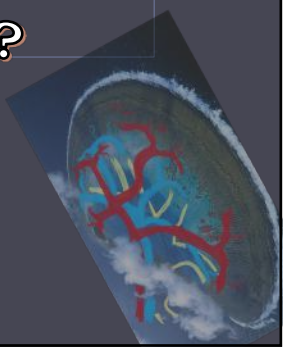
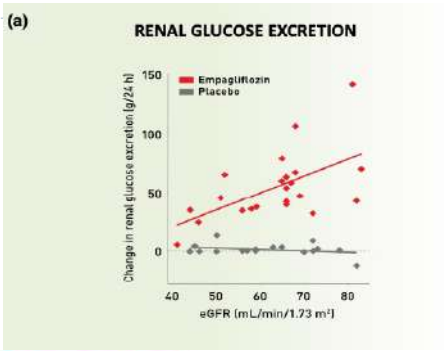


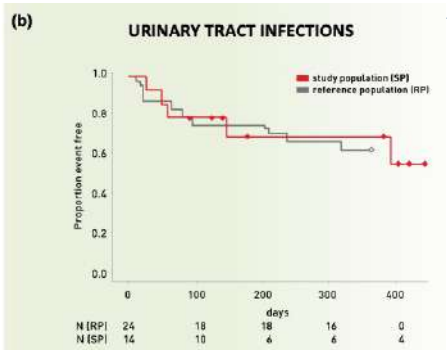
Les iSGLT2 ont-ils déjà leur place chez le transplanté rénal ?



Messages délivrés par 2 études prospectives (Oslo et Vienne)

Patients inclus après 1 an post TR





Antihyperglycemic effect

HbA_{1c} reduction of 0.2 % in Oslo at week 24, compared to a slight increase in the placebo group.
Clinically relevant rise in 2-hour glucose and SMBG at week 4 in Vienna, and a statistically significant increase in HbA_{1c} by 0.4 % at month 12 in Vienna.

Kidney Function

Initial drop in eGFR after therapy start (-8.1 mL/min/1.73m² in Vienna at week 4; -4 mL/min/1.73m² in Oslo at week 8), but kidney function then stabilizes.

Body weight

-2.5 kg in Oslo at week 24, compared to an increase in the placebo group; -5 kg in Vienna at month 12.

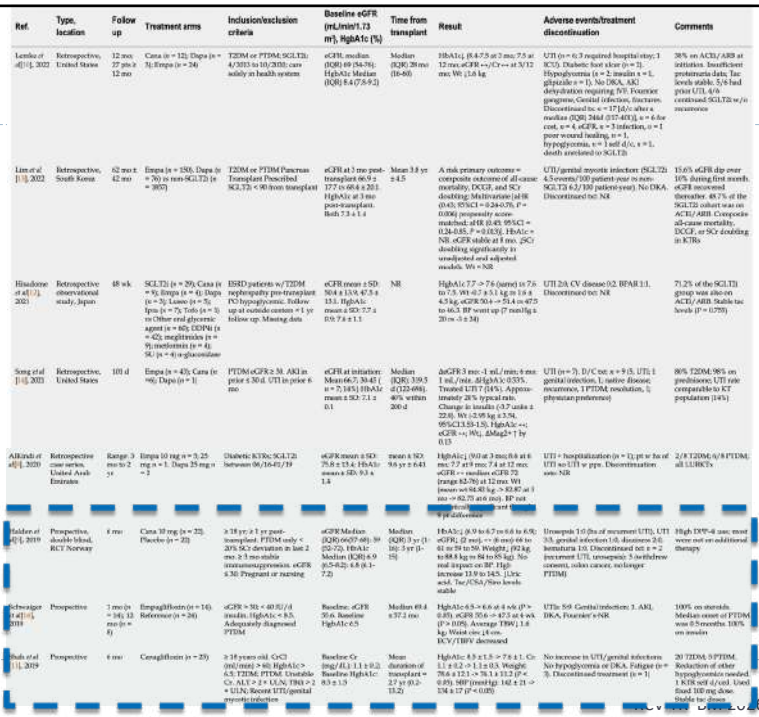
Metabolism

Decrease in uric acid, increase in LDL cholesterol, decrease in oral glucose insulin sensitivity.

