CHR VERVIERS EAST BELGIUM

Adaptations des posologies en IRC

Dr Quinonez Kevin
Néphrologie - CHR Verviers

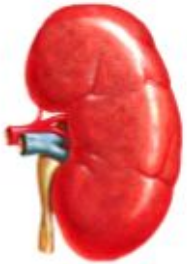
Créatininémie et fonction rénale

Catabolisme musculaire

Doit être interprétée en fonction :
- **du poids**
- **du sexe**
- **de l'âge**

Créatinine sanguine

Excrétion urinaire



- Exclusivement excrétée par le rein
- Filtrée par le glomérule et pas sécrétée ni réabsorbée dans le tubule
- Endogène
- Présente à une concentration sanguine constante dans le sang si les reins fonctionnent normalement

	Cockcroft	MDRD
Population	Canada 1976	USA 1999
N	249	1628
Mean GFR	73	40
Measured GFR	Creatinine Clearance	Iothalamate
Assay	Jaffe (special)	Jaffe calibré
% women	4	40
% black	0 (?)	12
Mean age	18-92	51
Mean weight	72	79.6
Indexation for BSA	No	yes
Internal validation	no	yes

[(140-âge) / créatinine (µmol/l)] x **k x Poids** (kg)

186 x (créatinine (µmol/l) **x 0,0113)**$^{-1,154}$ **x âge**$^{-0,203}$

Cockcroft DW, Nephron, 1976, 16, p31
Levey AS, Ann Intern Med, 1999, 130, p461

Comment estimer la fonction rénale ?

Formule de Cockcroft & Gault

ClCr (ml/min) = k x [(140-Âge) x Poids] / SCr (*µmol/l*)

Homme k = 1,23 et Femme k = 1,04

Sous-estimation de la valeur

Ne plus utiliser (SF Néphro 2009 !)

Formule abrégée MDRD

(aMDRD)

DFG (ml/min/1,73 m²) = k x 186 x $[S_{Cr}]^{-1,154}$ x $[Age]^{-0,203}$

Homme k = 1 et Femme k = 0,742

Valide chez :

- *L'adulte "jeune"*
- *Le sujet âgé (> 65 ans)*
- *L'obèse*

L'équation CKD-EPI donne la meilleure estimation (encore peu connue/diffusée)
http://www.sfndt.org/sn/eservice/calcul/eDFG.htm
Recommandation HAS 07/2012

Cockcroft DW and Gault MH. Nephron 1976; Levey AS et al. Ann Intern Med 1999
Froissart et al. J Am Soc Nephrol 2005; Stevens LA et al. J Am Soc Nephrol 2007
Launay-Vacher V et al. Rev Med Interne 2011; Flamant M et al. Presse Med 2010
Launay-Vacher V et al. Bull Cancer 2012; Faluyi OO et al Med. Oncol 2012
Levey AS et al. Ann Intern Med 2009

