



Planifier une procédure en cas d'insuffisance rénale chronique sévère ou chez le dialysé

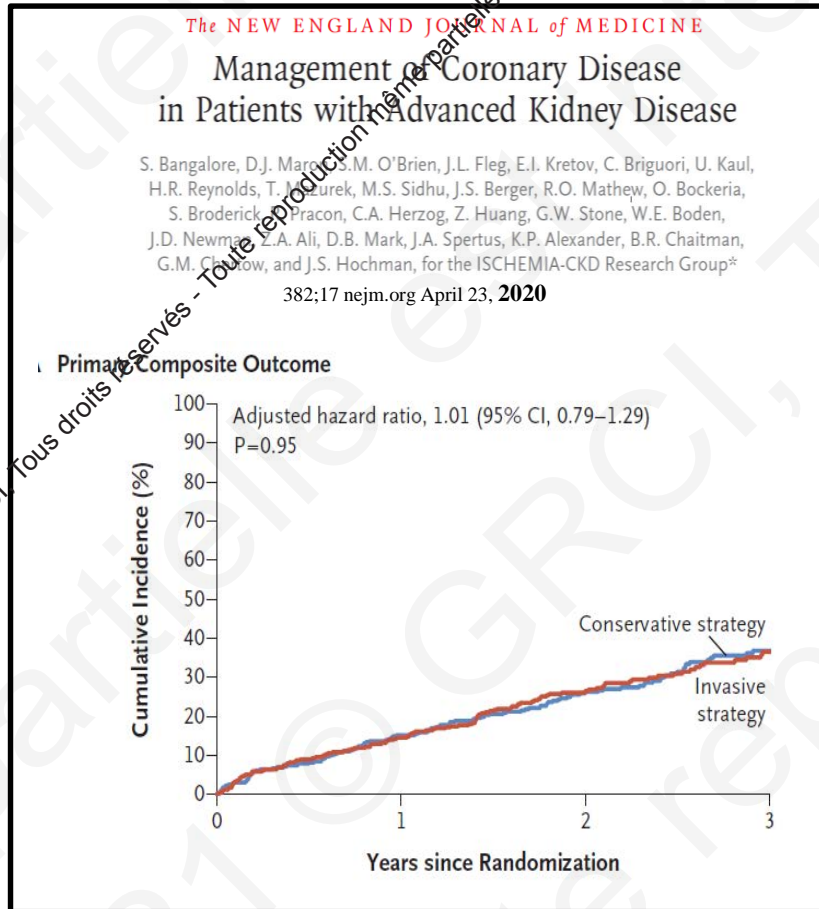
Dr Stéphanie Marlière

La bonne indication ?

➤ Coro après un test d'ischémie



777 pts eGFR<30 with **Moderate or severe ischemia on stress testing**



Invasive strategy :

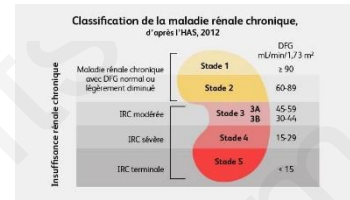
contrast-associated acute kidney injury (7.9%)

Revascularisation 50.2%:
85% PCI and 15% CABG

26% non obstructive coronary disease

Le bon timing

- Mesurer le débit de filtration
- Estimer le risque de CA-AKI
scores de risques https://qxmd.com/calculate/calculator_47/contrast-nephropathy-post-pci
- Se coordonner / communiquer avec le néphrologue
- Arrêt des néphrotoxiques : AINS
- arrêt METFORMINE 48H uniquement si eGFR < 30 ml/min/1,73m²
- Contrôle glycémique
- Favoriser l'euvolémie et éviter l'hypotension diurétiques / IEC / ARA 2 ??



Recommendations for updated ESUR Contrast Medium Safety Committee guidelines Van der molen, ESUR II, European Radiology 2018

Prévention : hydratation?



