PLACE 2026
PLATFORM OF LABORATORIES FOR ADVANCES IN CARDIAC EXPERIENCE

CONGRESSO
ROMA, 25 - 27 Giugno 2026

Gestione dell'ipertensione non controllata: ruolo della RDN nella strategia terapeutica

Il protocollo per lo screening del paziente candidato alla denervazione renale

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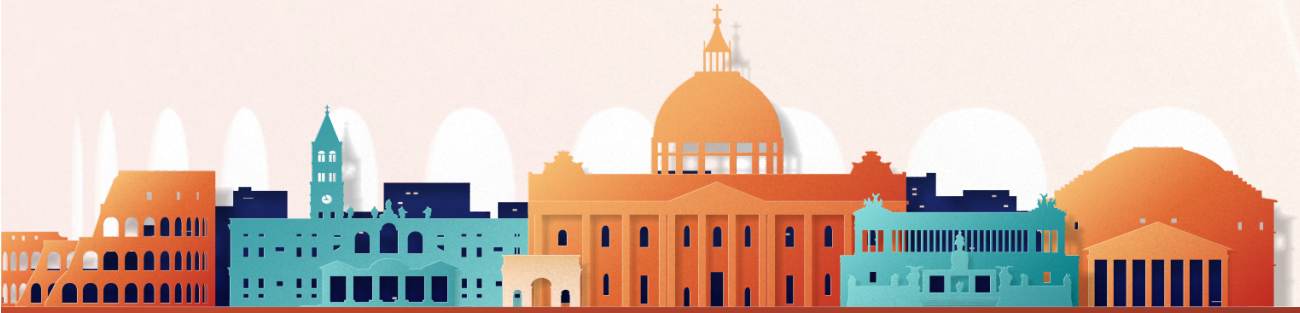


European Society of Hypertension (ESH) 2023 guidelines

Recommendations and statements	Class of recommendation
• RDN can be considered as a treatment option in patients with an eGFR >40 ml/min/1.73m^2 who have **uncontrolled BP** despite the use of antihypertensive drug combination therapy, or if drug treatment elicits serious side effects and poor quality of life.	II
• RDN can be considered as an additional treatment option in patients with **resistant hypertension** if eGFR is >40 ml/min/1.73m^2	
• Selection of patients to whom RDN is offered should be done **in a shared decision-making** process after objectives and complete patient's information	I
• Renal denervation should be performed in **experienced centers to guarantee appropriate selection of eligible patients** and completeness of the denervation procedure	

Mancia G. et al. Journal of Hypertension 2023

2024 ESC Guidelines for the management of elevated blood pressure and hypertension: Developed by the task force on the management of elevated blood pressure and hypertension of the European Society of Cardiology (ESC) and *endorsed by the European Society of Endocrinology (ESE) and the European Stroke Organisation (ESO)*

III	B	To reduce BP, and if performed at a medium-to-high volume centre, catheter-based renal denervation may be considered for resistant hypertension patients who have BP that is uncontrolled despite a three BP-lowering drug combination (including a thiazide or thiazide-like diuretic), and who express a preference to undergo renal denervation after a shared risk-benefit discussion and multidisciplinary assessment.	IIb	B
		To reduce BP, and if performed at a medium-to-high volume centre, catheter-based renal denervation may be considered for patients with both increased CVD risk and uncontrolled hypertension on fewer than three drugs, if they express a preference to undergo renal denervation after a shared risk-benefit discussion and multidisciplinary assessment.	IIb	A
		Due to a lack of adequately powered outcomes trials demonstrating its safety and CVD benefits, renal denervation is not recommended as a first-line BP-lowering intervention for hypertension.	III	C
		Renal denervation is not recommended for treating hypertension in patients with moderately to severely impaired renal function (eGFR <40 mL/min/1.73 m^2) or	III	C