Contrôle médiocre du diabète notamment chez les patients antérieurement traités par Insuline

- (a) Halden TAS et al, Diabetes Care 2019 & (b) Schwaiger E et al, AJT 2019

ISGLT2 & TR : Des études publiées uniquement chez les transplantés diabétiques et non randomisées



Ref.	Type, location	Follow up	Treatment arms	Inclusion/exclusion criteria	Baseline eGFR (mL/min/1.73 m²), HgbA1c (%)	Time from transplant	Result	Adverse events/treatment discontinuation	Comments
Lemke et al[16], 2022	Retrospective, United States	12 mo; 27 pts ≥ 12 mo	Cana (n = 12); Dapa (n = 3); Empa (n = 24)	T2DM or PTDM; SGLT2i; 4/2013 to 10/2020; care solely in health system	eGFR, median (IQR) 69 (54-78); HgbA1c Median (IQR) 8.4 (7.8-9.2)	Median (IQR) 28 mo (10-60)	HbA1c↓ (8.4-7.5 at 3 mo; 7.5 at 12 mo; eGFR ↔/Cr ↔ at 3/12 mo; Wt ↓1.6 kg	UTI (n = 6; 3 required hospitalization; 1 ICU). Diabetic foot ulcer (n = 1). Hypoglycemia (n = 2; insulin + 1, glipizide n = 1). No DKA, AKI, dehydration requiring IVF. Fournier gangrene, Genital infection, fractures. Discontinued tx: n = 17 [d/c after a median (IQR) 244.0 (137-403)], n = 6 for cost, n = 4, eGFR, n = 3 infection, n = 1 poor wound healing, n = 1, hypoglycemia, n = 1 self d/c, n = 1, death unrelated to SGLT2i	38% on ACEI/ARB at initiation. Insufficient proteinuria data. Tac levels stable. 5/8 had prior UTI. 4/9 continued SGLT2i w/o recurrence
Lim et al[13], 2022	Retrospective, South Korea	62 mo ± 42 mo	Empa (n = 150). Dapa (n = 76) vs non-SGLT2i (n = 393)	T2DM or PTDM Pancreas Transplant Prescribed SGLT2i < 90 from transplant	eGFR at 3 mo post-transplant 66.9 ± 17.7 vs 68.4 ± 20.1. HgbA1c at 3 mo post-transplant. Both 7.3 ± 1.4	Mean 3.8 yr ± 4.5	A risk primary outcome = composite outcome of all-cause mortality, DCGF, and SCr doubling; Multivariate [aHR (0.43; 95%CI = 0.24-0.76, P = 0.004) propensity score-matched: aHR (0.45; 95%CI = 0.24-0.85, P = 0.013)]. HbA1c = NR. eGFR stable at 1 mo. ↓SCr doubling significantly in unadjusted and adjusted models. 9% = NR	UTI/genital mycotic infection (SGLT2i) 4.5 events/100 patient-year vs non-SGLT2i 6.2/100 patient-year). No DKA. Discontinued tx: NR	15.6% eGFR dip over 10% during first month. eGFR recovered thereafter. 48.7% of the SGLT2i cohort was on ACEI/ARB. Composite all-cause mortality, DCGF, or SCr doubling in KTRs
Hisadome et al[17], 2021	Retrospective observational study, Japan	48 wk	SGLT2i (n = 29); Cana (n = 9), Empa (n = 4), Dapa (n = 3); Luseo (n = 5); Ipra (n = 7); Tofo (n = 1); no Other oral glycemic agent (n = 60); DDPi4 (n = 42); meglitinides (n = 9); metformin (n = 4); SU (n = 4) α-glucosidase	ISRD patients w/T2DM nephropathy pre-transplant PO hypoglycemic. Follow up at outside centers = 1 yr follow up. Missing data	eGFR mean ± SD: 50.4 ± 13.9; 47.5 ± 13.1. HgbA1c mean ± SD: 7.7 ± 0.9; 7.8 ± 1.1	NR	HgbA1c 7.7 -> 7.6 (same) in 7.5 to 7.5. Wt -0.7 ± 3.1 kg in 1.6 ± 4.5 kg. eGFR 50.4 -> 51.4 vs 47.5 to 46.3. BP went up (7 mm Hg ± 20 vs -1 ± 24)	UTI 2/6. CV disease 0/2. BPAR 1/1. Discontinued tx: NR	71.2% of the SGLT2i group was also on ACEI/ARB. Stable tac levels (P = 0.755)
