Apport de l'échographie pour la maladie rénale

Journée Unisanté

Juin 2021

PD Dr Menno Pruijm

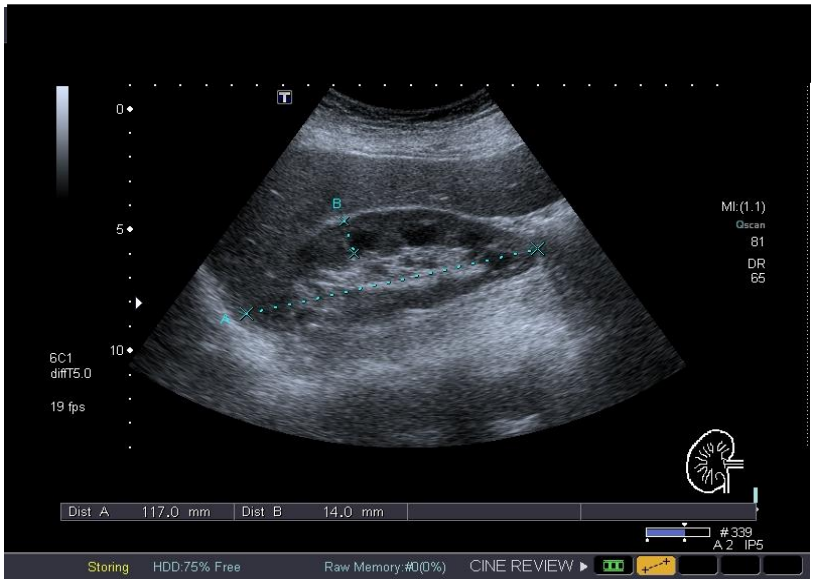
Médecin Adjoint, Service of Nephrology

Lausanne, Switzerland

Qu’apporte l’échographie? Réponse:

- Beaucoup!

- Enormément!



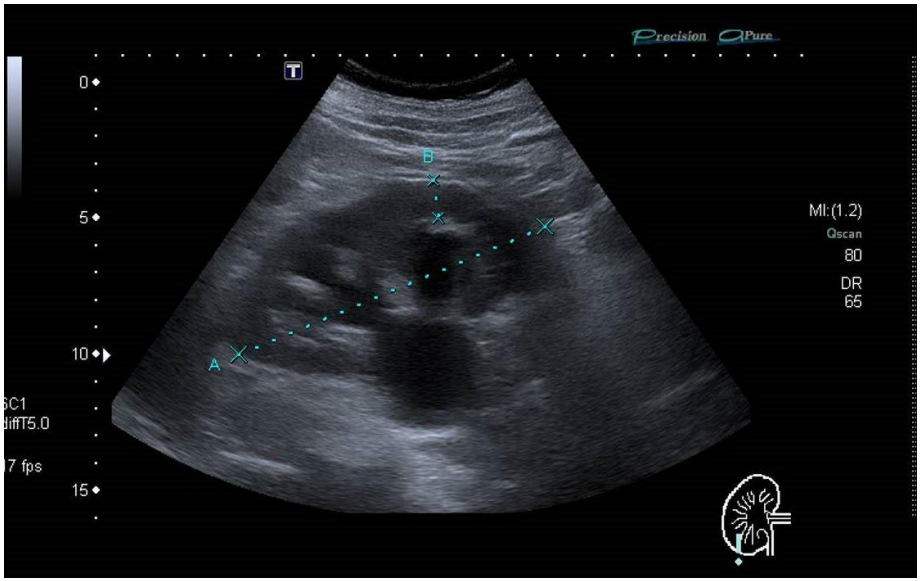
- *Présentation de cas*
- *Etudes et développements récents*
- *Recherche locale*

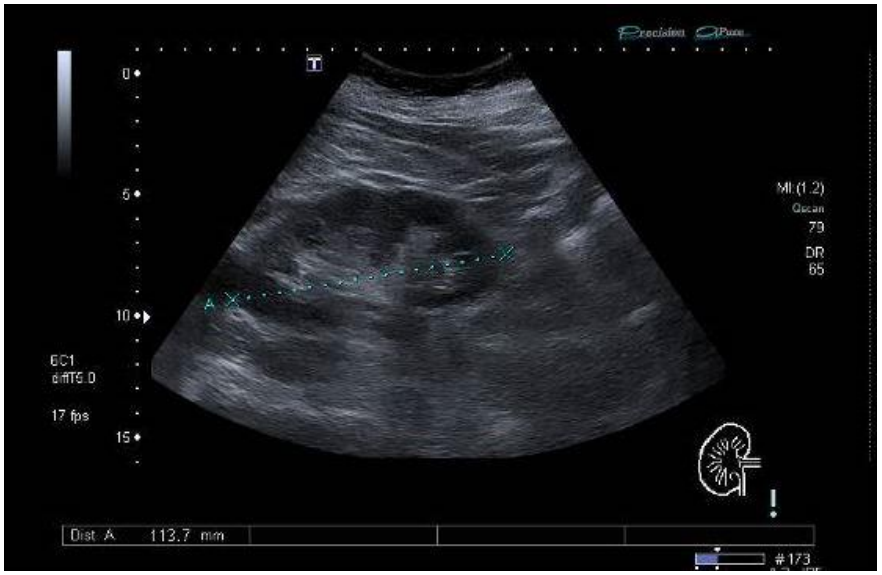
Néphrologues au CHUV: de spectateur à acteur

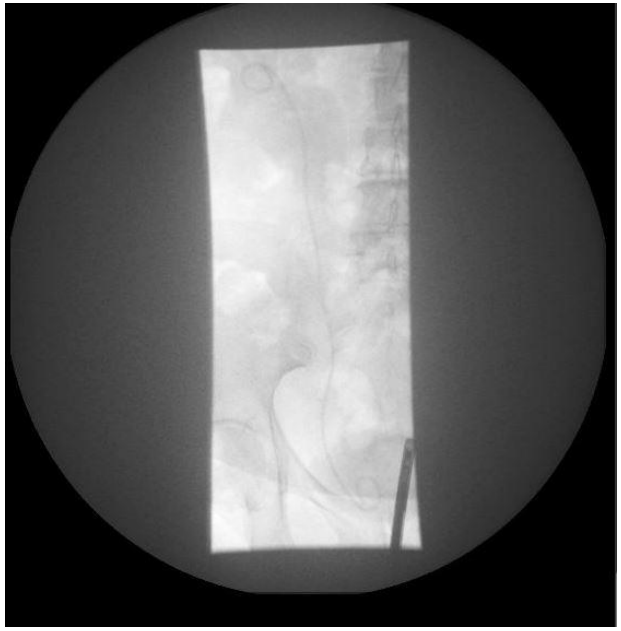
- De lundi-vendredi, 8h-12h ou en urgence.
- Sur rendez-vous: 021-3141131 ou fax 021-3141139.
- Equipe:
  - Wendy Brito, technicienne en radiologie
  - Menno Pruijm
  - Médecin assistant NEP en formation

1. Situations urgentes

- Femme 81 ans, connue pour agénésie du rein G et DFG à 32 ml/min (creatinine: 140 umol/l).
- Depuis quelques jours manque d'appétit, OMI, PA 170/100 mmHg.



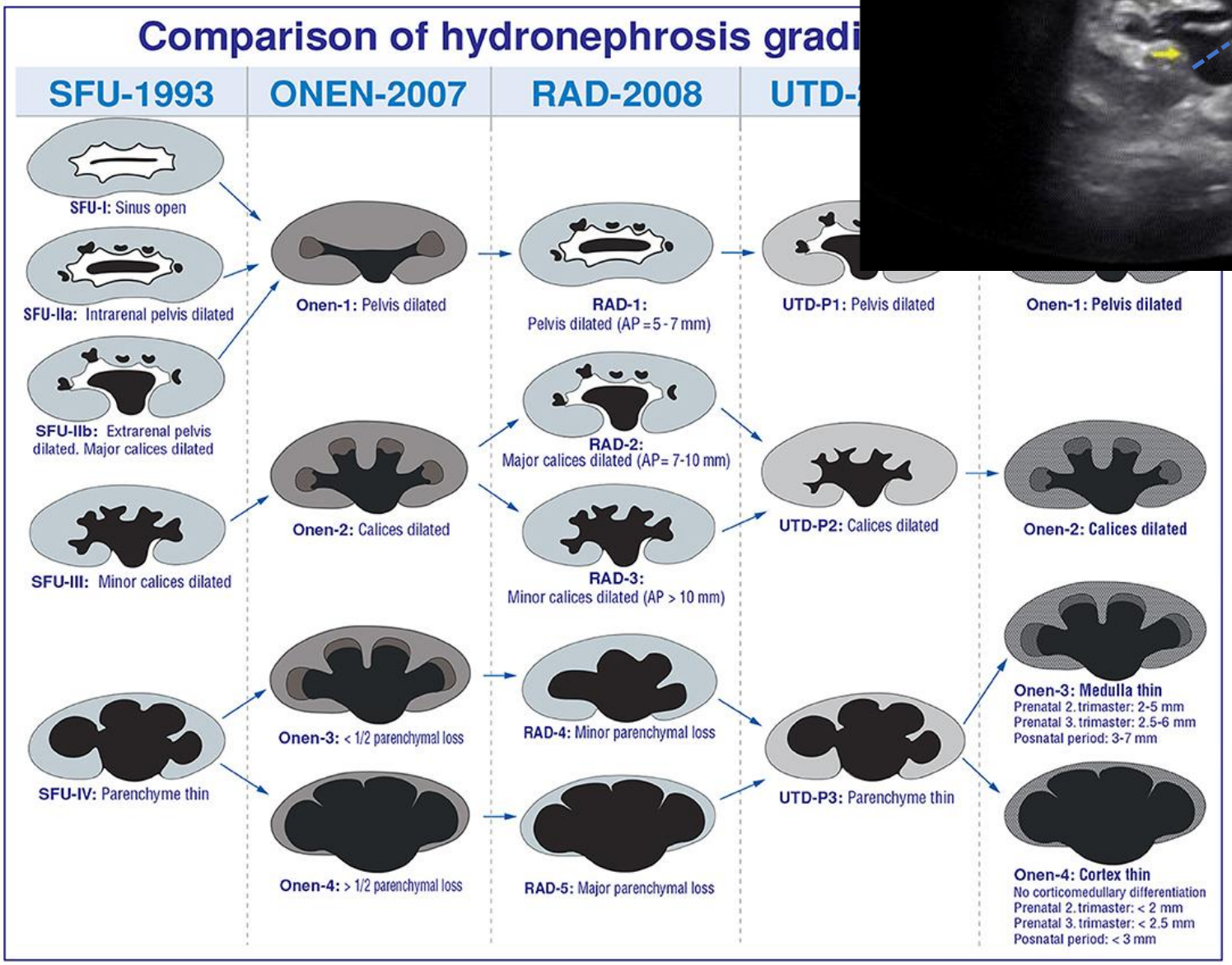




- Créatinine: 180 umol/l, K 5. 9 mmol/l

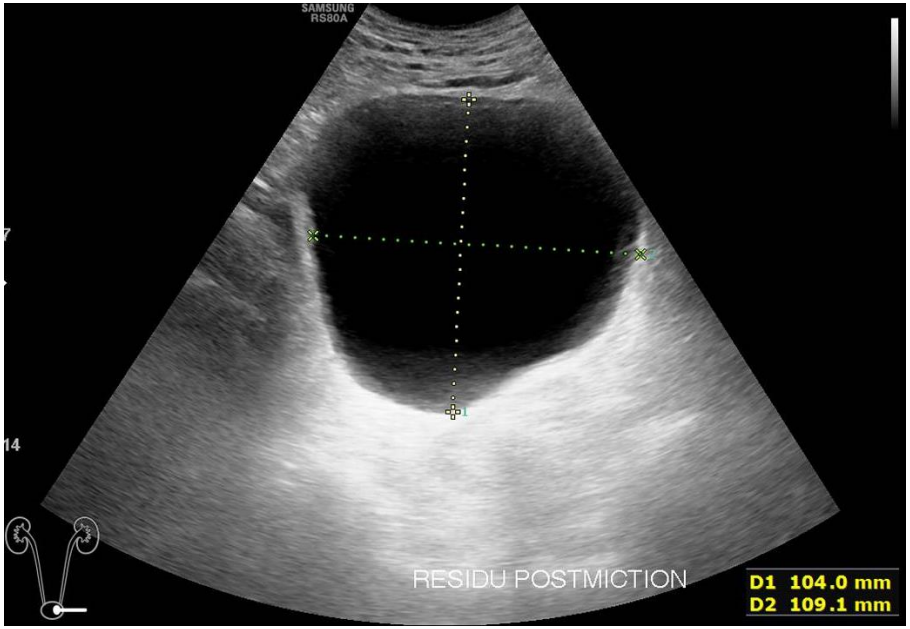
- Pyéloplastie effectué qq mois plus tard pour sténose pyélo-urétérale