Table 5

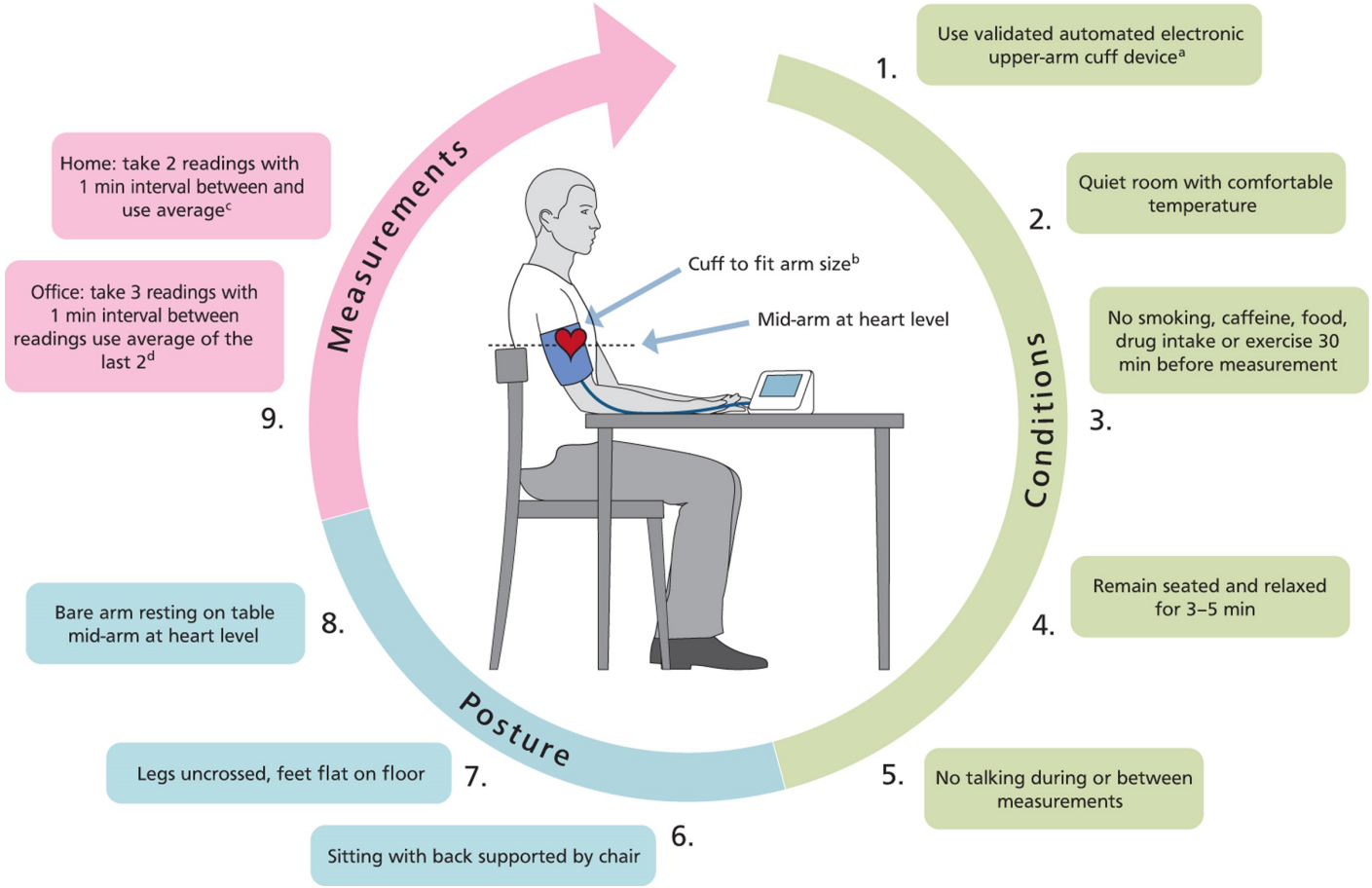
Comparison of office, home, and ambulatory blood pressure measurement thresholds for elevated blood pressure and hypertension

	Office BP (mmHg)[a]	Home BP (mmHg)	Daytime ABPM (mmHg)	24 h ABPM (mmHg)	Night-time ABPM (mmHg)
Reference					
Non-elevated BP	<120/70	<120/70	<120/70	<115/65	<110/60
Elevated BP	120/70–<140/90	120/70–<135/85	120/70–<135/85	115/65–<130/80	110/60–<120/70
Hypertension	≥140/90	≥135/85	≥135/85	≥130/80	≥120/70

ABPM, ambulatory blood pressure monitoring; BP, blood pressure.