Song et al[14], 2021	Retrospective, United States	101 d	Empa (n = 43); Cana (n = 6); Dapa (n = 1)	PTDM eGFR ≥ 30. AKI in prior 6.30 d. UTI in prior 6 mo	eGFR at initiation: Mean 66.7; 30-45 [n = 7; 14%]; HbA1c mean ± SD: 7.1 ± 0.1	Median (IQR): 339.5 d (122-698). 46% within 200 d	ΔeGFR 3 mo -1 mL/min; 6 mo: 1 mL/mi. ΔHgbA1c 0.55%. Treated UTI 7 (14%). Approximately 28 % typical min. Change in insulin (-3.7 units ± 22.6). Wt ↓2.95 kg ± 3.94, 95%CI 3.55-1.5). HgbA1c ↔; eGFR ↔; 9%; ΔMag2+ 7 by 0.13	UTI (n = 7). D/C tac n = 9 (5, UTI; 1 genital infection, 1, native disease, recurrence, 1 PTDM, resolution, 1; physician preference)	86% T2DM; 98% on prednisone; UTI rate comparable to KT population (14%)
Alkindi et al[15], 2020	Retrospective case series, United Arab Emirates	Range: 3 mo to 2 yr	Empa 10 mg n = 3; 25 mg n = 1. Dapa 25 mg n = 2	Diabetic KTRs; SGLT2i between 06/16-03/19	eGFR mean ± SD: 75.8 ± 13.4; HbA1c mean ± SD: 9.3 ± 1.4	mean ± SD: 9.6 yr ± 6.41	HgbA1c↓ (9.0 at 3 mo; 8.6 at 6 mo; 7.7 at 9 mo; 7.4 at 12 mo; eGFR ↔ median eGFR 72 [range 82-78] at 12 mo; Wt [mean wt 94.40 kg -> 82.87 at 3 mo -> 82.73 at 6 mo). BP not [illegible] and [illegible] 9 pt difference	UTI + hospitalization (n = 1); pt w hx of UTI no UTI w ppx. Discontinuation rate: NR	2/8 T2DM; 6/8 PTDM; all LURKTs
Halden et al[12], 2019	Prospective, double blind, RCT Norway	6 mo	Cana 10 mg (n = 22). Placebo (n = 22)	≥ 18 yr; ≥ 1 yr post-transplant. PTDM only < 20% SCr deviation in last 2 mo. ≥ 3 mo stable immunosuppression. eGFR ≤ 30. Pregnant or nursing	eGFR Median [IQR] 66 (57-68). 39 [52-72]. HbA1c Median (IQR) 6.9 (6.5-8.2); 6.8 (6.1-7.2)	Median (IQR) 3 yr (1-16); 3 yr (1-15)	HbA1c↓ (6.9 to 6.7 vs 6.6 to 6.9); eGFR; (2 mo), ↔ (6 mo) 66 to 61 vs 59 to 56. Weight↓ (82 kg to 80.8 kg vs 84 to 85 kg). No real impact on BP. High increase 13.9 to 14.5. Uric acid. Tac/CSA/Siro levels stable	Urosepsis 1/0 (hx of recurrent UTI). UTI 3/3, genital infection 1/0, dizziness 2/0, hematuria 1/0. Discontinued tx: n = 2 (recurrent UTI, urosepsis; 3 withdrew consent, colon cancer, no longer PTDM)	High DPP-4i use; most were not on additional therapy
Schwaiger et al[11], 2019	Prospective	3 mo (n = 14); 12 mo (n = 8)	Empagliflozin (n = 14). Reference (n = 26)	eGFR > 30; < 60 IU/d insulin. HgbA1c < 8.5. Adequately diagnosed PTDM	Baseline, eGFR 59.6. Baseline HgbA1c 6.5	Median 69.4 ± 57.2 mo	HgbA1c 6.5 -> 6.6 at 4 wk (P > 0.05). eGFR 59.6 -> 47.5 at 4 wk (P > 0.05). Average TBW↓ 1.6 kg. Waist circ ↓8 cm. ECV/TBFV decreased	UTIs 5/9. Genital infection; 3. AKI, DKA, Fournier's NR	100% on steroids. Median onset of PTDM was 0.5 months. 100% on insulin
Bals et al[18], 2019	Prospective	6 mo	Canagliflozin (n = 20)	≥ 18 years old. CrCl (ml/min) > 60. HgbA1c > 6.5. T2DM; PTDM. Unstable Cr. ALT > 2 × ULN; TBili > 2 × ULN; Recent UTI/genital mycotic infection	Baseline Cr (mg/dL): 1.1 ± 0.2. Baseline HgbA1c: 8.3 ± 1.3	Mean duration of transplant = 2.7 yr (0.2-13.2)	HgbA1c 8.5 ± 1.5 -> 7.6 ± 1. Cr: 1.1 ± 0.2 -> 1.1 ± 0.3. Weight: 78.6 ± 12.1 -> 76.1 ± 11.2 (P < 0.05). SBP [mmHg]: 142 ± 21 -> 134 ± 17 (P < 0.05)	No increase in UTI/genital infections. No hypoglycemia or DKA. Fatigue (n = 3). Discontinued treatment (n = 1)	20 T2DM; 0 PTDM. Reduction of other hypoglycemics needed. 1 KTR self-d/cntd. Used fixed 100 mg dose. Stable tac doses