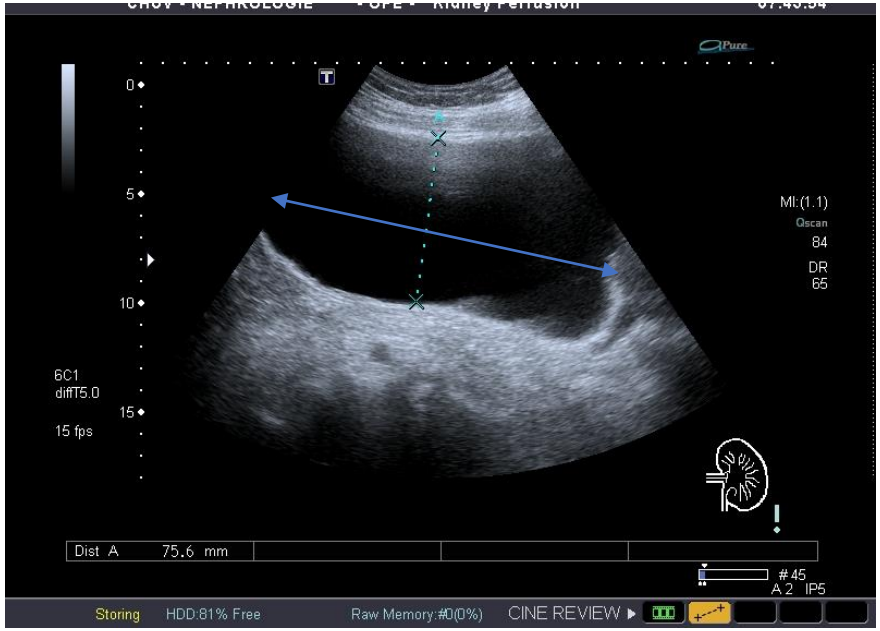
Hydronephrose-stades



Onen A, Front Ped 2020

Hydronéphrose: n’oubliez pas la vessie

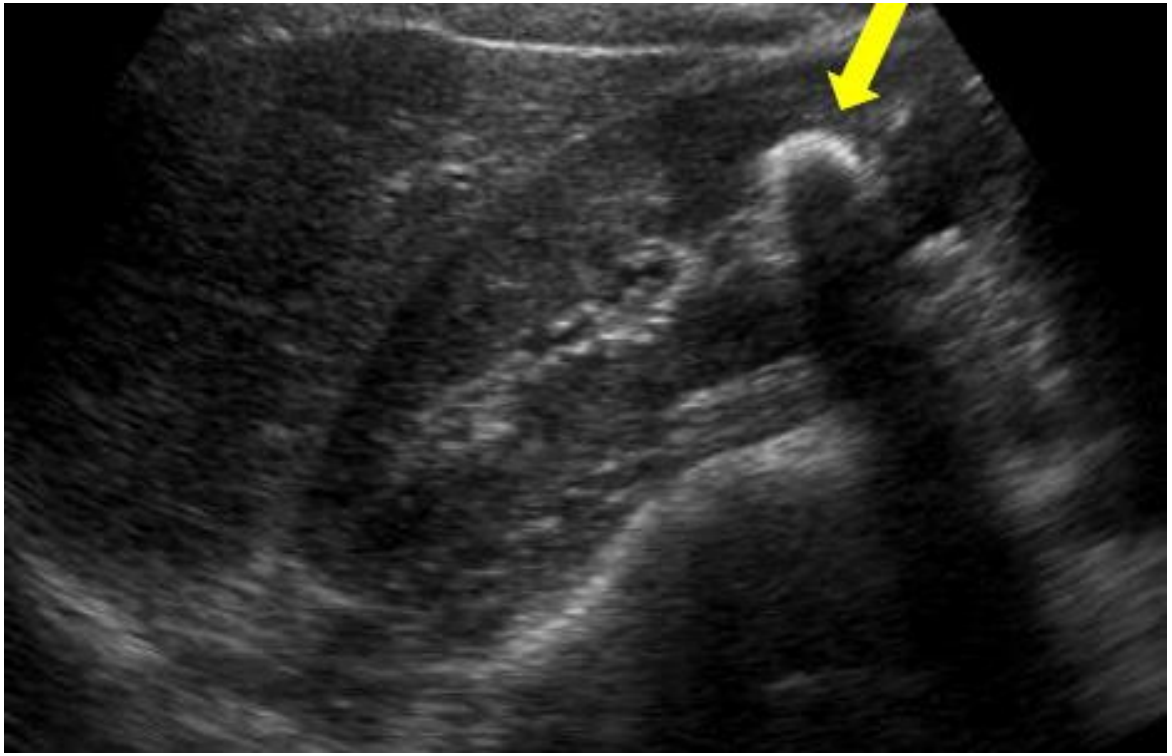




Homme diabétique, créatinine 360 umol/l

Volume post-miction: L x D x P x 0.5236 = 425 ml

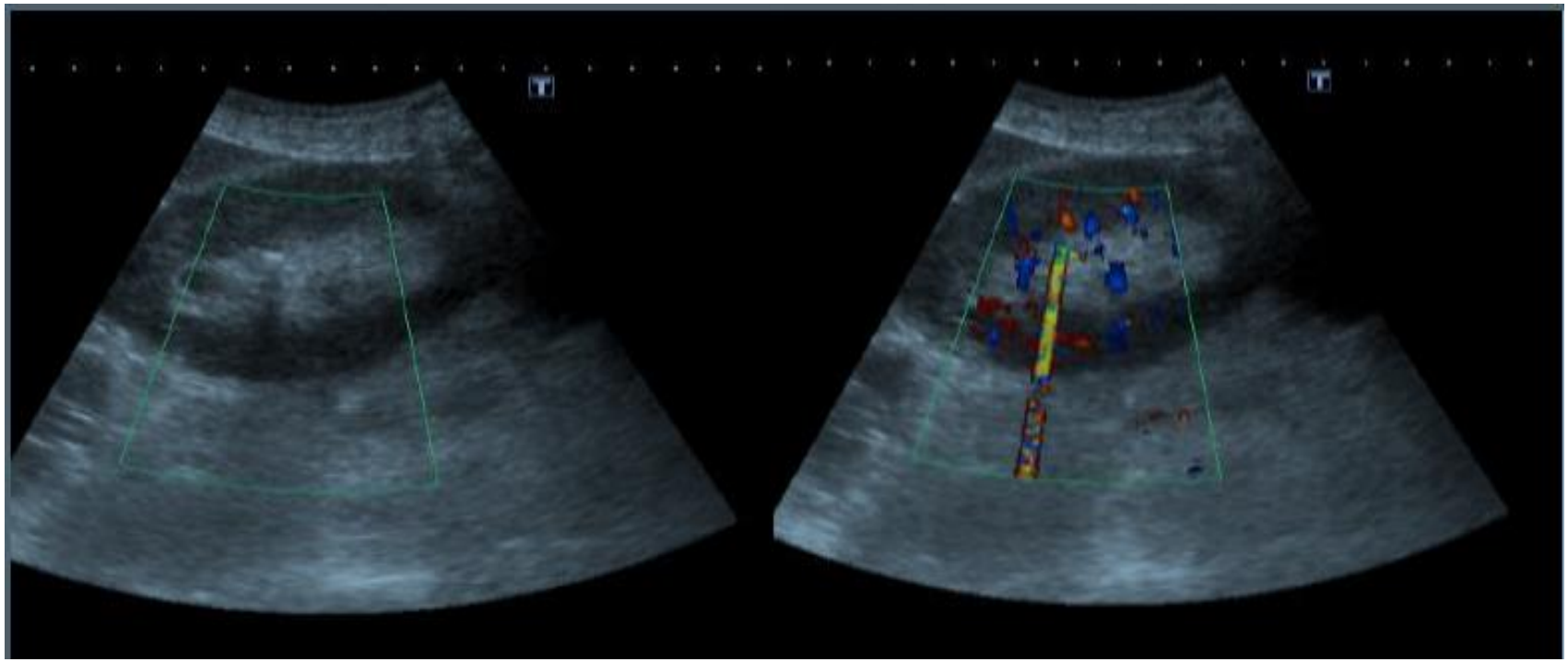
Femme, 47 ans, douleur intermittente au flanc D



Néphrolithiase

2. Dépistage calculs rénaux

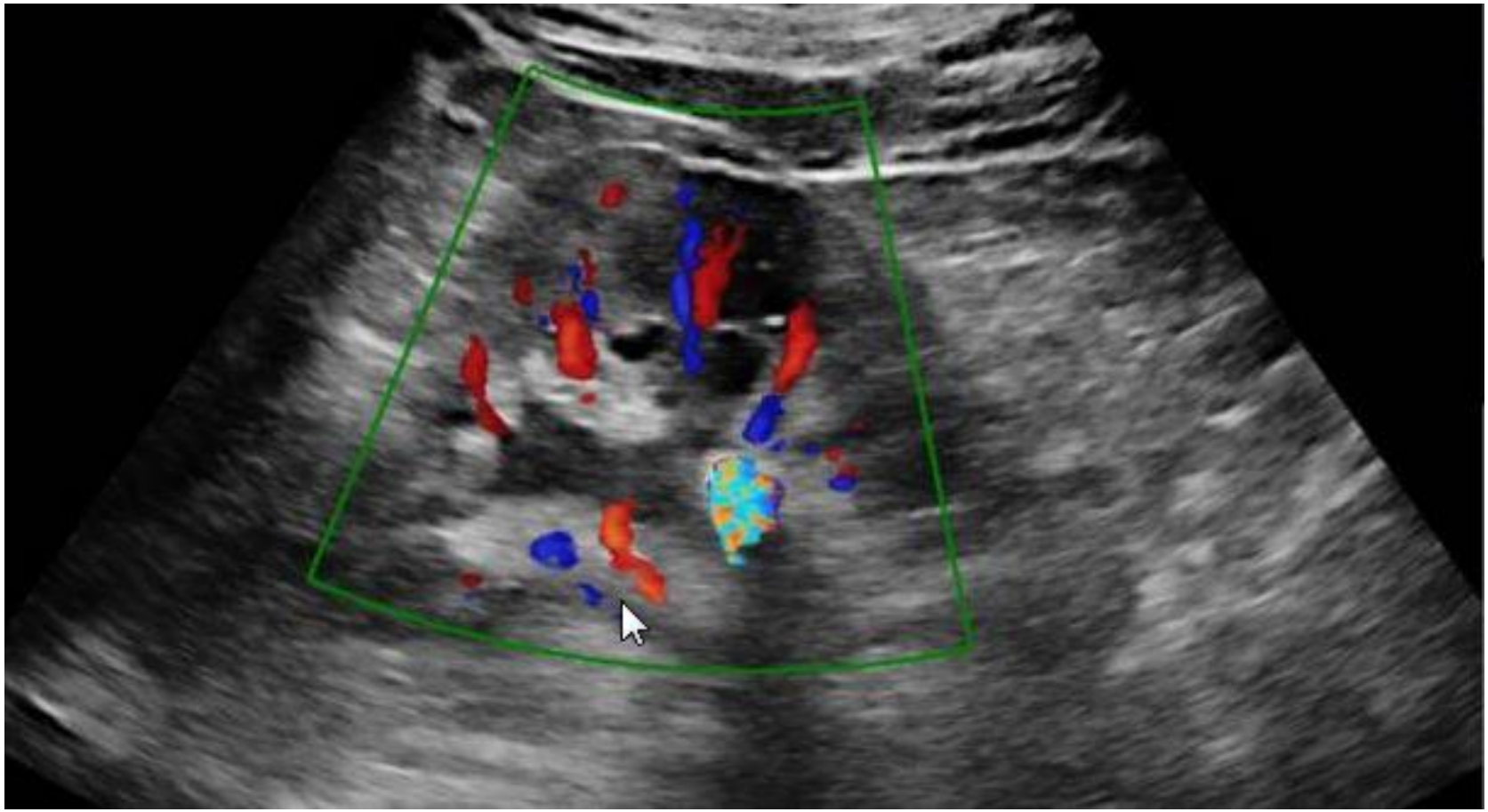
Homme, 52 ans, connu pour des néphrolithiases