[a]The BP thresholds provided assume that a standardized approach to office BP measurement is performed (*Figure 3*). However, evidence indicates that office BP measurement in routine clinical settings is often not done using a standardized approach and, in this case, the routine office BP value may be 5–10 mmHg higher than it would have been if measured using the recommended standardized approach.[65,66]

Recommendations for BP measurements in office and at home



- Hypertension is defined as resistant to treatment when appropriate lifestyle measures and treatment with optimal or best tolerated doses of three or more drugs (a Thiazide/Thiazide-like diuretic, an RAS blocker and a CCB) fail to lower office BP to <140/90 mmHg.

- The inadequate BP control should be confirmed by out-of-office BP measurement showing an uncontrolled 24 h BP (≥ 130 mmHg SBP or ≥ 80 mmHg DBP) values.

- Consider **white coat hypertension** and **continue home BP monitoring**.

- **24h BP monitoring**

- Check adherence to drug therapy → careful inquiry about pts medical habits…also with relatives
  drug tests in blood and urine (can be difficult/research)
  check signs of drugs assumption: bradycardia (BB), uric acids (T/TL), high plasma renin concentration (RAS).

- Otherwise we are facing with pseudohypertension.

Assess lifestyle modification:

- Reduce sodium intake < 1500 mg/die
- Moderate aerobic exercise of 30/45 min for 3 times/week
- Maintain healthy body weight
- Stop interfering agents: NSAIDs, paracetamol, glucocorticoids, nasal decongestants, abuse substances

CV risk assessment: SCORE2/SCORE2-OP

Assess HMOD: echocardiography, Fundus Oculi….

- **Blood samples**: CBC, hematocrit, fasting blood glucose, serum sodium, potassium, calcium levels, creatinine and GFR, BUN, a lipid profile, TSH.

- Investigate for **secondary causes of Hypertension**: ratio of aldosterone to plasma renin activity (PRA), aldosterone levels (aldosterone and renin should be measured together), urinary free cortisol excretion, 24-hour urinary fractionated metanephrines or plasma metanephrines.

- Abdomen CT scan/MRI

- Renal artery Doppler

CAUSE SECONDARIE DI IPERTENSIONE PIU' COMUNI

PATOLOGIA	SCREENING TESTS	INFORMAZIONI AGGIUNTIVE
Nefro-vascolare	Per escludere **stenosi dell'arteria renale e/o displasia fibromuscolare:** - **Eco-color Doppler delle arterie renali (o angio TC)**	
Nefro-parenchimale	Valutazione dei valori di **creatinina**, elettroliti e GFR	
Iperaldosteronismo Primario	Valutazione della concentrazione di aldosterone plasmatico (**PAC**), attività di renina nel plasma (**PRA**), calcolo del **ARR** (rapporto aldosterone/PRA), **potassiemia**.	Almeno 3 settimane prima di eseguire il test è consigliabile: 1) sospendere i farmaci interferenti (quelli che interferiscono meno sull'ARR sono gli Alfa-bloccanti e i calcio-antagonisti); 2) misurare la potassiemia ed eventualmente correggerla; Si raccomanda di tenere traccia della terapia farmacologica in corso durante l'esecuzione del test. Il *cutoff* più ampiamente accettato per definire la positività dello *screening* è unARR >30 (con aldosterone espresso in ng/dL e renina in ng/mL/h).

CAUSE SECONDARIE DI IPERTENSIONE MENO COMUNI

	SCREENING TESTS
Ipotiroidismo	Dosaggio TSH (FT4)
Ipertiroidismo	Dosaggio TSH

Per quanto riguarda altre secondarietà a genesi endocrina relativamente rare, come il Feocromocitoma e la Sindrome di Cushing, indagarle esclusivamente in caso di sospetto clinico:

Sindrome di Cushing (red flags)

- obesità centrale e facies a luna piena;
- diabete o alterata glicemia a digiuno;
- irregolarità del ciclo mestruale;
- irsutismo;
- cute sottile e atrofica con strie rubrae (smagliature di colore rosso violaceo).

Feocromocitoma (red flags)

Ipertensione parossistica, ovvero con rialzi pressori (in alcuni casi alternati ad episodi ipotensivi su base posturale) associati a tachicardia, sudorazione, pallore, cefalea e cardiopalmo.