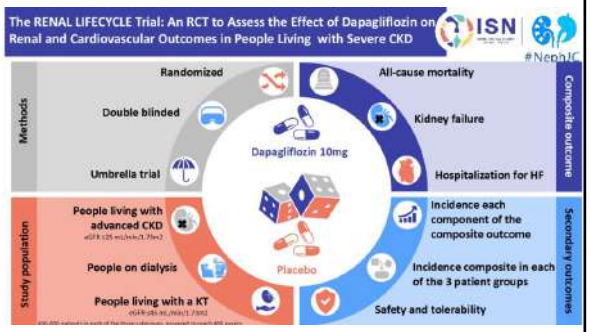
- WJT Sept 2023

Will SGLT2 Inhibitors Be Effective and Safe in Patients with Severe CKD, Dialysis, or Kidney Transplantation

" Some preliminary promising data… But it is at present unclear whether SLGT2 inhibition will be effective in preventing clinically relevant outcomes and be sufficiently safe in patients with severe CKD that are not included in the RCTs"

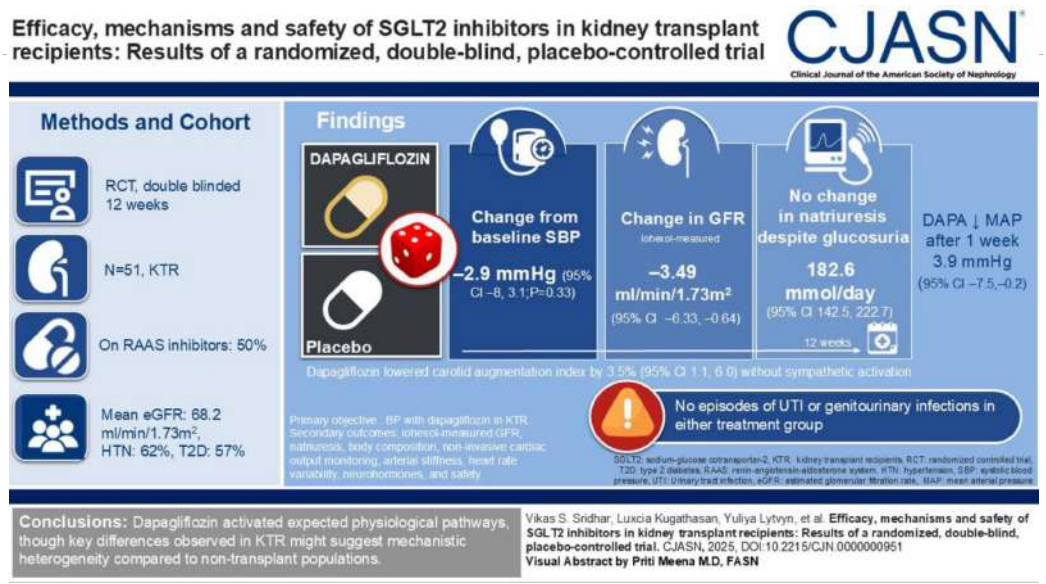
RENAL LIFECYCLE TRIAL recently started (Nov 2022-2027) :