Phénomène de ‘twinkling’

Twinkling

Homme 41 ans, douleur LRG



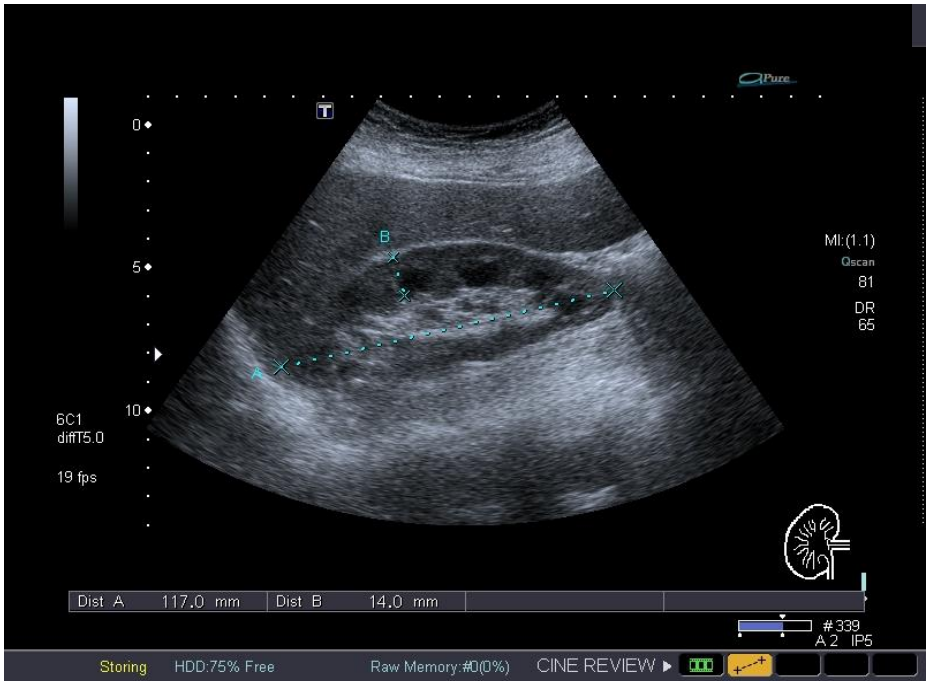
Calculs rénaux: échographie versus CT

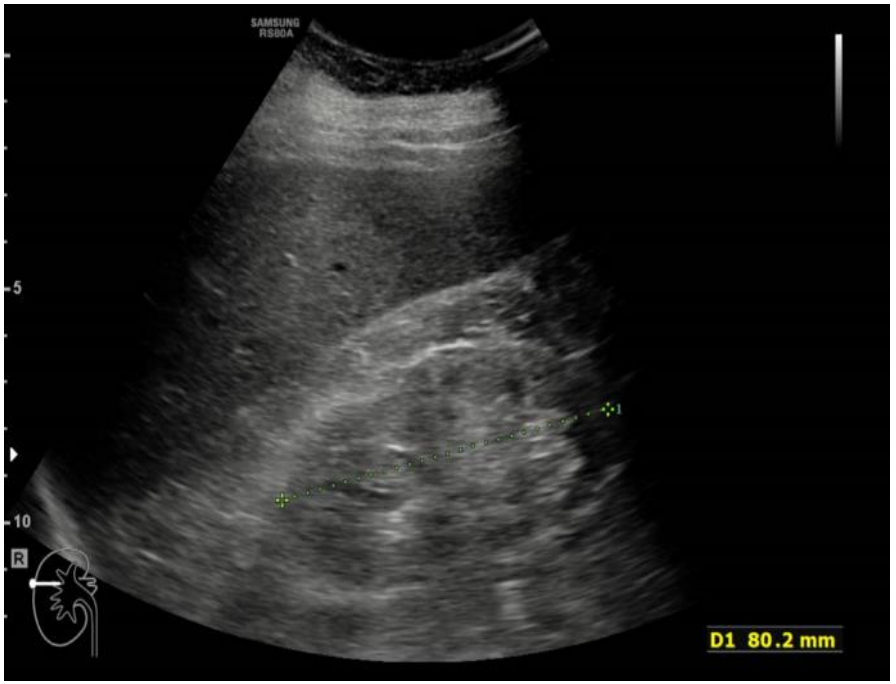
	Sens	Spec
CT	95	98
US	50-94	45-88

- CAVE faux positif: twinkling parfois à cause de l'échogénicité de la graisse et calcifications vasculaires [4]

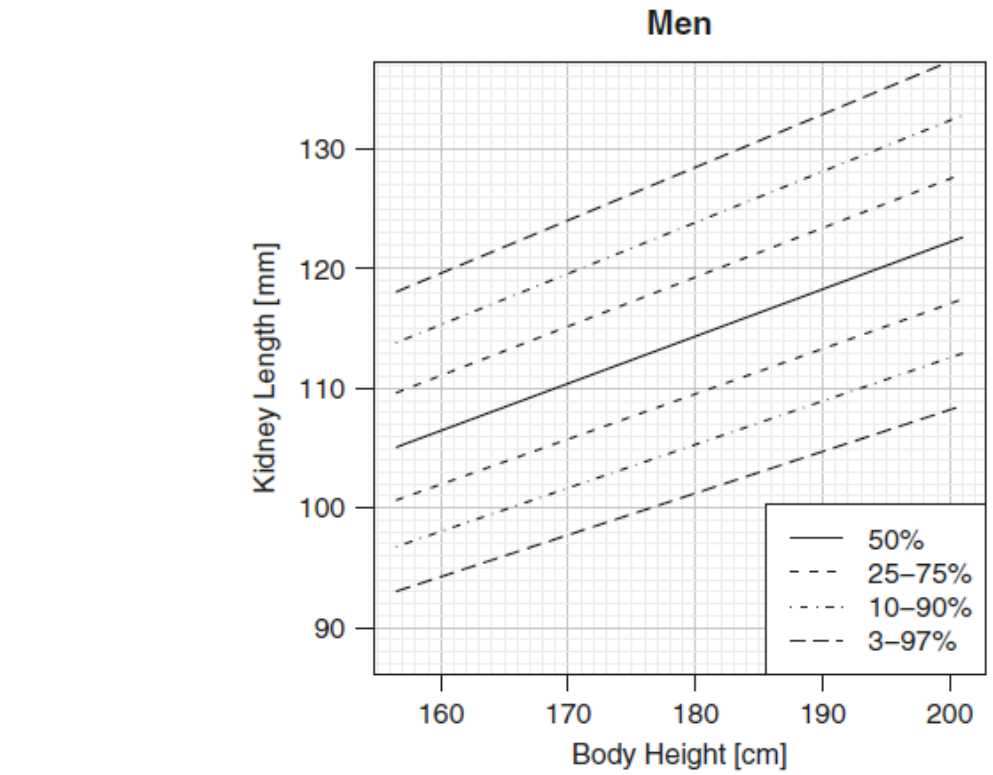
[1]Lu C, Merrill C, J Ultrasound Med 2019
[2]Simon JC, Maxwell AD, Acoust Today 2017
[3]Kielar AZ, Shabana W, J Ultrasound Med 2012
[4] Kamaya A, Am J Roentgenology 2003

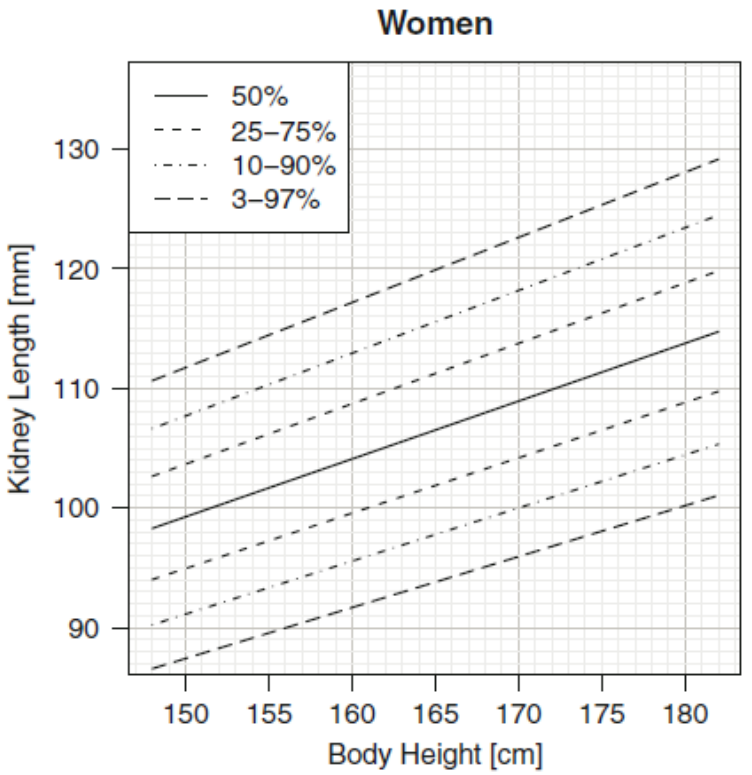
3. Analyse maladie rénale chronique





Percentiles longueur des reins

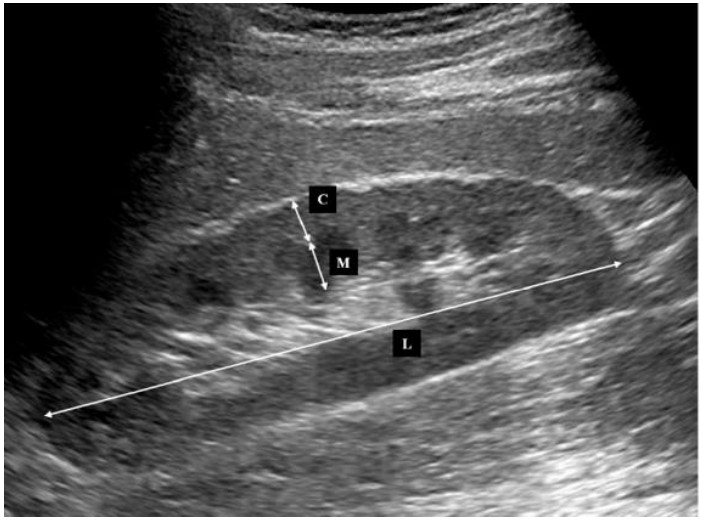


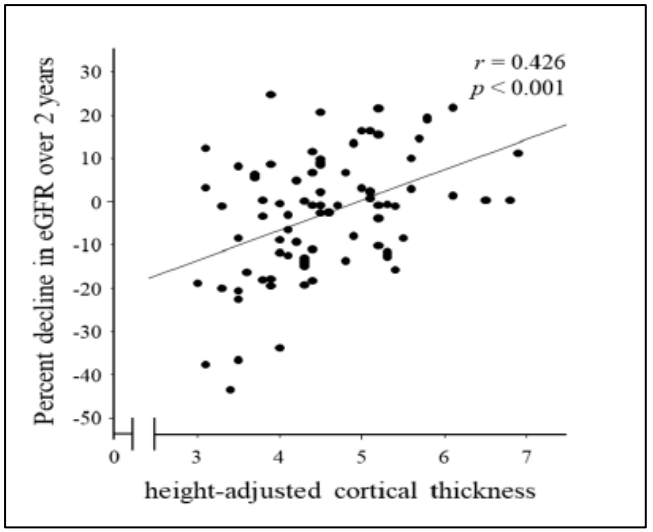


Pruijm et al, Eur Rad 2013

Predictive Value of Cortical Thickness Measured by Ultrasonography for Renal Impairment: A Longitudinal Study in Chronic Kidney Disease

Shotaro Hoi, Tomoaki Takata *, Takaaki Sugihara, Ayami Ida, Masaya Ogawa, Yukari Mae, Satoko Fukuda, Chishio Munemura and Hajime Isomoto