Une créatininémie « normale » ne signe pas toujours une fonction rénale normale

Amélie M.
35 ans, 75 kg

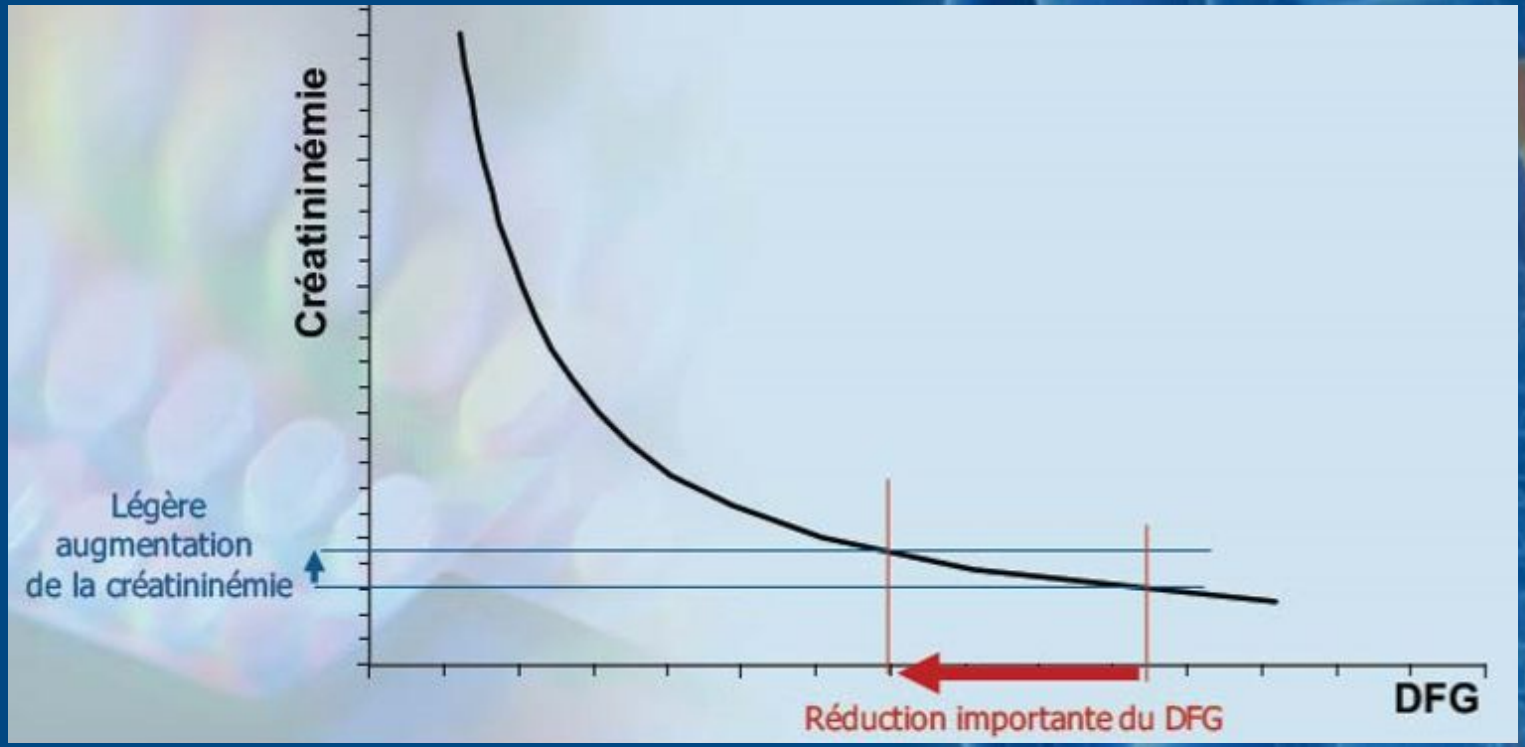
Fonction rénale
~ 100 ml/mn

Créatininémie
1 mg/dL

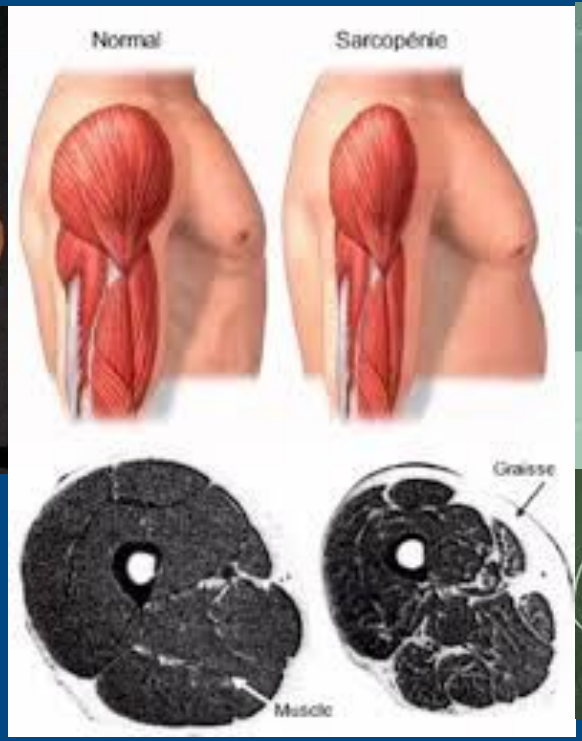
Eglantine M.
89 ans, 51 kg

Fonction rénale
~ 40-50 ml/mn

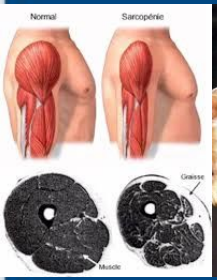
La relation |e| créatininémie et eGFR = non linéaire