- Dapaglifozin 10mg vs placebo
- N=1500 patients with:
  1) eGFR< 25ml/min/1.73m2
  2) Dialysis patients with residual diuresis >500ml/24h
  3) **Or Kidney transplantation ave eGFR<45ml/min/1.73m2**
- Primary study end point: composite end point of :
  - Kidney failure
  - Heart failure hospitalization
  - Or all-cause mortality



Critère exclusion : >= 2 IU ou infection génitale dans les 6 derniers mois

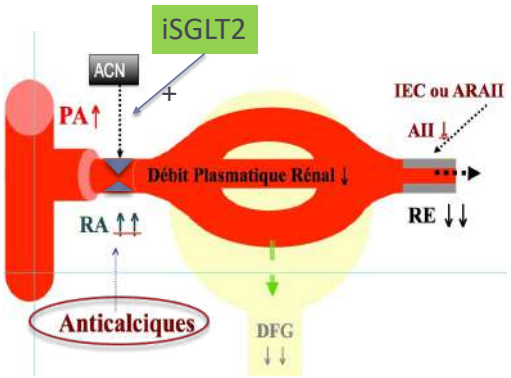
- CJASN 2023



- Kugathasan et al CJASN 2026

Synthèse : Peut-on transposer les résultats des Gliflozines obtenus chez le non-transplanté…

Effets hémodynamiques glomérulaires



iSGLT2 : quand les utiliser chez le TR ?

- Chez tous les diabétiques ? (MET + iSGLT2… ± aGLP1 ?)
- Chez les TR non-D ? (Niveau de DFG et RAC)
- En cas d'insuffisance cardiaque FEP ou FED
- En sus des BSRA? En association avec les anti-Ca ?
- Surveillance fonction rénale 15j après introduction ? (chez les patients sous diurétiques…).
- Détecter les risques ou signes d'acido-cétose euglycémique (stress, insulinopénie, douleurs abdominales…)

Conclusions



Le plus difficile !!



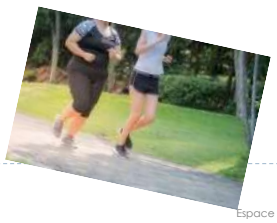


1
- ☞ Activité physique
- ☞ Diététique
- ☞ Arrêter le tabac

2
- ☞Contrôler HTA (130/80 mmHg) (Bloqueurs du SRA et/ou Aca)
- ☞Traiter par Statines (tous ?), aspirine (tous ?)
- ☞Eviter ou contrôler le diabète
- ☞ISGLT2 ?

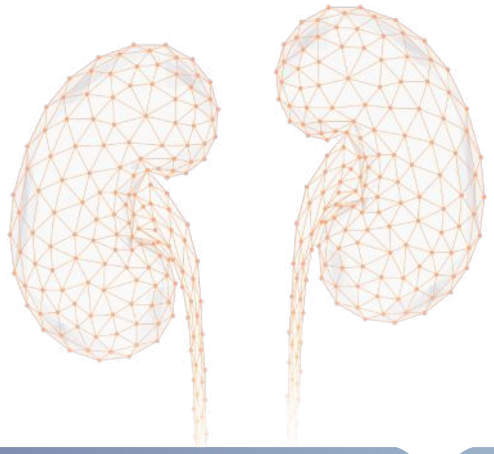


3
- ☞ Adapter protocoles IS



Espace réservé de texte des participants si besoin

Merci
de votre attention



Questions…?