2014 ESC/EACTS guidelines on myocardial revascularization

IV isotonic saline 1 to 1.5 ml /kg / h

12 hours before

24 hours after

Or a shorter protocol ? :

1 to 3 hours before

6 hours after

American College of Radiology (ACR) Committee on Drugs and Contrast Media 2016

IV isotonic saline **100 ml per hour**

for 6 to 12 hours before

4 to 12 hours after

Contrast media safety committee ESUR II 2018

IV saline 0,9% 1 ml/kg/h

3-4h before et **4-6h after**

Either

sodium bicarbonate 1,4%:

3m/kg/h **1h before**

1ml/kg/h **4-6h after**

Individualize preventive hydration for NYHA III IV and eGFR<15ml/min/1,73m²

Mehran N Engl J Med 2019;380:2146-55.

Hydratation ??



	H+ group	H- group	Absolute difference: H-group minus H+ group (95% CI)	p value
Renal events within 26–35 days post-contrast				
Renal failure (eGFR <15 mL per min/1.73 m ²)	0	0	0	1.0000
>10 eGFR unit renal function decline from baseline	7/260 (2.7%)	11/260 (4.2%)	1.5 (-1.60 to 4.68)	0.3512
Renal function decline to eGFR <30 mL per min/1.73 m ²	2/260 (0.8%)	6/260 (2.3%)	-0.4 (-3.07 to 2.30)	0.7881
Both >10 eGFR unit decline from baseline and a decline to eGFR <30 mL per min/1.73 m ²	2/260 (0.8%)	2/260 (0.8%)	0.0 (-1.50 to 1.50)	>0.9999
Mortality, dialysis, and intensive care admission within 35 days post-contrast				
All-cause mortality	0/328	3/332 (0.9%)	0.9 (-0.11 to 1.92)	0.1267
Dialysis	0/328	0/332	0	1.0000
Intensive care admission	0/328	0/332	0	1.0000
Sequelae of intravenous hydration in the standard prophylactic treatment group				
Symptomatic heart failure	13/328 (4.0%)	0/332	-4.0 (-6.08 to -1.85)	0.0001
Hypernatraemia	0/328	0/332	0	1.0000
Hyponatraemia	1/328 (0.3%)	0/332	-0.3 (-0.90 to 0.29)	0.4970
Arrhythmia	4/328 (1.2%)	0/332	-1.2 (-2.41 to -0.03)	0.0604

eGFR=estimated glomerular filtration rate.

Table 3: Incidence of major adverse events in the standard prophylactic treatment (H+) and no prophylactic treatment (H-) groups

Patients à risque
(diabète, anémie, >75ans
AINS, diurétique, CVD)
+
eGFR of **30–59** ml/min/1.73 m²)

3ml/kg/h 4h avant + 4h après
1ml/kg/h 12h avant + 12h après

THE LANCET 2017

Prophylactic hydration to protect renal function from intravascular iodinated contrast material in patients at high risk of contrast-induced nephropathy (AMACING): a prospective, randomised, phase 3, controlled, open-label, non-inferiority trial

Estelle C Nijssen, Roger J Bennenbergh, Patty J Nelemans, Brigitta A Essers, Margo M Janssen, Marja A Vermeeren, Vincent van Ommen, Joachim E Wildberger