	SCREENING TESTS
Feocromocitoma	Dosaggio metanefrine urinarie sulle 24h previa preparazione nelle 48 h precedenti e per tutta la durata della raccolta. È necessario: ▪ osservare una dieta priva di alimenti come banane, vaniglia, cioccolato, caffè, tè, agrumi, noci, legumi; ▪ Rimanere a riposo ed evitare l'assunzione di paracetamolo.
Sindrome di Cushing	Cortisolo dopo desametasone 1 mg overnight (test di Nugent) e/o cortisolo libero urinario nelle 24h (cortisoluria).

Prevalence of PA among pts with RHTN ranges from 5 to 20 %

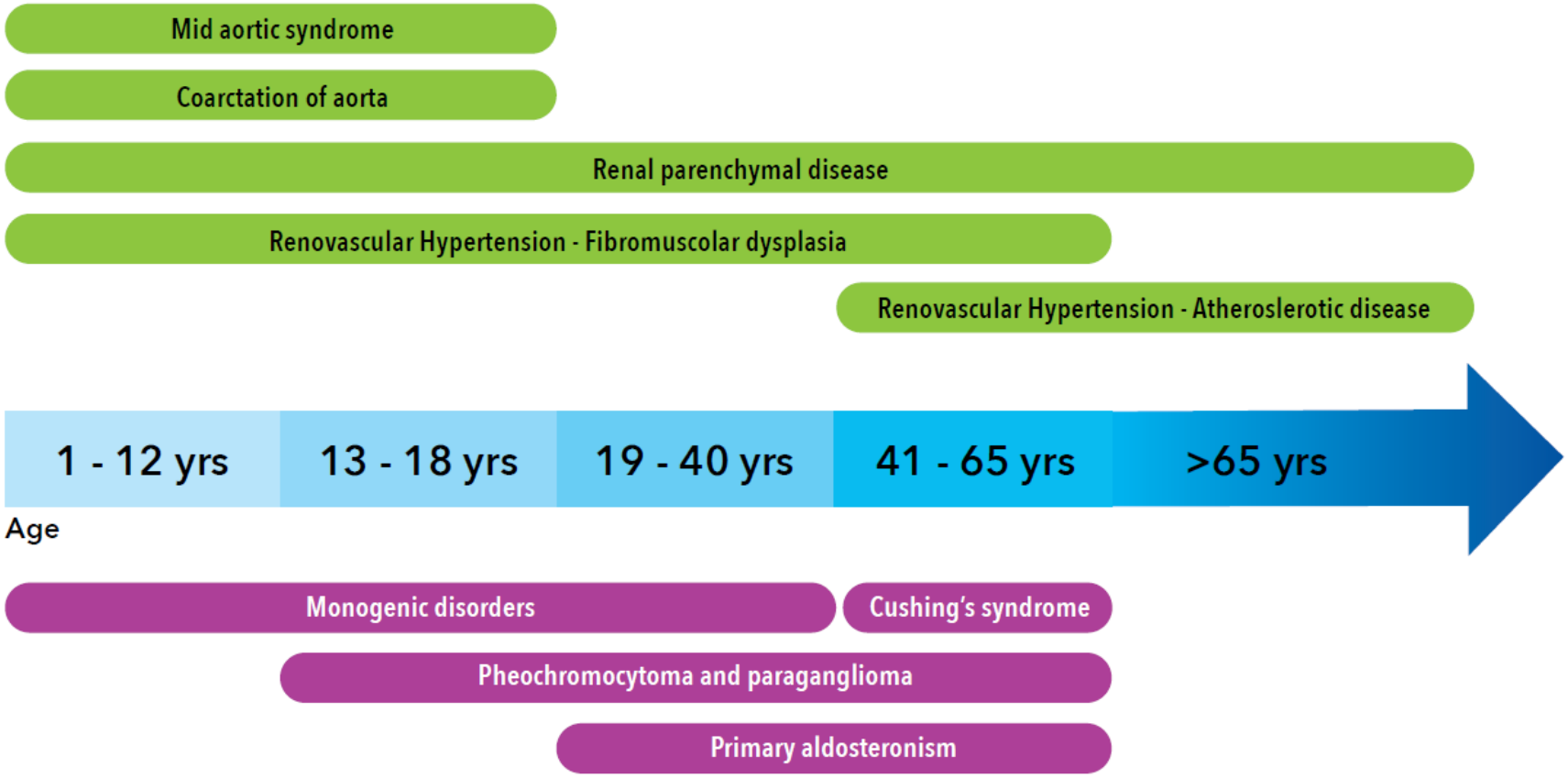
Normokalemia is more common than Hypokaliemia