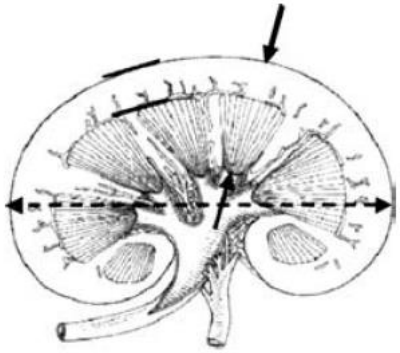
N=87, age 67 ans, DFG 67 ml/min/1.73m2

J Clin Med 2018

Correlation of renal histopathology with sonographic findings

SAMMY MOGHAZI, EDRIA JONES, JILL SCHROEPPLE, KRAISITH ARYA, WILLIAM MCCLELLAN, RANDOLPH A. HENNIGAR, and W. CHARLES O'NEILL

A

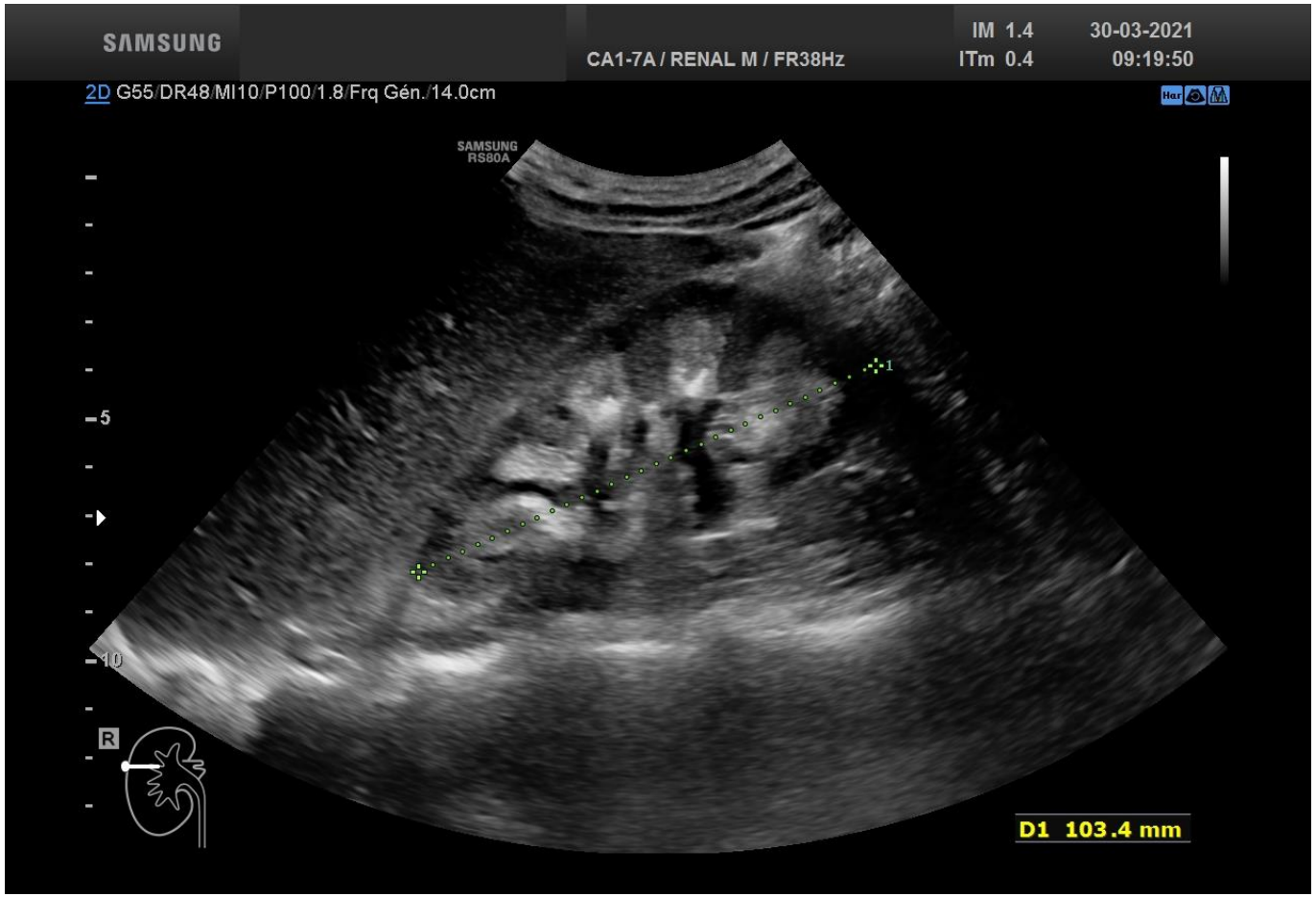


B

Parameter	*N*	% Severe disease	% Sclerosed glomeruli
Combined length <20 cm	32	69[a]	36 ± 4
Combined length ≥20 cm	175	47	23 ± 2
Echogenicity >1.0	99	66[b]	30 ± 3
Echogenicity ≤1.0	69	30	14 ± 2
Combined length <20 cm and echogenicity >1.0	21	86[b]	46 ± 5
Combined length ≥20 cm or echogenicity ≤1.0	147	46	20 ± 2