Hydratation adaptée aux pressions de remplissage

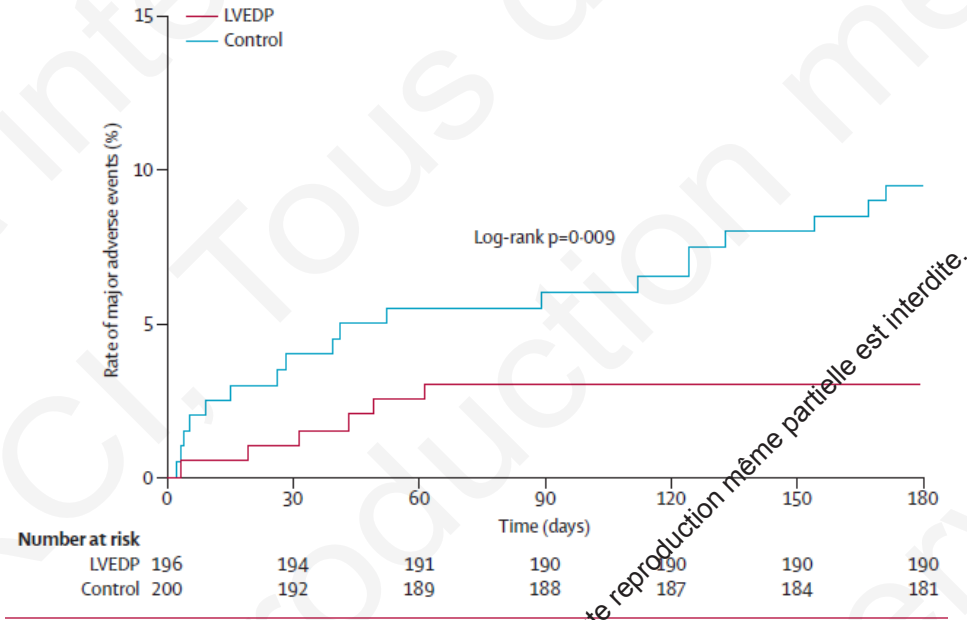
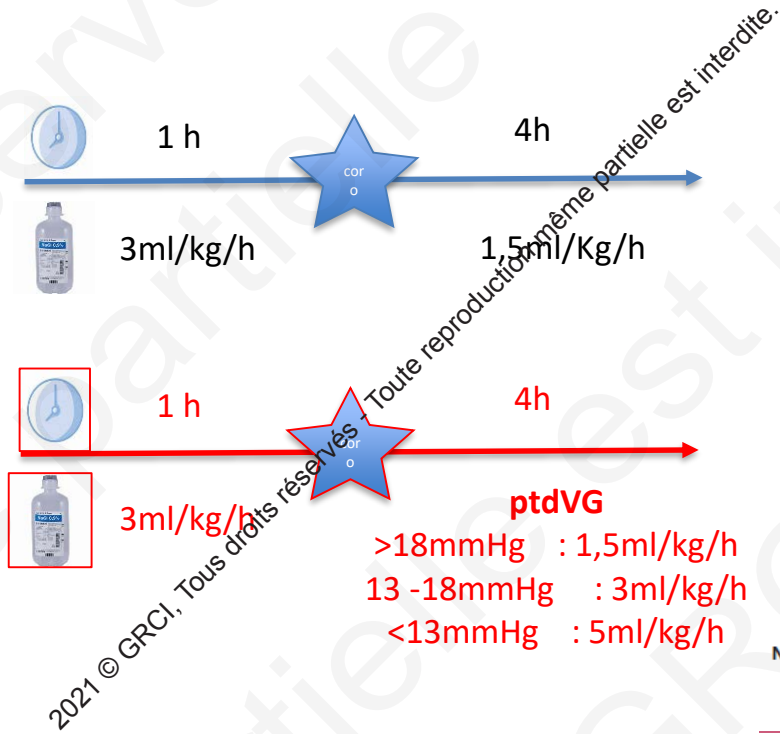
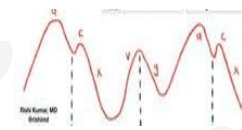


Figure 3: Rate of major adverse events in each group
 The graph shows the 6-month rate of major adverse events, defined as a composite of all-cause mortality, myocardial infarction, or dialysis. LVEDP=left ventricular end-diastolic pressure.

6.7% vs. 16.3%; relative risk, 0.41; 95% CI, 0.22 to 0.79; P = 0.005),

Brar SS, et al the POSEIDON randomised controlled trial. *Lancet* 2014; 383: 1814-23.