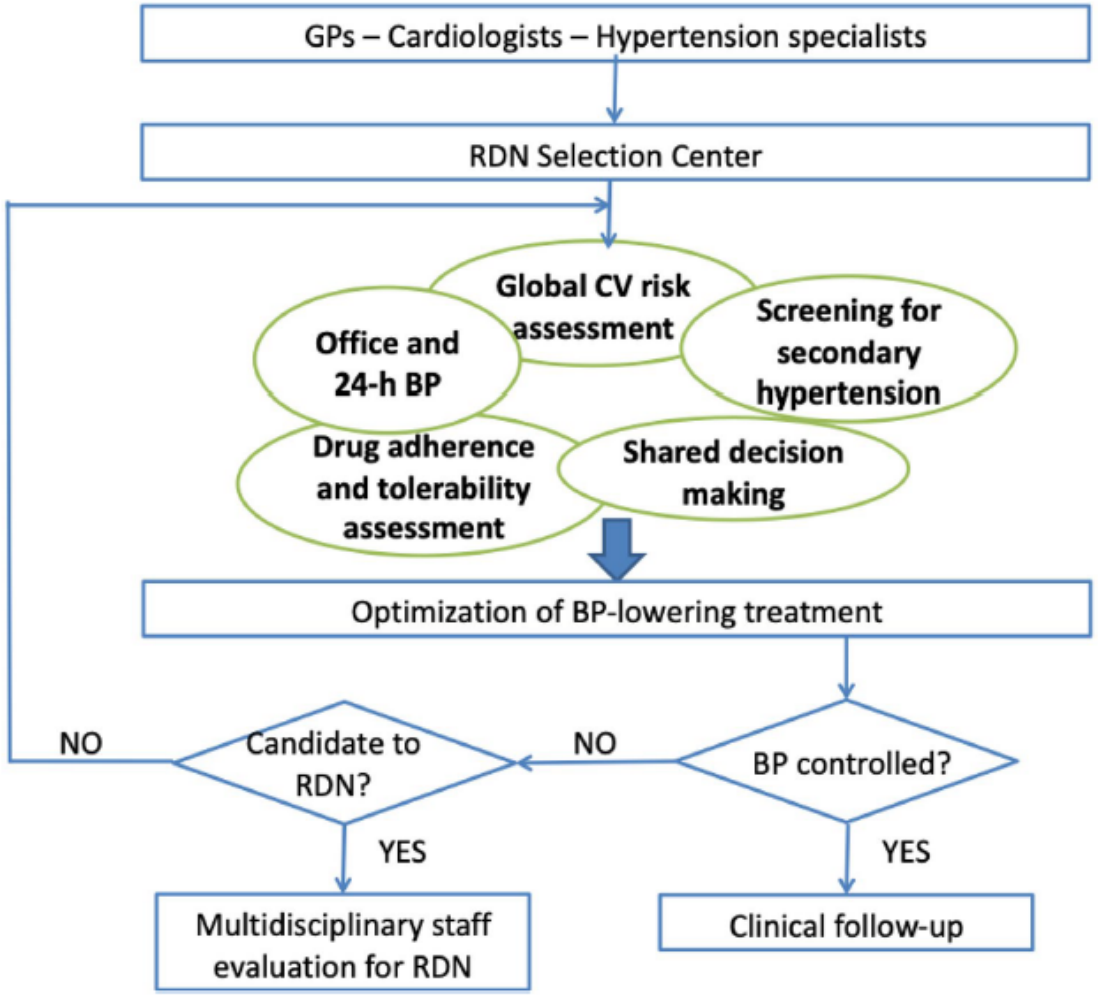
Approfondimento per la corretta preparazione del paziente all'esecuzione del test per il calcolo del rapporto Aldosterone/Renina (ARR)