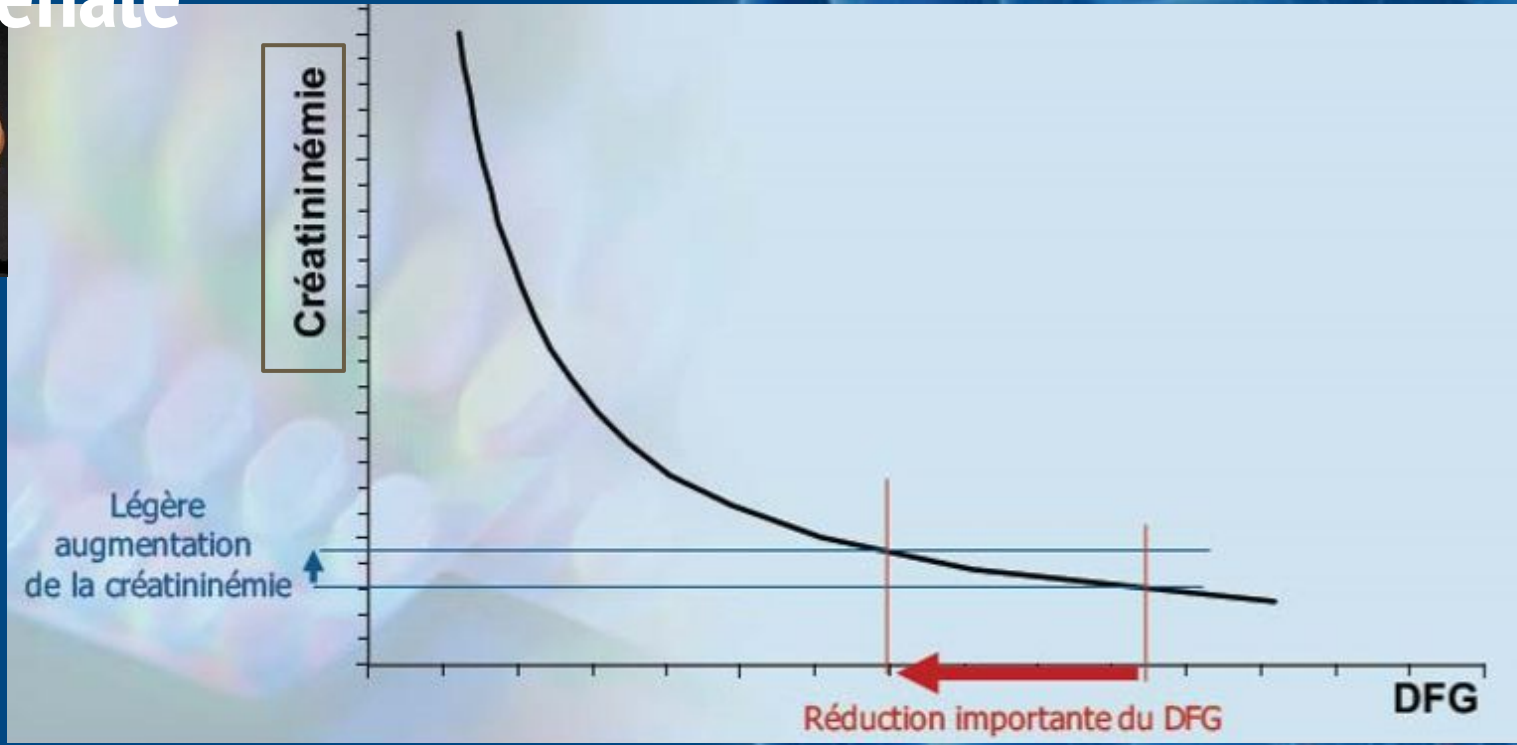


Pièges des formules eGFR (MDRD, CKD-EPI,...)



Sarcopéniques : “trop bonne” fonction rénale





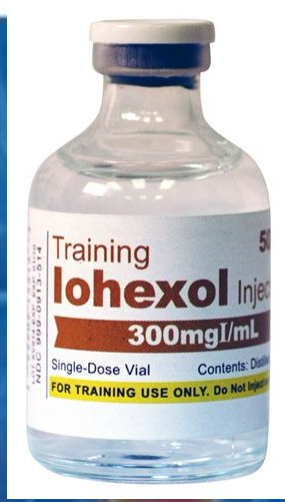
Prognosis of CKD by GFR and albuminuria category

Prognosis of CKD by GFR and Albuminuria Categories: KDIGO 2012

GFR categories (ml/min/ 1.73 m²) Description and range				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
	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.

mGFR : méthode via Iohexol



- CHU de Liège uniquement (Pr P. Delanaye)
- Test de 5 heures
- T zéro : Prise de sang référentielle puis 5 mL en bolus
- Prise de sang à 2, 3, 4 et 5 heures post bolus
- Coût : 50 à 100 euros
- Intérêt ?
  - Prégreffe
  - Poids extrêmes
  - Etudes cliniques
  - Pas en pratique ambulatoire

Adaptation des posologies en cas d'IRC : pourquoi ?