Hydratation adaptée aux pressions de remplissage

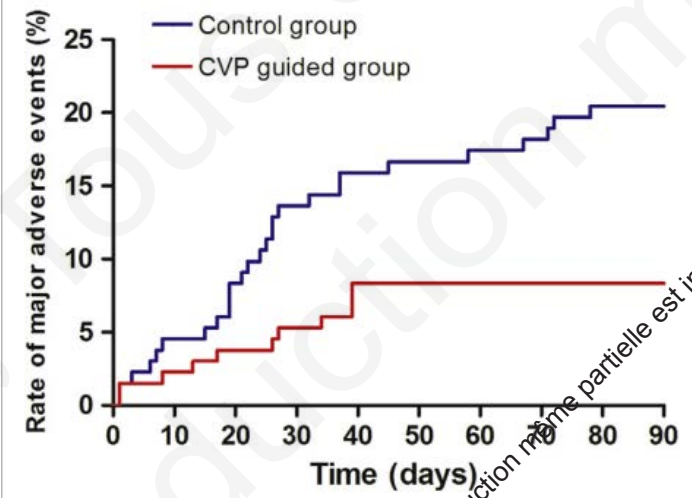
TABLE 3 Incidence of CIN in Study Patients by Subgroups

	CVP-Guided Hydration Group	Control Group	Absolute Difference, % (95% CI)	p Value
LVEF				
40%-50%	10/69 (14.5)	17/66 (25.8)	11.3 (-2.3 to 24.8)	0.077
<40%	11/63 (17.5)	22/66 (33.3)	15.8 (0.9 to 30.9)	0.031
CVP				
<6 cm H ₂ O	3/28 (10.7)	9/24 (37.5)	26.8 (4.0 to 49.6)	0.045
6-12 cm H ₂ O	8/69 (11.6)	20/74 (27.0)	15.4 (2.5 to 28.4)	0.022
>12 cm H ₂ O	19/35 (54.3)	10/34 (29.4)	0.8 (-21.3 to 23.0)	0.939

Values are n/N (%).
LVEF = left ventricular ejection fraction; other abbreviations as in Tables 1 and 2.

1 à 3 ml/kg/h selon PVC < 6mmhg et > 12mmhg

FIGURE 4 Cumulative Major Adverse Events at 90 Days for the CVP-Guided Hydration Group Versus Control Group



The graph shows the 3-month major adverse events, defined as a composite of all-cause mortality, myocardial infarction, and acute renal failure requiring dialysis in each group. CVP = central venous pressure.

Geng Q et al, J Am Coll Cardiol Intv 2016;9:89-96

Autres thérapeutiques préventives



➤ Acétylcysteine NAC

➤ Bicarbonate de sodium

Table 3. Primary and Secondary End Points.

Outcome	Sodium Bicarbonate (N=2511)	Sodium Chloride (N=2482)	Odds Ratio (95% CI)	P Value	Acetylcysteine (N=2495)	Placebo (N=2498)	Odds Ratio (95% CI)	P Value
	no. of patients (%)		no. of patients (%)					
Primary end point*	110 (4.4)	116 (4.7)	0.93 (0.72–1.22)	0.62	114 (4.6)	112 (4.5)	1.02 (0.78–1.33)	0.88
Secondary end points								
Contrast-associated acute kidney injury†	239 (9.5)	206 (8.3)	1.16 (0.96–1.41)	0.13	228 (9.1)	217 (8.7)	1.06 (0.87–1.28)	0.58
Death by 90 days	60 (2.4)	68 (2.7)	0.87 (0.61–1.24)	0.43	67 (2.7)	61 (2.4)	1.10 (0.78–1.57)	0.59
Need for dialysis by 90 days	32 (1.3)	29 (1.2)	1.09 (0.65–1.81)	0.73	30 (1.2)	31 (1.2)	0.97 (0.58–1.60)	0.90
Persistent kidney impairment by 90 days	28 (1.1)	25 (1.0)	1.10 (0.64–1.91)	0.71	26 (1.0)	27 (1.1)	0.96 (0.56–1.66)	0.89
Hospitalization with acute coronary syndrome, heart failure, or stroke by 90 days	272 (10.8)	251 (10.1)	1.08 (0.90–1.29)	0.40	244 (9.8)	211 (8.4)	0.86 (0.71–1.04)	0.11
All-cause hospitalization by 90 days	1071 (42.7)	1052 (42.4)	1.01 (0.90–1.13)	0.85	1069 (42.8)	1054 (42.2)	1.03 (0.91–1.15)	0.64