- È necessario correggere l'**ipokaliemia**. Bassi livelli di potassio nel sangue potrebbero aumentare la frequenza di falsi negativi (riduzione dell'aldosterone e di conseguenza dell'ARR);
- Incoraggiare il paziente a liberalizzare (piuttosto che limitare) l'assunzione di sodio;
- Verificare sempre l'eventuale assunzione di **terapia estroprogestinica** perché i farmaci contenenti estrogeni possono ridurre la renina e aumentare i **falsi positivi**;
- Controllare eventuale assunzione di **FANS** in quanto riducono la renina molto più dell'aldosterone determinando dunque un aumento della frequenza di **falsi positivi**;
- Se l'ipertensione arteriosa può essere controllata con farmaci relativamente non interferenti come Calcio antagonisti a lunga durata d'azione e alfa1 bloccanti periferici come doxazosina, sospendere i farmaci che possono influenzare l'ARR a favore di questi ultimi;
- Non ci sono schemi validati per la gestione del wash out farmacologico. Tuttavia, è consigliabile che i diuretici vengano sospesi almeno 4 settimane prima l'esecuzione del test mentre per quanto riguarda gli estroprogestinici è ragionevole sospenderli almeno 2 mesi prima (alcune evidenze dimostrano influenza degli estroprogestinici sulla renina anche più a lungo).

Tabella riassuntiva delle principali classi di antipertensivi e il loro effetto su aldosterone, renina e ARR.

Farmaco	renina	Aldosterone	ARR	
Diuretici	↑ ↑	↑	↓	Falso negativo
ACE/ARBS	↑ ↑	↓	↓	Falso negativo
Beta Bloccanti	↓ ↓	↓	↑	Falso positivo
Alfa-2agonisti ad azione centrale	↓ ↓	↓	↑	Falso positivo


Mid aortic syndrome
Coarctation of aorta
Renal parenchymal disease
Renovascular Hypertension - Fibromuscolar dysplasia
Renovascular Hypertension - Atherosclerotic disease
1 - 12 yrs
13 - 18 yrs
19 - 40 yrs
41 - 65 yrs
>65 yrs
Age
Monogenic disorders
Cushing's syndrome
Pheochromocytoma and paraganglioma
Primary aldosteronism


GPs – Cardiologists – Hypertension specialists
RDN Selection Center
Global CV risk assessment
Office and 24-h BP
Screening for secondary hypertension
Drug adherence and tolerability assessment
Shared decision making
Optimization of BP-lowering treatment
BP controlled?
NO
Candidate to RDN?
NO
YES
YES
Clinical follow-up
Multidisciplinary staff evaluation for RDN

Clinical profiles of patients candidate for RDN:

Clinical profile	Additional features to be considered
Essential hypertensive patient uncontrolled by an association RAS-blocker/calcium-channel blocker/diuretic at maximally tolerated doses (recommended)	Patient preference, adverse effects of spironolactone, poor drug adherence despite extensive counseling, systo-diastolic hypertension, no extensive vascular damage, high/very high lifetime cardiovascular risk
Grade 1-2 hypertension uncontrolled by 1-2 BP-lowering drugs (possible)	Patient preference, multiple intolerances to BP-lowering drugs/adverse effects, poor drug adherence despite extensive counseling, high/very high lifetime cardiovascular risk, paroxysmal atrial fibrillation and planned ablation