Surdosage : Toxicité

Sous dosage : Non efficace

Sources des données présentées

CBIP

Données présentées à l'ASN (American Society of Nephrology) de 2017

Articles de Review Pubmed

ASN LEADING THE FIGHT AGAINST KIDNEY DISEASE

AINS

> 60 ml/min : recommandations classiques : court et ponctuel

45-60 mL/min : en cas d'absolue nécessité et courte durée

< 45 mL/min : JAMAIS

Dialyse : permis en cas d'anurie complète et ponctuel

Insuffisance rénale	Posologies	stade 1	stade 2	stade 3	stade 4	stade 5	Hémodialyse (posologie cfr stade 5) Doses supplémentaires:		Hémo-filtration	Dialyse péritonéale	Remarques
DFG		≥ 90 ml/min	60-89 ml/min	30-59 ml/min	15-29 ml/min	< 15 ml/min	Avant hémodialyse	Après hémodialyse			
Antibiotiques											
Béta-lactames											
Amoxicilline PO	0,25 - 1 g/8 h	0,25 - 1 g/8 h	0,25 - 1 g/8 h	0,25 - 1 g/8 - 12 h	0,25 - 1 g/12 h	250 - 500 mg/12 h	/	250 - 500 mg	0,25 - 1 g/8 h	250 - 500 mg/12 h	
Amoxicilline IV	1 - 2 g/4 - 6 h	1 - 2 g/4 - 6 h	1 - 2 g/6 h	0,5 - 2 g/8 - 12 h	0,5 - 2 g/12 h	0,5 - 2 g/24 h	/	0,5 - 2 g	0,5 - 2 g/8 - 12 h	0,5 - 2 g/24 h	
Amoxicilline + clavulanate PO	875 mg + 125 mg/8 h ou 500 mg + 125 mg/6 h	875 mg + 125 mg/8 h ou 500 mg + 125 mg/6 h	875 mg + 125 mg/8 h ou 500 mg + 125 mg/6 h	875 mg + 125 mg/8 h ou 500 mg + 125 mg/6 h	500 - 875 mg + 125 mg/12 h	500 - 875 mg + 125 mg/12 h	/	500 - 875 mg + 125 mg	875 mg + 125 mg/8 h ou 500 mg + 125 mg/6 h	250 - 875 mg + 125 mg/8 h	En cas d'IR, le temps d'élimination de l'amoxicilline est augmenté de 6x alors que l'acide clavulanique de 2,6x. En cas de dialyse, l'élimination de l'acide clavulanique est plus rapide que l'amoxicilline.
Amoxicilline + clavulanate IV	1 - 2 g + 100 - 200 mg/6 h	1 - 2 g + 100 200 mg/6 h	1 - 2 g + 100 200 mg/6 h	1 - 2 g + 100 200 mg/6 h	1 - 2 g + 100 200 mg/12 h	500 mg - 1 g + 50 - 100 mg/12 h*	/	500 mg - 1 g + 50 - 100 mg*	1 - 2 g + 100 200 mg/6 h	1 - 2 g + 100 200 mg/6 - 8 h	* Forme pédiatrique Augmentin IV (1 g + 100 mg ou 500 mg + 50 mg)
Ampicilline IV	1 - 2 g/4 - 6 h	1 - 2 g/4 - 6 h	1 - 2 g/6 h	0,5 - 2 g/8 - 12 h	0,5 - 2 g/12 h	0,5 - 2 g/24 h	/	0,5 - 2 g	0,5 - 2 g/8 - 12 h	0,5 - 2 g/24 h	
Flucloxacilline PO	0,5 - 1 g/6 - 8 h	0,5 - 1 g/6 - 8 h	0,5 - 1 g/6 - 8 h	0,5 - 1 g/6 - 8 h	0,5 - 1 g/6 - 8 h	0,5 - 1 g/6 - 8 h	/	0,5 - 1 g	0,5 - 1 g/8 h	0,5 - 1 g/12 h	
Flucloxacilline IV	1 - 2 g/4 - 6 h	1 - 2 g/4 - 6 h	1 - 2 g/4 - 6 h	1 - 2 g/4 - 6 h	1 - 2 g/4 - 6 h	1 g/4 h ou 2 g/6 h	/	1 - 2 g	1 - 2 g/4 - 6 h	1 g/4 h ou 2 g/6 h	
Pénicilline G IV	4 x 10^6 U.I./4 - 6 h	4 x 10^6 U.I./4 - 6 h	4 x 10^6 U.I./4 - 6 h	4 x 10^6 U.I./4 - 6 h	4 x 10^6 U.I./4 - 6 h	4 x 10^6 U.I./6 - 8 h	/	1 - 4 10^6 U.I.	4 x 10^6 U.I./4 - 6 h	4 x 10^6 U.I./6 - 8 h	Pénicilline G utilisée à haute dose en pratique (méningite, endocardite, infection ostéo-articulaire)
Pénicilline V (Phénoxyméthylpénicilline) PO	1 x 10^6 U.I./6 h	1 x 10^6 U.I./6 h	1 x 10^6 U.I./6 h	1 x 10^6 U.I./6 h	1 x 10^6 U.I./6 h	1 x 10^6 U.I./6 h	/	1 x 10^6 U.I.	1 x 10^6 U.I./6 - 12 h	1 x 10^6 U.I./6 h	
Piperacilline + tazobactam IV	4 g/6 - 8 h en 30 min	4 g/6 - 8 h en 30 min	4 g/6 - 8 h en 30 min	4 g/6 - 8 h en 30 min	4 g/8 h en 30 min	4 g/12 h en 30 min	/	4 g	4 g/6 - 8 h en 30 min	4 g/12 h en 30 min	Il est recommandé d'effectuer un **TDM** après au moins administration de trois doses. En cas de perfusion continue, un TDM est recommendé après 24 h. Adaptation posologique en fonction du résultat.
	12 - 16 g/24 h en 24 h	12 - 16 g/24 h en 24 h	12 - 16 g/24 h en 24 h	12 - 16 g/24 h en 24 h	12 g/24 h en 24 h	8 g/24 h en 24 h	/	4 g	12 - 16 g/24 h en 24 h	8 g/24 h en 24 h	
	4 g/8 h en 4 h	4 g/8 h en 4 h	4 g/8 h en 4 h	4 g/8 h en 4 h	4 g/8 - 12 h en 6 h	4 g/12 h en 6 h	/	4 g	4 g/8 h en 4 h	4 g/12 h en 4 h	