* The primary end point was a composite of death, the need for dialysis, or a persistent increase of at least 50% from baseline in the serum creatinine level at 90 days. Data regarding 90-day creatinine levels were missing in 119 patients (4.7%) in the sodium bicarbonate group, 103 (4.1%) in the sodium chloride group, 105 (4.2%) in the acetylcysteine group, and 117 (4.7%) in the placebo group.

† Contrast-associated acute kidney injury was defined as an increase in serum creatinine of at least 25% or at least 0.3 mg per deciliter (44 μmol per liter) from baseline at 3 to 5 days after angiography. Data regarding serum creatinine levels on days 3 to 5 were missing in 212 patients (8.4%) in the sodium bicarbonate group, 229 (9.2%) in the sodium chloride group, 210 (8.4%) in the acetylcysteine group, and 231 (9.2%) in the placebo group.

PRESERVE TRIAL

Weisbord SD et al. Outcomes after angiography with sodium bicarbonate and acetylcysteine.

N Engl J Med 2018; 378: 603-14.

Autres thérapeutiques préventives



➤ statines

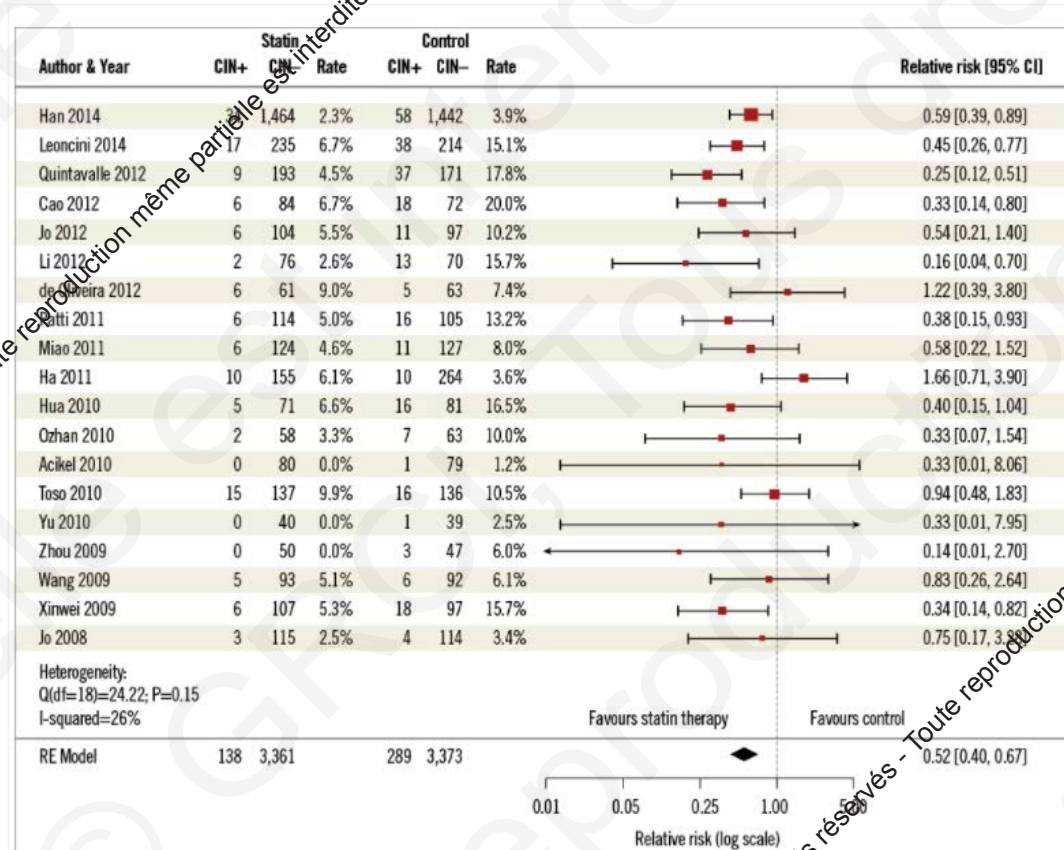


Figure 2. Forest plot. Forest plot of randomised trials meeting inclusion criteria. CI-AKI: contrast-induced acute kidney injury; RE: random effects

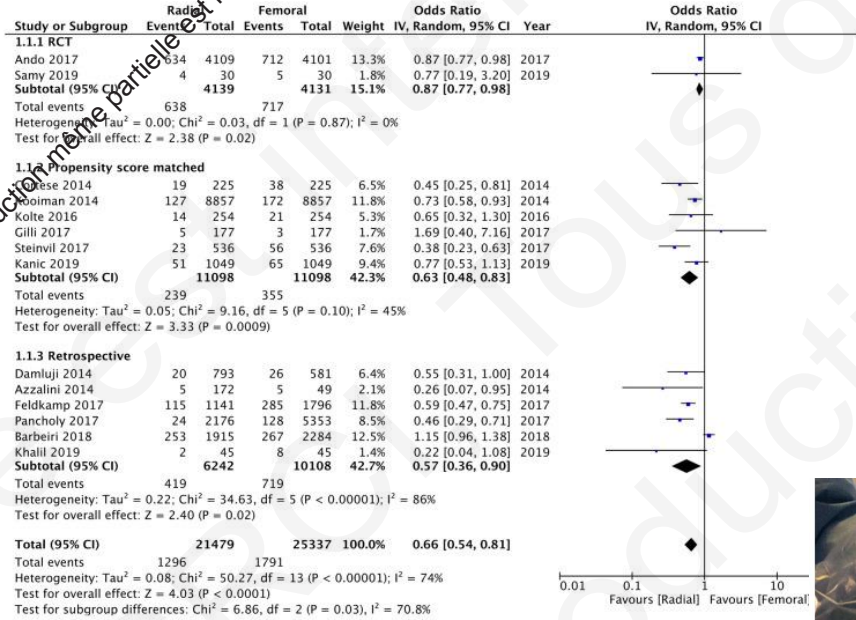
Leoncini M et al. (PRATO-ACS) study. *Am Heart J* 2014; 168: 792-7.

Thompson et al *EuroIntervention* 2016;12:366-374

La voie d'abord

Radiale++

Fémorale

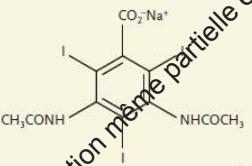
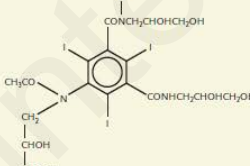
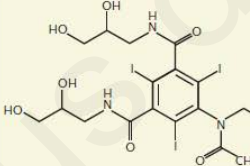
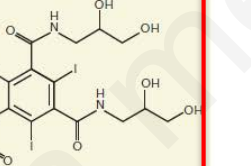




- ❏ Bleeding
- ❏ Athero-embolization



C Wang Exp Ther Med. 2020 Nov; 20(5): 42

Quel produit de contraste ?