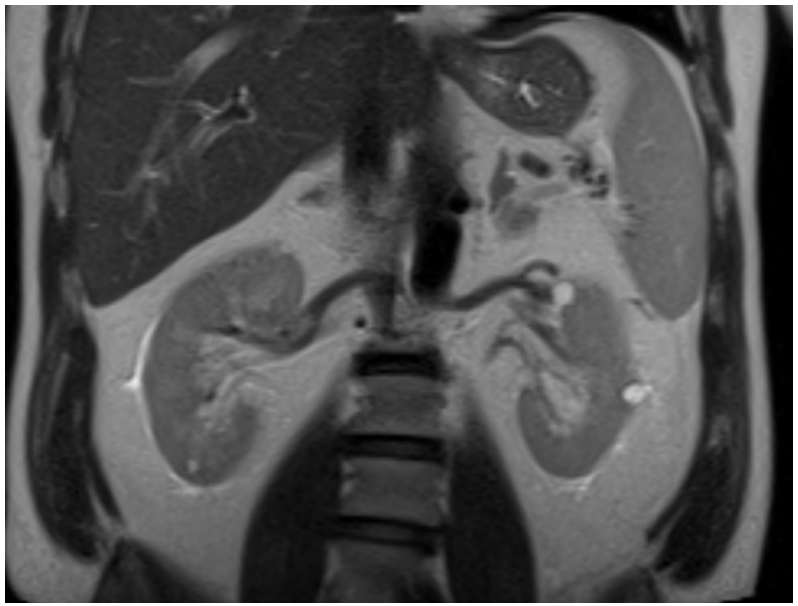
exclusion criteria for RDN:

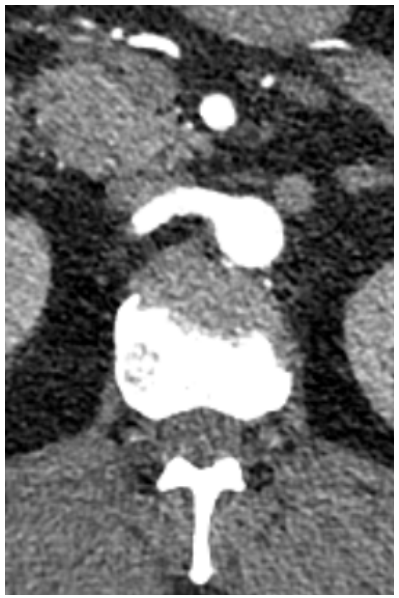
- secondary hypertension including renal artery stenosis;
- chronic renal failure with eGFR ≤40 mL/ min/1.73 m2;
- size of the main renal arteries and branches 8 mm in diameter;
- recent renal artery stenting (6 months)

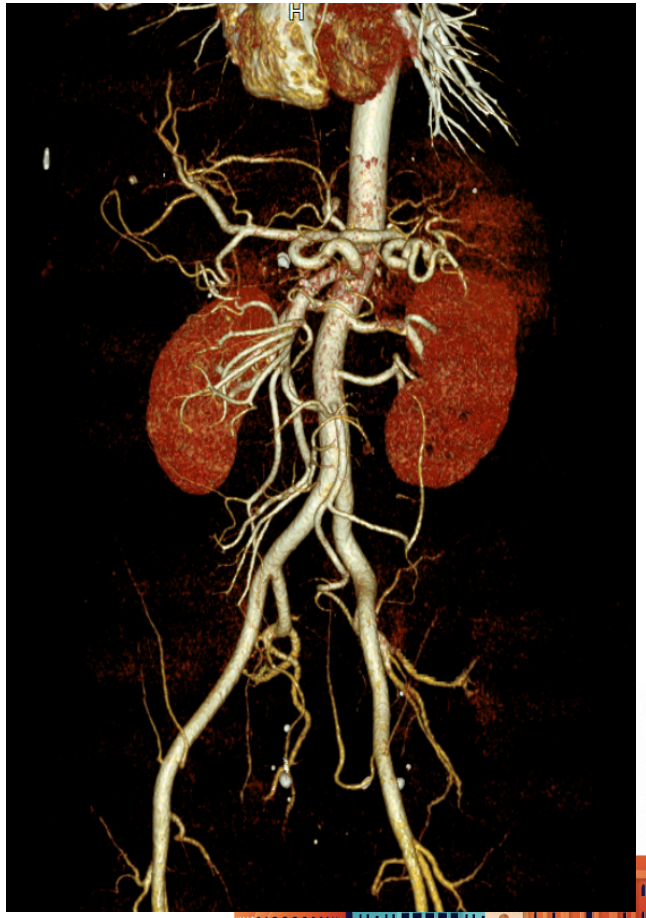
Minerva Cardiology and Angiology 2024 Mar 27

PREPROCEDURAL PHASE

- Rule out stenosis and fibromuscular dysplasia
- Location of renal artery ostia
- Accessory renal arteries
- diameters







Thanks for attention