Antibiotiques per os : en résumé et en pratique

	> 90 mL/min	90 - 60 mL/min	60 - 30 mL/min	30 - 15 mL/min	< 15 mL/min
Augmentin	875/125 mg/8 h	875/125 mg/8 h	875/125 mg/8 h	**500/125 - 875/125 mg/12 h**	**500/125 - 875/125 mg/12 h**
Ciproxine	500 - 750 mg/12 h	500 - 750 mg/12 h	**500 - 750 mg/12 - 24 h**	**500 - 750 mg/ 24 h**	**500 mg/24 h**
Biclar	500 mg/12 h	500 mg/12 h	500 mg/12 h	**250 mg/12 h**	**250 mg/12 h**
Céfuroxime	500 mg/8 -12h	500 mg/8 -12h	500 mg/8 -12h	**500 mg/12 h**	**500 mg/24 h**
Flagyl	**500 mg/8 h**	**500 mg/8 h**	**500 mg/8 h**	**500 mg/8 h**	**500 mg/8 h**

Source = Groupe de Gestion de l'Antibiothérapie (GGA) - CHU de Liège - Juin 2016

Incrétinomimétiques

GLP-1 Receptor Agonists

Agent	Dosing in CKD stages 3, 4 and 5 (non-dialysis)
Exenatide	Not recommended if eGFR <30
Exenatide Once Weekly	Not recommended if eGFR <30
Liraglutide	No dose adjustment recommended
Lixisenatide	No dose adjustment required for eGFR= 30-60 Monitor for AEs and change in renal function eGFR 15-29 experience is limited eGFR <15 avoid
~~Albiglutide~~	No dose adjustment required for eGFR= 15-89
Dulaglutide	No dose adjustment recommended

Byetta ®

Bydureon ®

Victoza ®

Lyxumia ®

Trulicity ®

Neumiller J, Alicic R, Tuttle K. J Am Soc Nephrol. 2017;28;8:2263-2274
National Kidney Foundation. Am J Kidney Dis. 2012;60(5):850-886
Respective Package Inserts- accessed via Daily Med

GLIPTINES

DPP-4 Inhibitors

Characteristic	Sitagliptin	Saxagliptin	Linagliptin	Alogliptin
Hypoglycemia Risk	Low	Low	Low	Low
Dose	100 mg daily	5 mg daily	5 mg daily	25 mg daily
Weight	Neutral	Neutral	Neutral	Neutral
Renal Dose Adjustment	•CrCl <50 mL/min: 50 mg qd •CrCl ≤30 mL/min: 25 mg qd	•CrCl ≤ 50 mL/min: 2.5 mg qd	No adjustment recommended based on renal function	•CrCl <60 mL/min: 12.5 mg qd •CrCl <30 mL/min: 6.25 mg qd
	Januvia ®	Onglyza ®	Trajenta ®	Vipidia ®

Sitagliptin Prescribing Information, 2009. Saxagliptin Prescribing Information, 2009. Linagliptin Prescribing Information, 2012. Alogliptin Prescribing Information, 2013. Neumiller J, Alicic R, Tuttle K. J Am Soc Nephrol. 2017;28:8:2263-2274

GLIFLOZINES

SGLT-2 inhibitors

Invokana ®

Forxiga ®

Jardiance ®

Medication	Dosing in Stages 3,4, and 5 (nondialysis)
Canagliflozin[2]	• **eGFR ≥60 mL/min/1.73 m²** No dosage adjustment needed • **eGFR 45-59 mL/min/1.73 m²** Do not exceed 100 mg/day by mouth • **eGFR <45 mL/min/1.73 m²** Do not initiate; discontinue in patients currently receiving drug
Dapagliflozin[3]	Do not initiate; discontinue with an eGFR <60 mL/min/1.73 m²
Empagliflozin[4]	• **eGFR ≥45 mL/min/1.73 m²** No dosage adjustment needed • **eGFR <45 mL/min/1.73 m²** Do not initiate; discontinue in patients currently receiving drug

1. Kohan DE, et al. *Kidney Int.* 2014;85(4):962-971. 2. Drugs at FDA. https://www.accessdata.fda.gov/drugsatfda_docs/label/2017/204042s018lbl.pdf. Accessed June 27, 2017. 3. Drugs at FDA. https://www.accessdata.fda.gov/drugsatfda_docs/label/2017/202293s011lbl.pdf. Accessed June 27, 2017. 4. Drugs at FDA. https://www.accessdata.fda.gov/drugsatfda_docs/label/2016/204629s008lbl.pdf. Accessed June 27, 2017.