	High Osmolality	Low Osmolality		Iso-osmolality
Molecular Structure				
	Ionic monomer	Ionic dimer	Nonionic monomer	Nonionic dimer
Generic Name (mg contrast/ml)	Diatrizoate meglumine and diatrizoate sodium (760)	ioxaglate meglumine and ioxaglate sodium (589)	lopamidol (408) lopamidol (510) lopamidol (612) lopamidol (755)	Iodixanol (550) Iodixanol (652)
Iodine Concentration (mg/ml)	370	320	200–370	270–320
Osmolality (mOsm/kg H₂O)	1551	~600	413–796	290
Viscosity (mPa·sec at 37°C)	10.5	7.5	2.0–9.4	6.3–8.8
				

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Sana Waheed/ Thorac Cardiovasc Surg 2020;:-1-6

Limiter drastiquement le produit de contraste

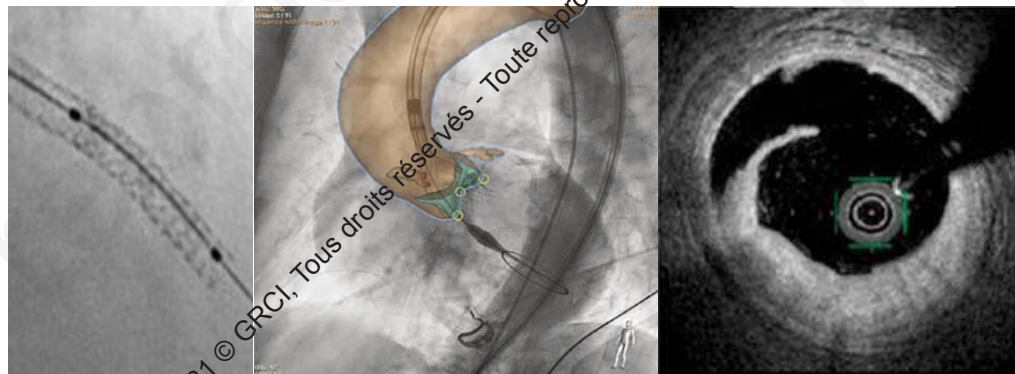
➤ Eviter de dépasser une dose maximale

- Dose (en g d'iode) / eDFG absolu (ml/min) < 1,1
- Volume de PDC (en ml) / eDFG relatif (ml/min/1,73 m²) < 3
(produit à 350 mg d'I/ml)

➤ Limiter le volume total = double de la clairance

➤ Petits moyens et innovations

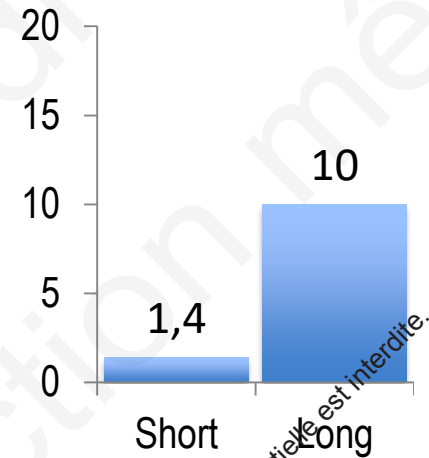
- Petits cathéter : 5F
- 2ml/ injection
- limiter incidences
- Diluer le produit de contraste
- Augmenter la cadence image et scopie forte
- PCI: diminuer les contrôles
- Image en référence
- Utiliser le rehaussement de stent
- Roadmap
- IVUS, dextran OCT



Ando G ;Circ Cardiovasc Interv 2014; 7: 465-72.