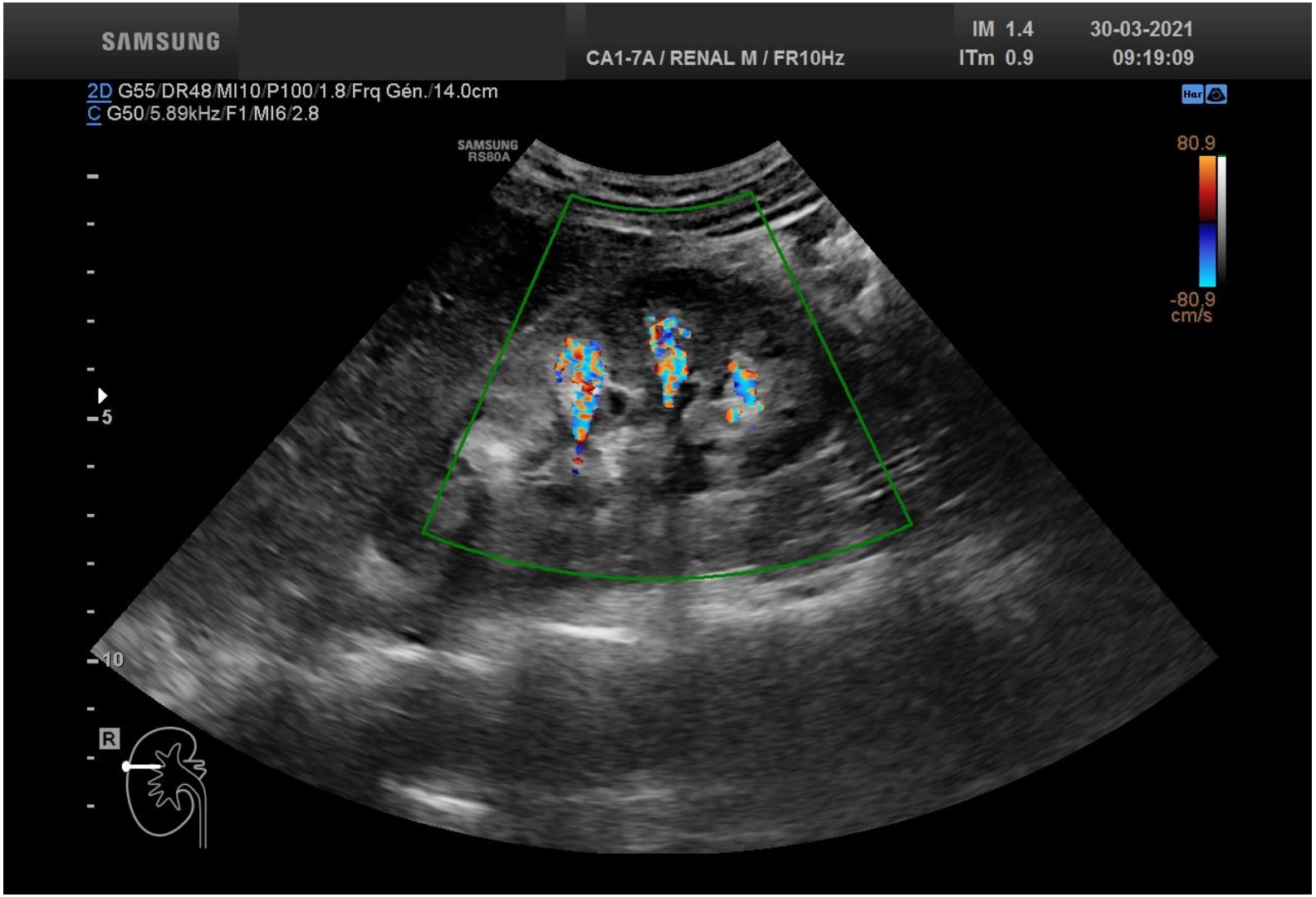
KI 2005,1515-20

Femme, 30 ans, créatinine 110 umol/l

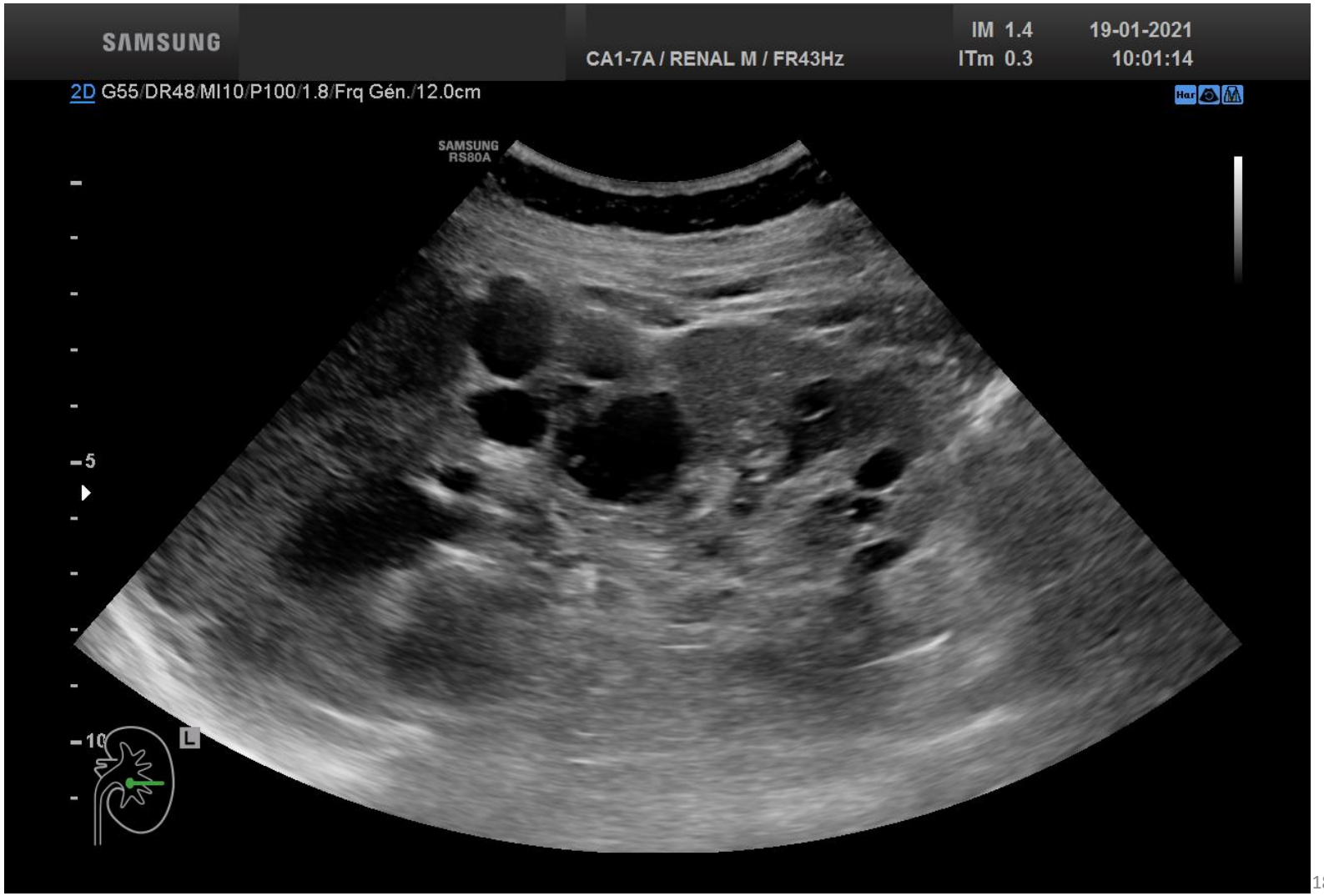


Maladie de Sjögren- acidose rénale tubulaire

Néphrocalcinose

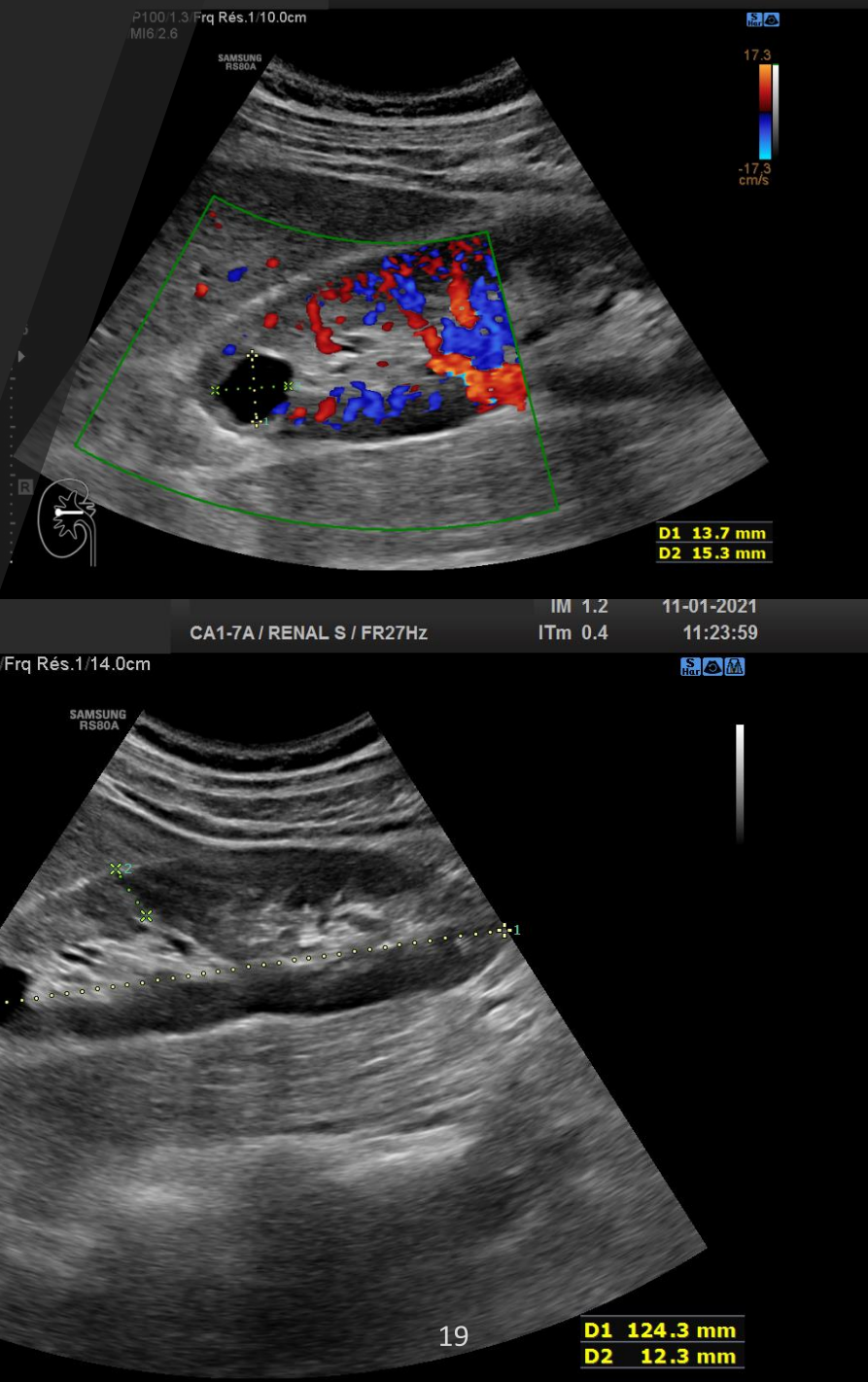


Femme 34 ans, creatinine 101 umol/l, DFG 54 ml/min/1.73m²

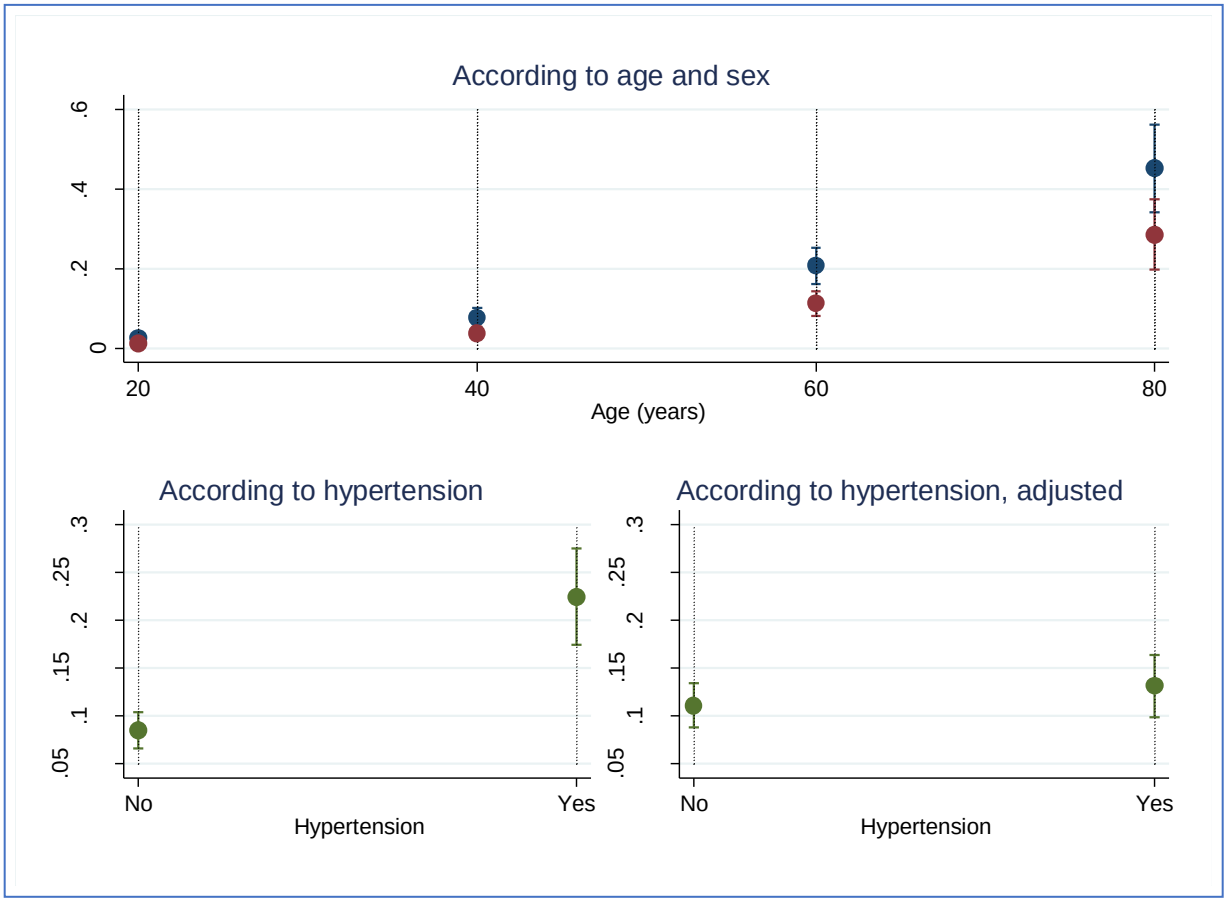


Kystes

- Anéchogène
- Artéfact du “Side lobe”
- Renforcement postérieur



Kystes dans la population: Une découverte fréquente

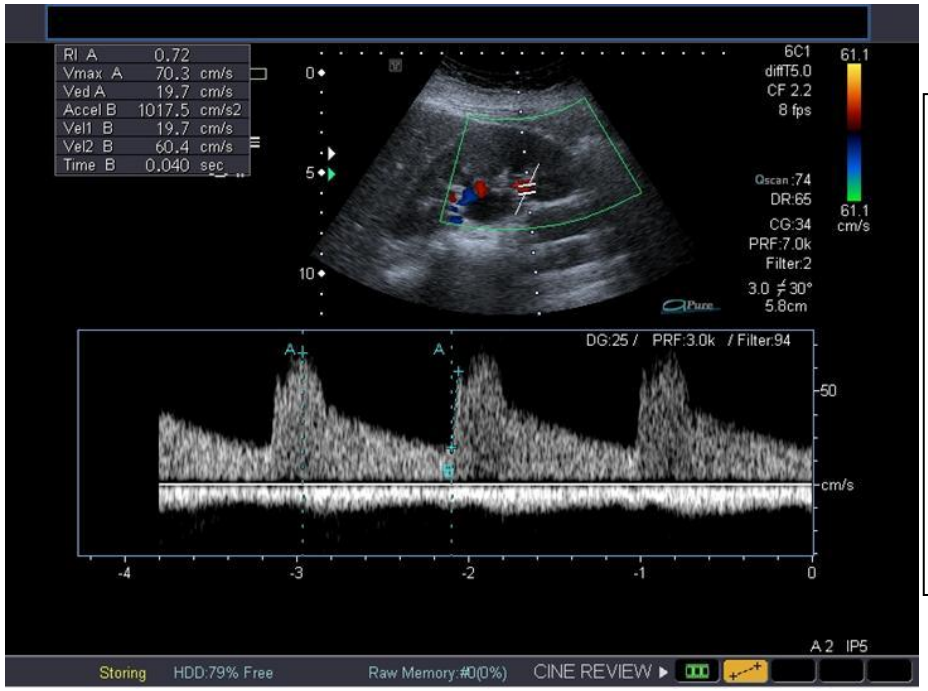


- Âge
- Sexe masculin
- Hypertension

N=1106 participants, SKIPOGH

Wüthrich et al, Swiss Society of Nephrology congress, 2016

4. Perfusion rénale : Écho doppler



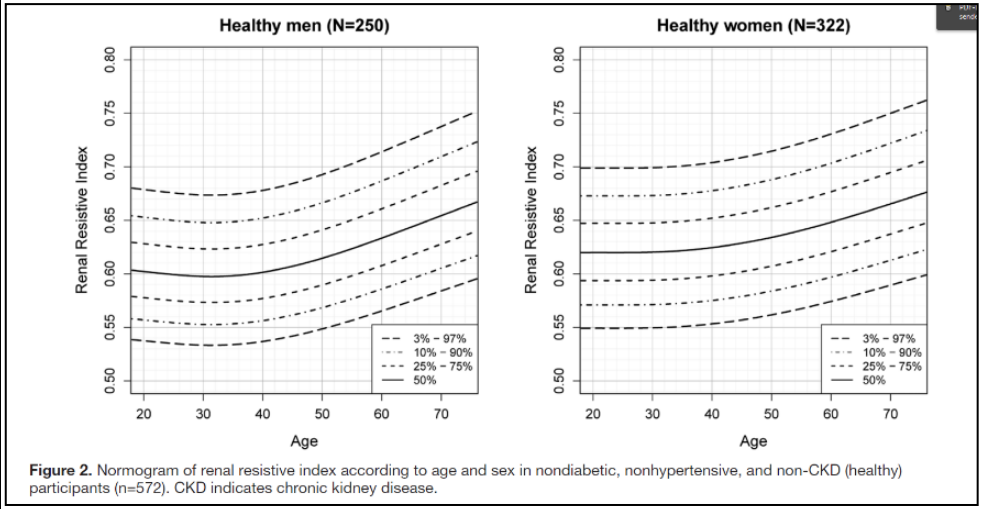


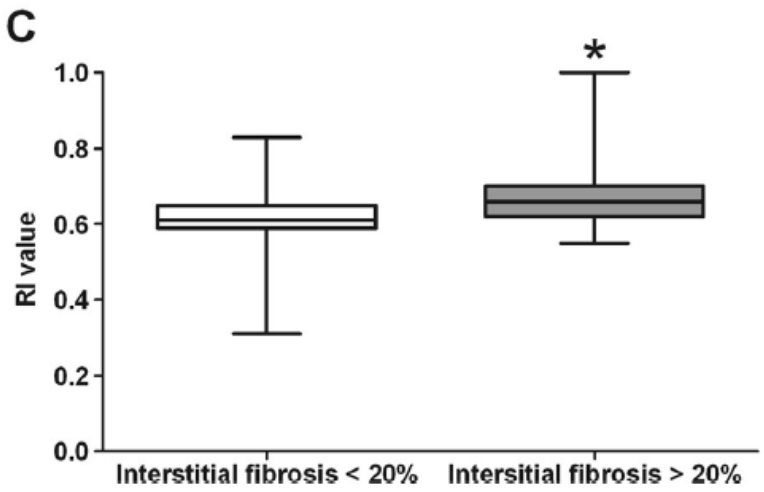
Figure 2. Normogram of renal resistive index according to age and sex in nondiabetic, nonhypertensive, and non-CKD (healthy) participants (n=572). CKD indicates chronic kidney disease.