GLITAZONES

Actos ®

Thiazolidinediones

Agent	Dosing in CKD stages 3, 4 and 5 (non-dialysis)
Pioglitazone	No dose adjustment
~~Rosiglitazone~~	No dose adjustment

- Both agents nearly completely metabolized by the liver
- Side effect profile limiting:
  - Fluid retention/edema
  - Increased fracture rates and bone loss
- Generally not used in CKD

National Kidney Foundation. Am J Kidney Dis. 2012;60(5):850-886,
Neumiller J, Alicic R, Tuttle K. J Am Soc Nephrol. 2017;28;8:2263-2274

Alpha-Glucosidase Inhibitors

Agent	Dosing in CKD stages 3, 4 and 5 (non-dialysis)
Acarbose	Avoid if eGFR <30 mL/min/1.73 m^2
~~Miglitol~~	Avoid if eGFR <25 mL/min/1.73 m^2

Glucobay ®

- Acarbose minimally absorbed, but drug and metabolite levels can accumulate with reduced kidney function
  - No increase in adverse effects reported
- Miglitol exhibits greater systemic absorption and is eliminated by the kidneys
  - 2-fold increase in plasma concentrations for patients with CrCl < 25 mL/min when compared to those with CrCl > 60 mL/min

National Kidney Foundation. Am J Kidney Dis. 2012;60(5):850-886.
Snyder RW, et al. Semin Dial. 2004;17:365.
Scheen AJ. Expert Opin Drug Metab Toxicol. 2013;9(5):529-550.
Neumiller J, Alicic R, Tuttle K. J Am Soc Nephrol. 2017;28;8:2263-2274

Diabetes and CKD

- Chronic kidney disease (CKD) is associated with insulin resistance and, in advanced CKD, decreased insulin degradation.
- The latter can lead to a marked decrease in insulin requirement or even the cessation of insulin therapy in patients with type 2 diabetes.
- Both of these abnormalities are at least partially reversed with the institution of dialysis

Kumar, K.V. S. et al: Glycemic Control in Patients of Chronic Kidney Disease. \www.ijddc.com/article.asp?issn=0973-3939;year=2007; volume27; issue=4

International Journal of Diabetes in Developing Countries.

GLINIDES

Meglitinides

Novonorm ®

Agent	Dosing in CKD stages 3, 4 and 5 (non-dialysis)
Repaglinide	Initiate conservatively at 0.5 mg with meals if eGFR <30 mL/min/1.73 mg^2
~~Nateglinide~~	Initiate conservatively at 60 mg with meals if eGFR <30 mL/min/1.73 mg^2

- Accumulation of the active metabolite of nateglinide occurs with decreased kidney function
- No active metabolites for repaglinide, but parent drug can accumulate with GFR <30
  - Lower maintenance doses likely needed in renal impairment

National Kidney Foundation. Am J Kidney Dis. 2012;60(5):850-886.
Hasslacher C, et al. Diabetes Care. 2003;26:886.
Inoue T, et al. Clin Nephrol. 2003;60(2):90-95.
Schumacher S et al. Eur J Clin Pharmacol. 2001;57(2):147-152.

SULFAMIDES

Sulfonylureas

- Overall associated with high risk of hypoglycemia, particularly in the elderly and/or patients with CKD
- Glyburide associated with higher incidence of severe hypoglycemia in renal impairment
  - Metabolized to 2 active metabolites cleared by the kidneys
- Glimepiride:
  - Fewer severe hypoglycemic episodes compared to glyburide in routine clinical use
  - Severe hypoglycemic events more common in elderly and those with renal impairment

Amarylle ®

Rydberg T, et al. Diabetes Care. 1994;17:1026-1030.
van Staa T, et al. J Clin Epidemiol. 1997;50:735-741.
Holstein A, et al. Diabetes Metab Res Rev. 2001; 17:467-473.

Table 3. Prescribing Metformin by CKD Stage

eGFR Level mL/ 1.73m^2	Action
≥ 60	No contraindication to metformin—monitor GFR yearly.
< 60 ≥ 45	Continue metformin—monitor GFR every 3-6 months.
< 45 ≥ 30	Prescribe metformin with caution. Use lower dose (eg, 50%, or half-maximal dose)—closely monitor GFR (every 3 months). Do not start new patients on metformin.
< 30	Do not use metfomin.

eGFR, estimated glomerular filtration rate.

Lipska[24]