Mesures post procédure

➤ **Prévenir la thrombose radiale** : compression courte



Rashid & al. J Am Heart Assoc. 2016

➤ **Surveillance clinique** : diurèse et les signes de surcharge

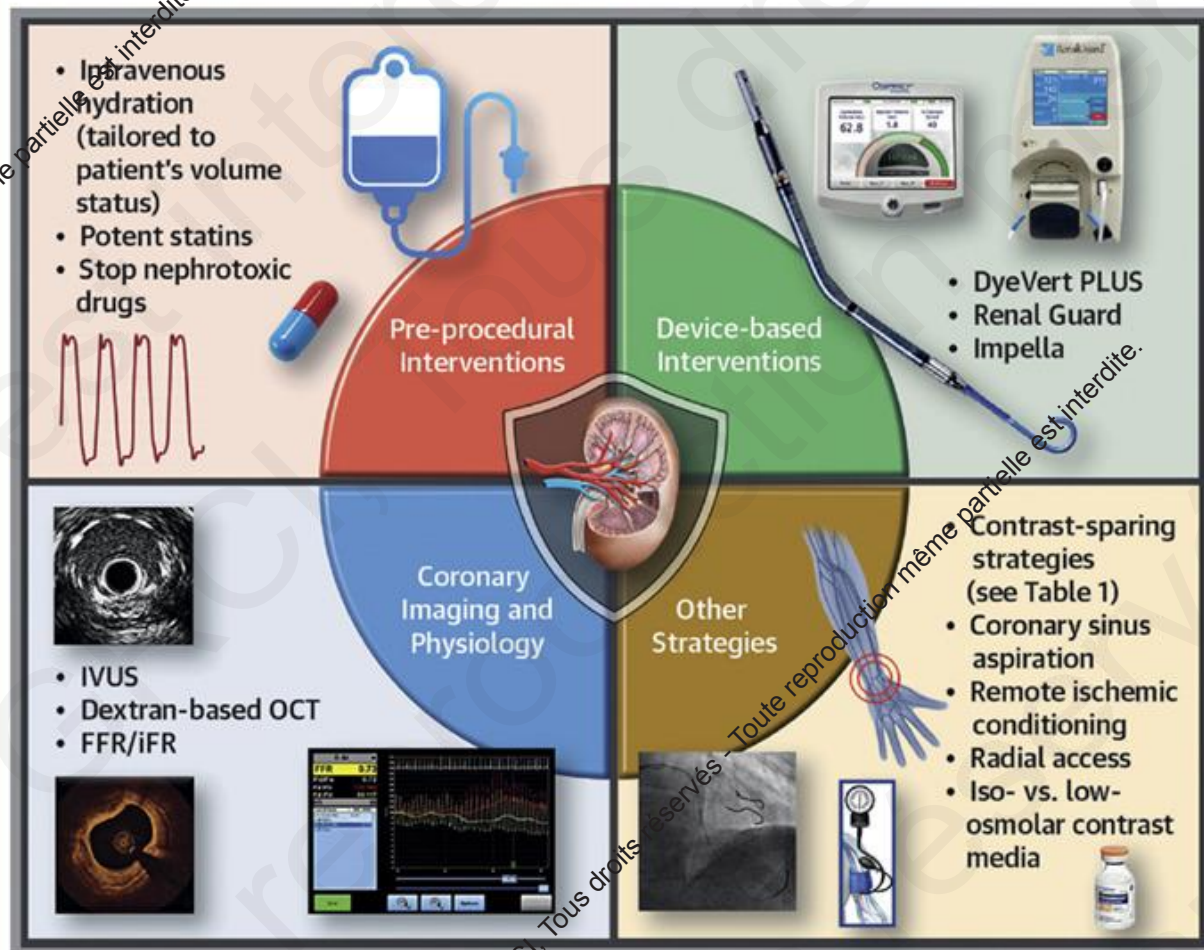
➤ **Surveillance Biologique** : Dosage créatininémie à **H 4-6 + J4-7**

Take home message

➤ Possibilité de l'ambulatoire

➤ Applicable en urgence

CENTRAL ILLUSTRATION: Measures to Decrease the Risk of CI-AKI Before and During PCI



Almendarez, M. et al. J Am Coll Cardiol Intv. 2019;12(19):1877-88.