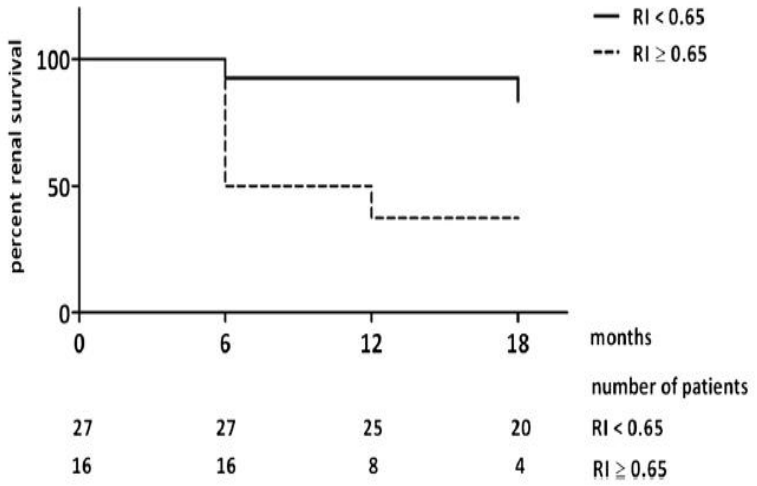
Renal Resistive Index= RRI= (Peak Systolic Velocity-Peak Diastolic Vel)/PSV

Ponte B, Pruijm M, Ackermann D, et al Hypertension 2014

Renal arterial resistive index is associated with severe histological changes and poor renal outcome during chronic kidney disease

Naïke Bigé[1*], Pierre Patrick Lévy[2,3,4], Patrice Callard[5], Jean-Manuel Faintuch[6], Valérie Chigot[6], Virginie Jousselin[1], Pierre Ronco[1,7,8] and Jean-Jacques Boffa[1,7,8]

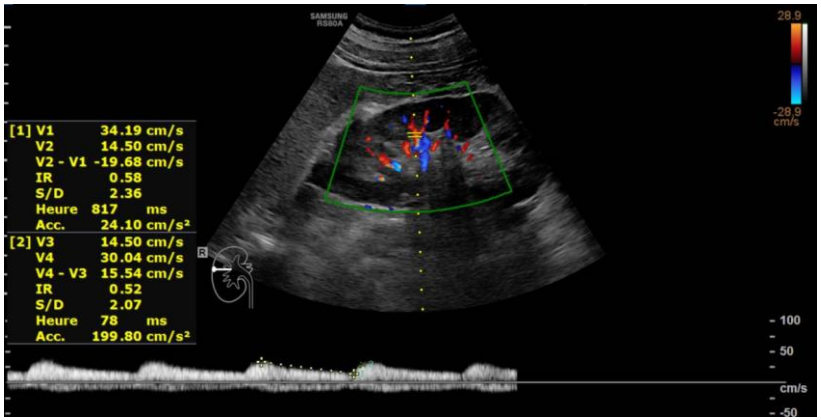


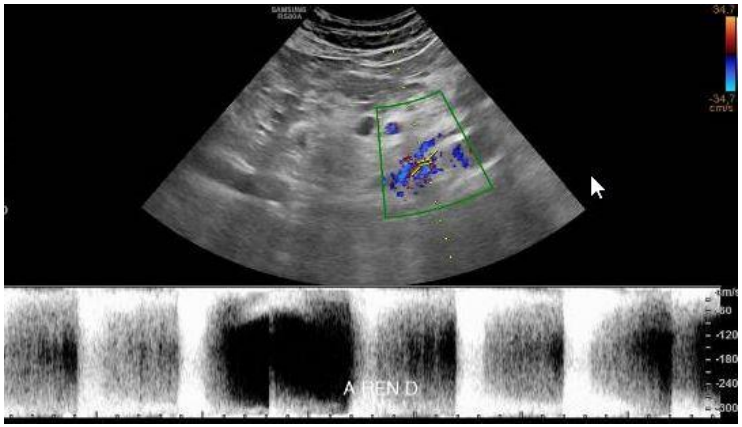


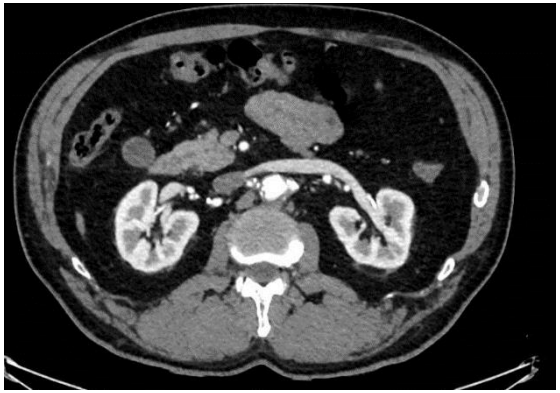
N=58, 49 ans, 70% hommes, DFG 59 ml/min/1.73m²

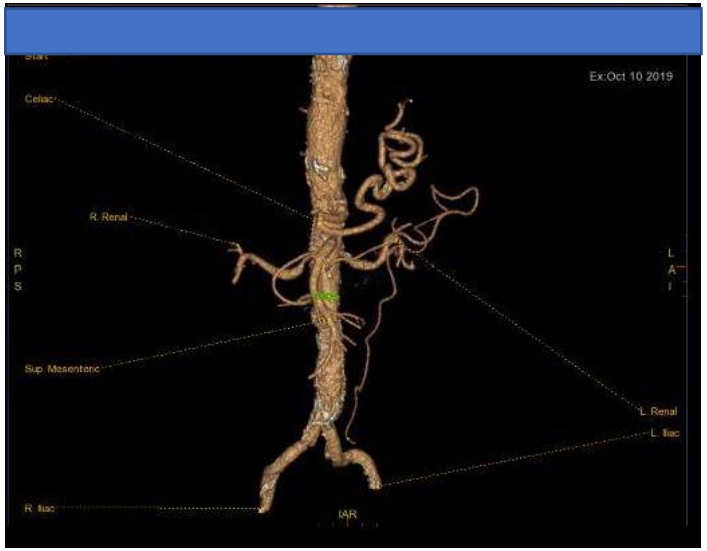
BMC Nephrol 2018

Homme, 62 ans, HTA résistante, 103 kg, créatinine 140 umol/l

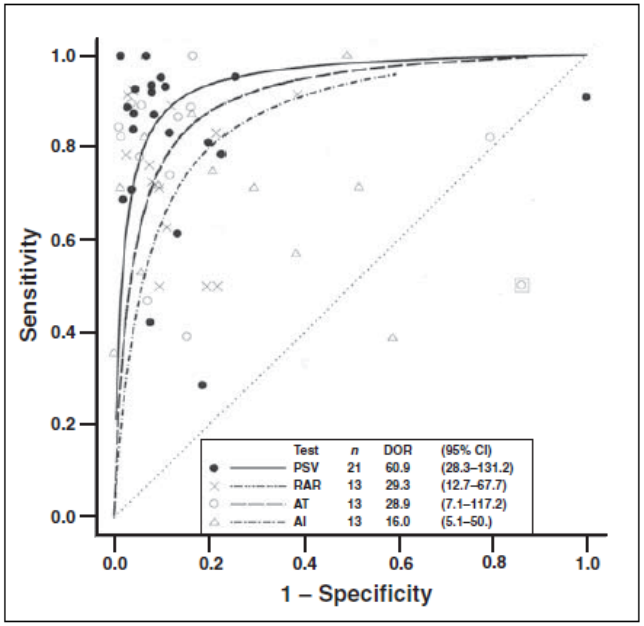








Comparative Accuracy of Renal Duplex Sonographic Parameters in the Diagnosis of Renal Artery Stenosis: Paired and Unpaired Analysis



- Meta-analyse, 88 études
- 8147 patients
- Performance des différents paramètres mesurés par Doppler

	Peak Systolic Velocity (n = 21)	Acceleration Time (n = 13)	Acceleration Index (n = 13)	Renal–Aortic Ratio (n = 13)
Sensitivity	0.85 (0.76–0.90)	0.80 (0.62–0.91)	0.74 (0.55–0.87)	0.78 (0.67–0.86)
1 – Specificity	0.08 (0.05–0.13)	0.12 (0.05–0.25)	0.15 (0.07–0.29)	0.11 (0.06–0.17)

Williams GJ, AJR 2007

Should renal color Doppler ultrasonography be a routine test in newly diagnosed hypertensive patient?

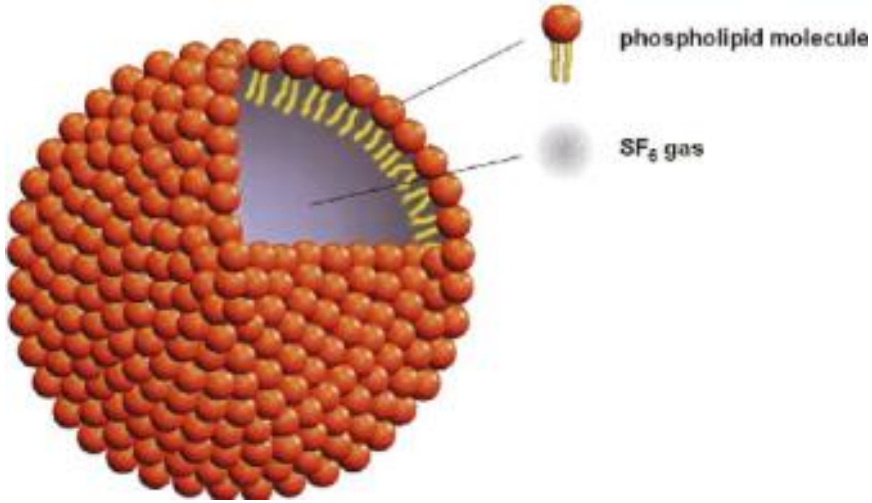
Costas Tsioufis[a], Ioannis Andrikou[a], Menno Pruijm[b], Belén Ponte[c], Pantelis Sarafidis[d], Andreas Koureas[e], Dimitrios Tousoulis[a], Enrico Agabiti-Rosei[f], Giuseppe Mancia[g], and Michel Burnier[b]

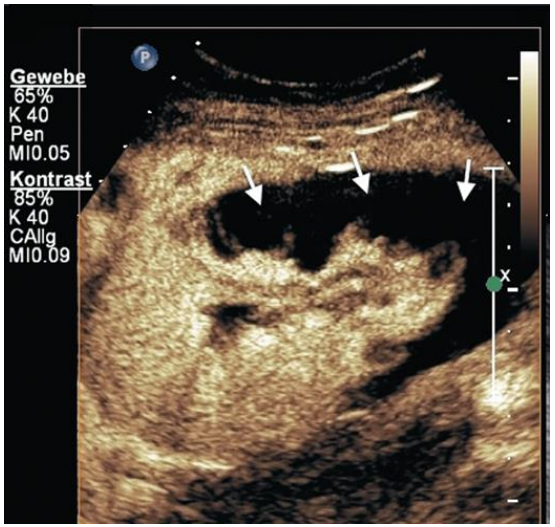
Table 15 Assessment of hypertension-mediated organ damage