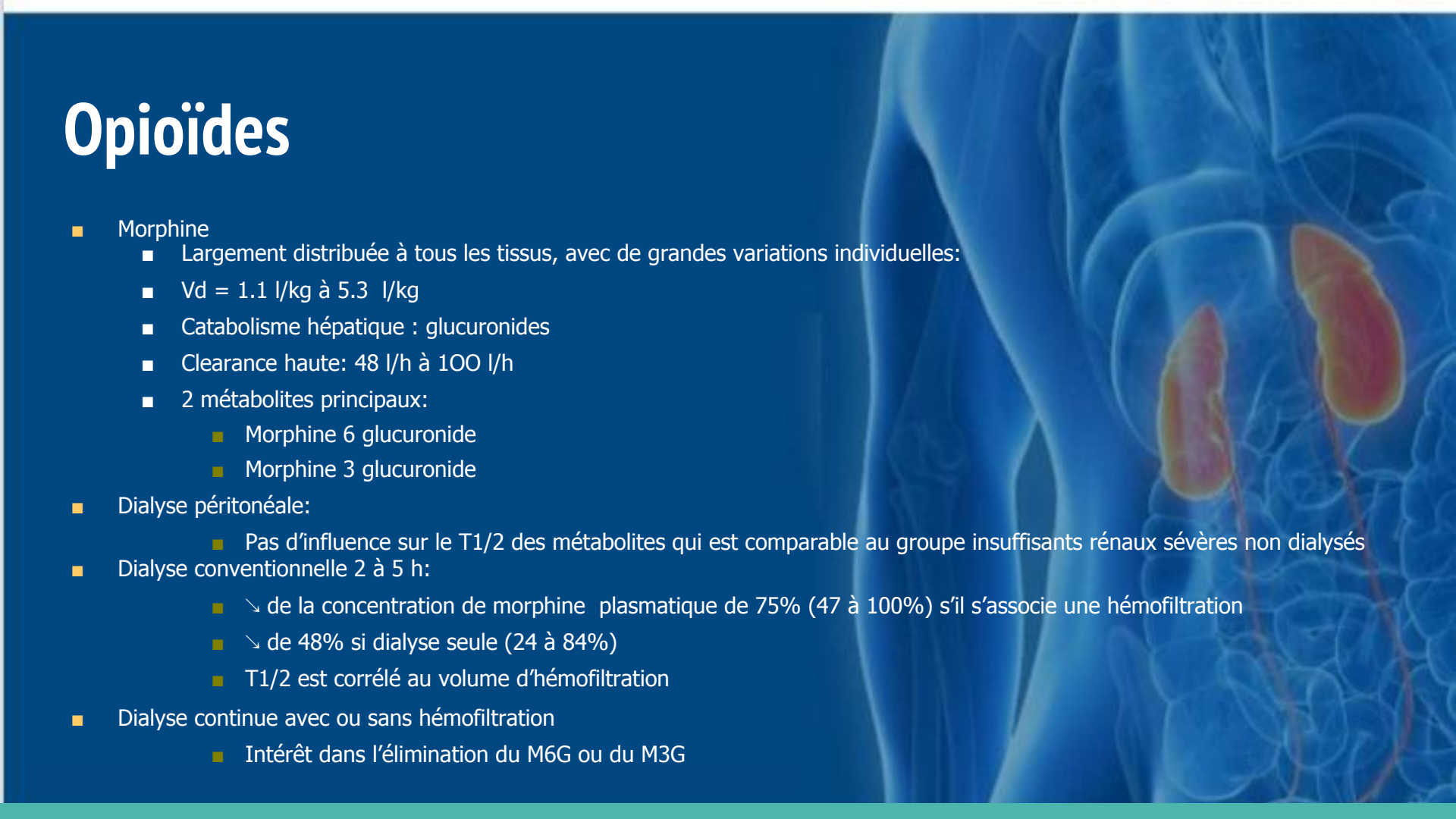
Drug	Urine excretion	Use in renal failure
Metformin	90%	Contraindicated in stages 3, 4 and 5
Pioglitazone	15-30%	Not contraindicated in CKD
Sitagliptin	87%	Reduced dosage starting from stage 3
Vildagliptin	85%	Reduced dosage starting from stage 3
Saxagliptin	75%	Reduced dosage starting from stage 3
Linagliptin	5%	Not contraindicated in CKD. No reduction in dosage
Glibenclamide	50%	Contraindicated in stages 4 and 5
Gliquidone	<5%	Contraindicated in stages 4 and 5
Glimepiride	40%-60%	Contraindicated in stages 4 and 5
Repaglinide	<10%	Not contraindicated in CKD
Nateglinide	16%-83%	Contraindicated in stages 4 and 5
Acarbose	<2%	Contraindicated in stages 4 and 5
Miglitol	95%	Contraindicated in stages 4 and 5

		CKD-1	CKD-2	CKD-3	CKD-4	CKD-5ND	CKD-5D
	Metformin	No adjustments		1,5g-850 mg/day*	500 mg/day**	Consider carefully/Awaiting further data	
Sulfonylureas	Chlorpropamide	No adjustments		100-125 mg/day	To be avoided		
	Acetohexamide	To be avoided					
	Tolazamide	To be avoided					
	Tolbutamide	250mg, 1-3 times/day				To be avoided	
	Glipizide	No adjustments					
	Glicazide	Start at low doses and dose titration every 1-4 weeks					
	Glyburide	To be avoided					
	Glimepiride	Recude dosage to 1 mg/day				To be avoided	
	Gliquidone	No adjustments					
α-gluc inhibitors	Repaglinide	No adjustments				Limited experience available	
	Nateglinide	No adjustments				Start at 60 mg/day	To be avoided
	Acarbose	No adjustments			use lowest dose and <50mg		
	Miglitol	Limited experience available					
	Pioglitazone	No adjustments					
DPP-IV inhibitors	Sitagliptin	No adjustments		Reduce to 50 mg/day	Reduce to 25 mg/day		
	Vildagliptin	No adjustments		Reduce to 50 mg/once daily			
	Saxagliptin	No adjustments		Reduce to 2,5 mg/once daily			
	Linagliptin	No adjustments					
	Alogliptin	No adjustments		Reduce to 12,5 mg/daily			
Incretin Mimetics	Exenatide	No adjustments	Reduce dose to 5 mcg/once to twice daily		To be avoided		
	Liraglutide	Limited experience available					
	Lixisenatide	No adjustments	Careful use if GFR 80-50 mL/min				No experience available
	Pramlintide	Limited experience available					
SGLT-2 inhibitors	Dapagliflozin	Limited experience available					
	Canagliflozin	Reduced efficacy		Careful monitoring		To be avoided	
	Empagliflozin	Limited experience available					

Figure 6: Dose recommendation in CKD

Opioïdes

- Morphine
  - Largement distribuée à tous les tissus, avec de grandes variations individuelles:
  - Vd = 1.1 l/kg à 5.3 l/kg
  - Catabolisme hépatique : glucuronides
  - Clearance haute: 48 l/h à 1OO l/h
  - 2 métabolites principaux:
    - Morphine 6 glucuronide
    - Morphine 3 glucuronide
- Dialyse péritonéale:
  - Pas d'influence sur le T1/2 des métabolites qui est comparable au groupe insuffisants rénaux sévères non dialysés
- Dialyse conventionnelle 2 à 5 h:
  - ↘ de la concentration de morphine plasmatique de 75% (47 à 100%) s'il s'associe une hémofiltration
  - ↘ de 48% si dialyse seule (24 à 84%)
  - T1/2 est corrélé au volume d'hémofiltration
- Dialyse continue avec ou sans hémofiltration
  - Intérêt dans l'élimination du M6G ou du M3G



Opioïdes

Physico-Chemical Properties of Some Opioids

Drug	Volume of Distribution (L/kg)	Plasma Protein Binding (%)	Water Solubility	Molecular Weight
Morphine sulfate	3.2	35	1:21	758.8
Hydromorphone hydrochloride	1.22	N/A[a]	1:3	321.8
Oxycodone hydrochloride	2.6	45	1:6	405.9
Codeine phosphate	2.6	7	1:4	406.4
Methadone hydrochloride	3.8	89	1:12	345.9
Fentanyl citrate	4	80	1:40	528.6

Sources: Martindale Pharmacopeia; Goodman & Gilman's Therapeutics; Micromedex (Drug information computer program); Remington's Pharmaceutical Sciences.

[a] There are no data in the above sources on hydromorphone protein binding, but Sarhill et al. state in their article that serum protein binding is 7.1%.[39]

Murtagh et al 2007

TABLE 1. Summary of Recommendations for Opioid Use in ESRD (eGFR < 15 mL/minute) Without Dialysis

World Health Organization Analgesic Ladder Categories	Analgesic	In ESRD Managed Without Dialysis eGFR < 15 mL/minute	Comments
Step 1	Acetaminophen (paracetamol)	Recommended	Maximum 3 g per 24 hours orally when eGFR < 10 mL per minute
Step 2	Codeine	Not recommended	
	Dihydrocodeine	Not recommended	
	Dextropropoxyphene	Avoid	
	Hydrocodone	Not recommended	
	Tramadol	Use with caution	50 mg 12 every 12 hours orally
Step 3	Morphine	Not recommended (see text re: short-term use)	Subcutaneous starting dose: 2.5 mg every 4-12 hours as required
	Diamorphine	Not recommended; see text re: short-term use	Subcutaneous starting dose: 2.5 mg every 4-12 hours as required
	Buprenorphine	Limited evidence	Use with caution (reduce dose and increase interval)
	Fentanyl	Recommended	Consider reducing dose by 25-50%; Starting dose for subcutaneous use: 25 micrograms Q4H as required
	Alfentanil	Recommended but not for 'as required' use	Use in CSCI only, when volume makes higher doses of fentanyl impractical
	Hydromorphone	Limited evidence	Use with caution. Starting dose: 1.3 mg every 8 hours orally
	Methadone	Recommended, with specialist advice on prescribing	Reduce dose by 50-75%. Wide inter-individual variations.
	Oxycodone	Limited evidence	Use with caution. Starting dose: 2.5 mg every 8-12 hours orally

Co-antalgiques

- Gabapentine:
  - Gabapentine est excrété inchangé voie rénale et dépend de la filtration glomérulaire. Effets secondaires : somnolence, ataxie ,léthargie ...
  - Extraction par dialyse: 35%
  - ½ vie d'élimination pour le patient dialysé = 132h (300mg/j max)
- Prégabalin:
  - Éliminé sous forme inchangé par voie rénale
  - Réduction des doses: maximum 600mg /j si clearance > 60 ml /mn
  - 75 mg /j en dose maxi de départ si clearance entre 30 et 60 ml/mn (maxi : 300mg/j)
  - Commencer par 25 mg si clearance < 15 ml/mn (maxi150mg/j) en une dose unique
  - Ajouter une dose supplémentaire après chaque hémodialyse de 4h
  - Effets secondaires : somnolence,étourdissements , oedèmes périphériques
- Alpha 2 agoniste : Clonidine
  - Voie orale ou injectable
  - ½ vie augmentée de 12 à 40h
  - 50 % métabolisée par le foie le reste sous forme inchangée par voie rénale

CHR VERVIERS
EAST BELGIUM

Merci pour votre attention

NéphroPhone
Avis néphrologiques
087 21 93 33
8h - 18h en semaine