Basic screening tests for HMOD	Indication and interpretation
12-lead ECG	Screen for LVH and other possible cardiac abnormalities, and to document heart rate and cardiac rhythm
Urine albumin:creatinine ratio	To detect elevations in albumin excretion indicative of possible renal disease
Blood creatinine and eGFR	To detect possible renal disease
Fundoscopy	To detect hypertensive retinopathy, especially in patients with grade 2 or 3 hypertension
More detailed screening for HMOD	
Echocardiography	To evaluate cardiac structure and function, when this information will influence treatment decisions
Carotid ultrasound	To determine the presence of carotid plaque or stenosis, particularly in patients with cerebrovascular disease or vascular disease elsewhere
Abdominal ultrasound and Doppler studies	• To evaluate renal size and structure (e.g. scarring) and exclude renal tract obstruction as possible underlying causes of CKD and hypertension • Evaluate abdominal aorta for evidence of aneurysmal dilatation and vascular disease • Examine adrenal glands for evidence of adenoma or phaeochromocytoma (CT or MRI preferred for detailed examination); see section 8.2 regarding screening for secondary hypertension • Renal artery Doppler studies to screen for the presence of renovascular disease, especially in the presence of asymmetric renal size

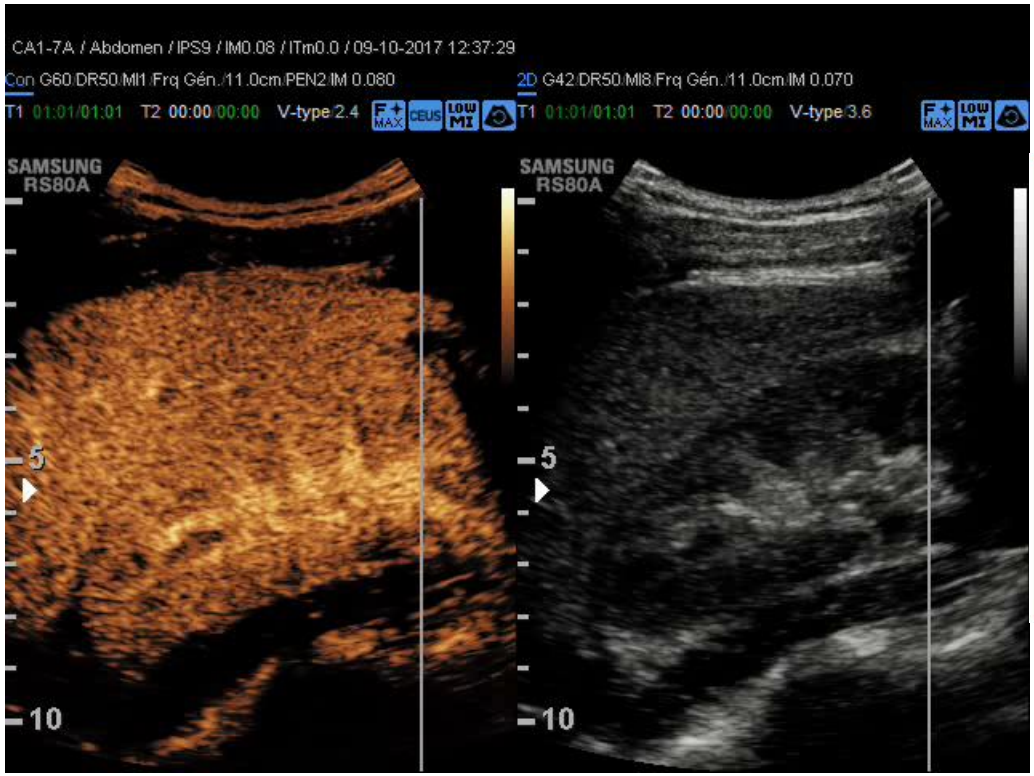
J of Hypertension 2017; ESH Guidelines, J of Hyp 2018

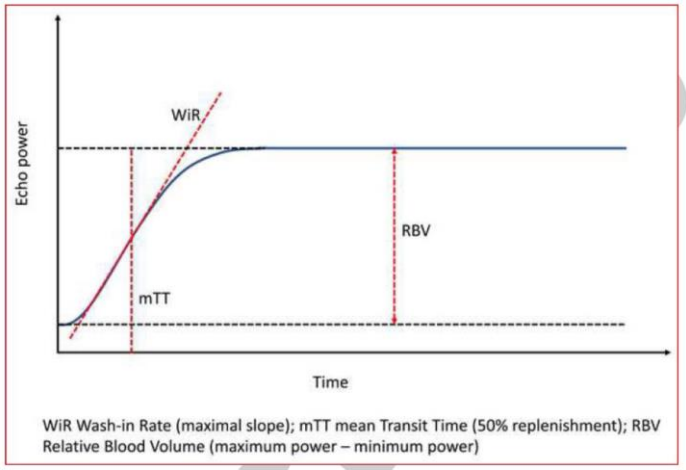
5. CEUS=contrast enhanced ultrasound “ultrason à microbulles”





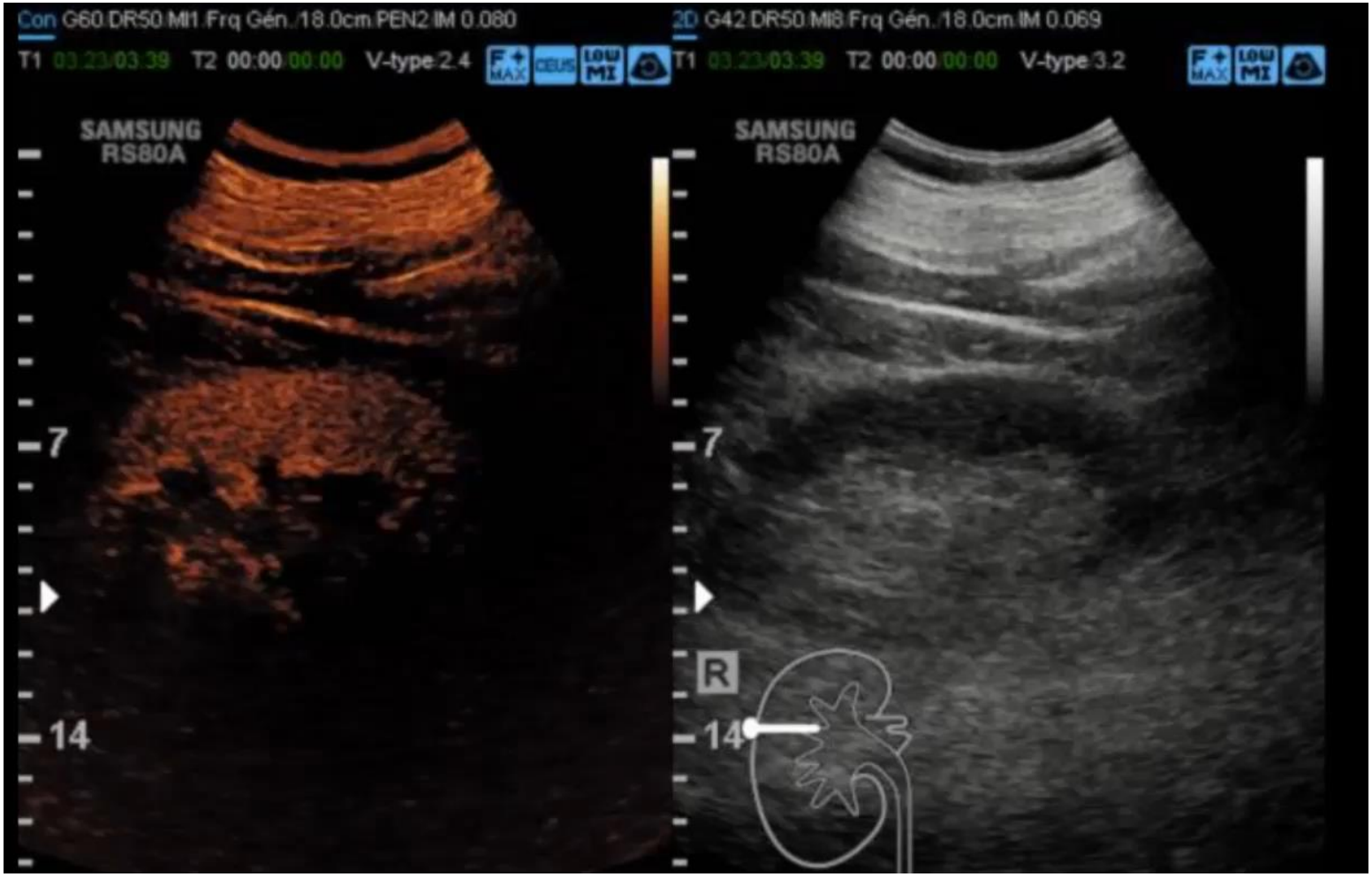
CEUS: méthode de destruction- reperfusion pour mesurer la microperfusion





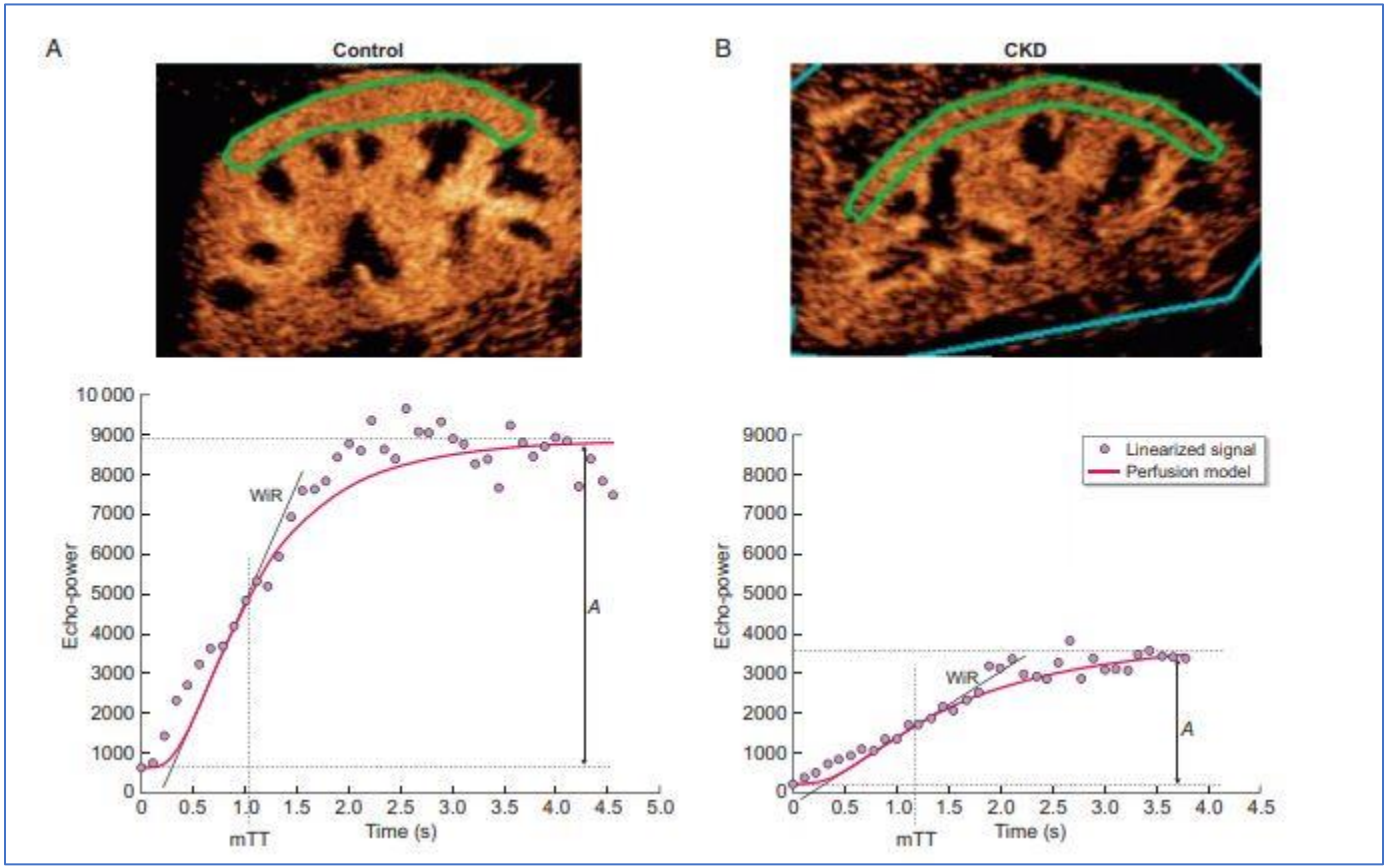
WiR Wash-in Rate (maximal slope); mTT mean Transit Time (50% replenishment); RBV Relative Blood Volume (maximum power – minimum power)

CEUS et maladie rénale chronique (DFG 26ml/min/1.73 m2)



Cortical perfusion as assessed with contrast-enhanced ultrasound is lower in patients with chronic kidney disease than in healthy subjects but increases under low salt conditions

Jonas Garessus[1], Wendy Brito[1], Nicolas Loncle[1], Anna Vanelli[1], Marielle Hendriks-Balk[1], Grégoire Wuerzner[1], Antoine Schneider[2], Michel Burnier [1] and Menno Pruijm [1]



Garessus et al, NDT 2021

Influence de la consommation en sel

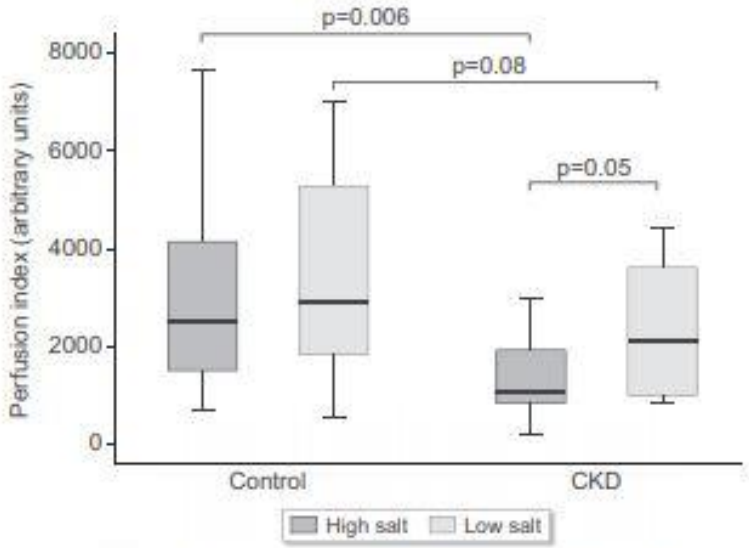


FIGURE 3: Boxplot showing the PI after 5 days of HS and after 5 days of an LS diet in healthy volunteers and CKD patients.

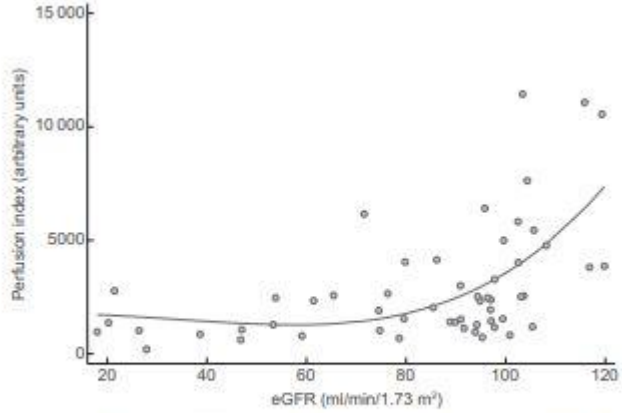
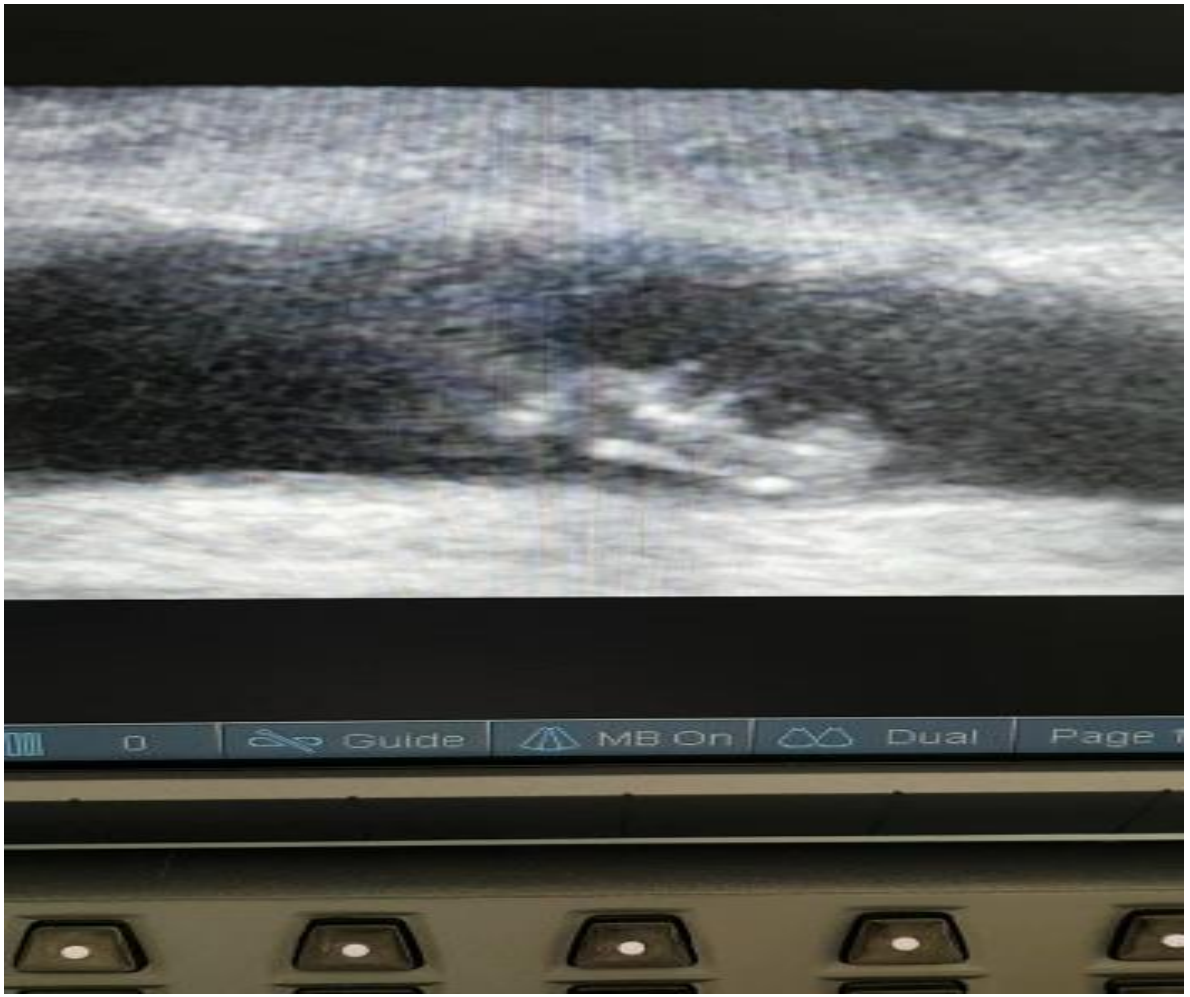


FIGURE 4: Scatterplot showing the association between eGFR of controls and CKD patients and the PI under HS conditions.

Garessus et al, NDT 2021

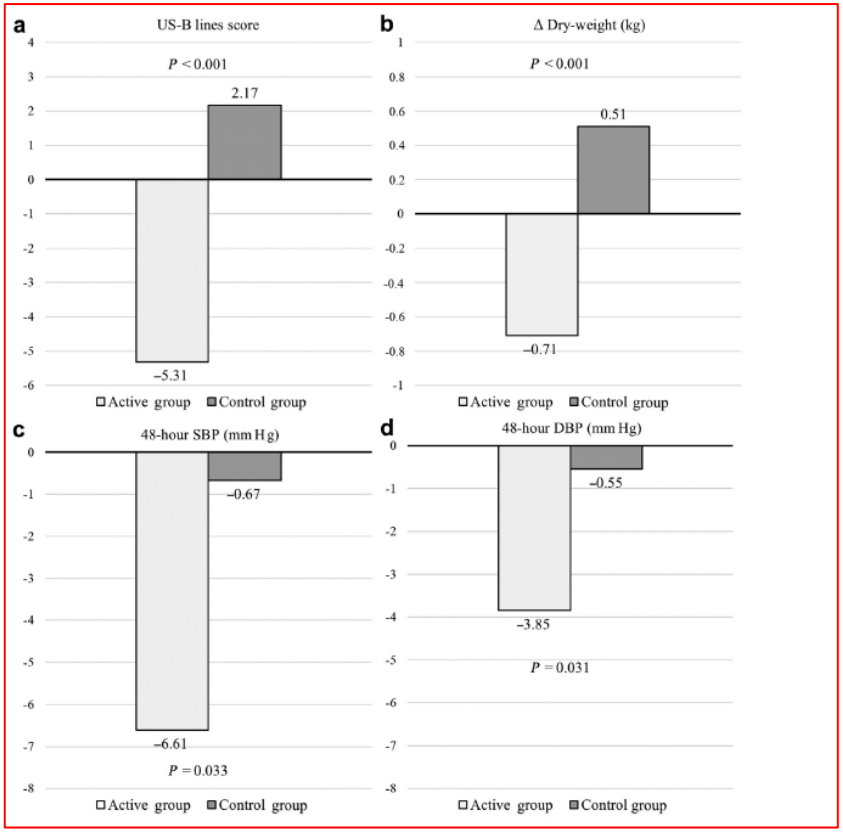
Cas 7: Mme P, hémodialysée avec Supercath, pression veineuse >250 mmHg pendant séance

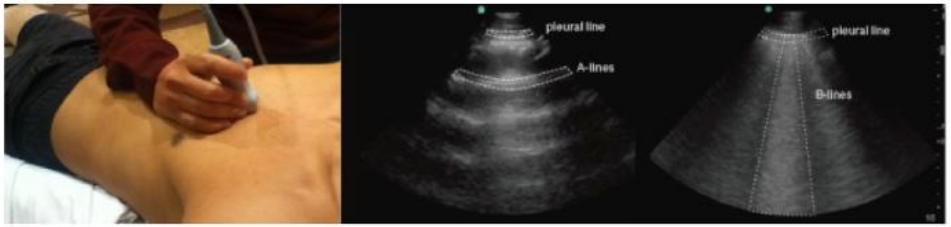
Image US pendant séance:



The effect of dry-weight reduction guided by lung ultrasound on ambulatory blood pressure in hemodialysis patients: a randomized controlled trial

Charalampos Loutradis[1], Pantelis A. Sarafidis[1], Robert Ekart[2], Christodoulos Papadopoulos[3], Vasileios Sachpekidis[4], Maria Eleni Alexandrou[5], Dorothea Papadopoulou[5], Giorgos Efstratiadis[1], Aikaterini Papagianni[1], Gerard London[6] and Carmine Zoccali[7]





- N=35 per group
- 8W 1x/W lung US before dialysis session
- Interventional group: UF and dry weight according to B lines
- Conventional group: conventional treatment

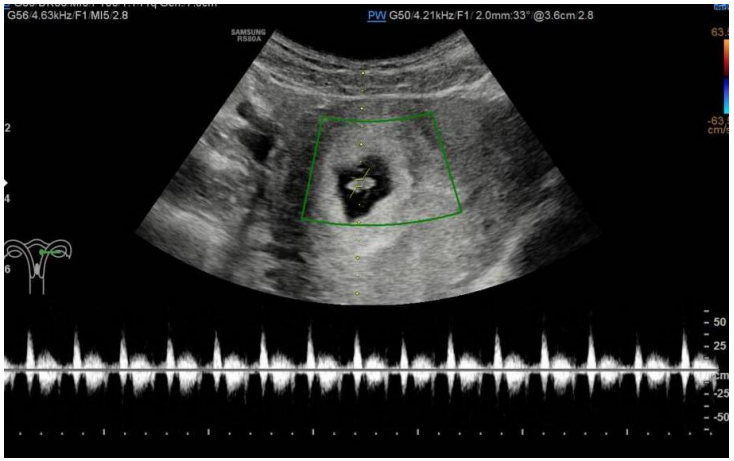
KI 2019

Conclusions:

- L'échographie rénale est l'examen de prédilection lors de la prise en charge de patients présentant une créatinémie élévée, une protéinurie/albuminuria ou hématurie.

- Le mode Doppler est extrêmement utile pour détecter:

  - L'Hydronephrose
  - Les calculs rénaux : twinkling
  - Les sténoses des artères rénales
  - …



- Mais il faut être prêt à avoir quelques surprises!!!

Merci pour votre attention!

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Jets urétéraux