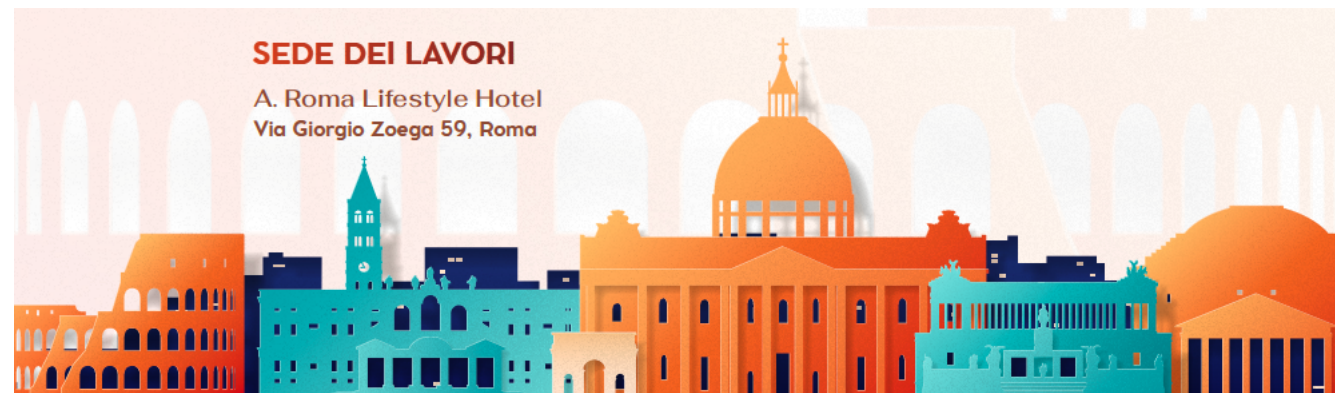




ROMA, 25 - 27 Giugno 2026

GESTIONE DELL'IPERTENSIONE NON CONTROLLATA: IL RUOLO DELLA DENERVAZIONE RENALE NELLA STRATEGIA TERAPEUTICA

La denervazione renale nel paziente iperteso difficile da trattare:
Il paziente con malattia renale cronica

Stefano Bianchi, Livorno

Struttura della presentazione (I)

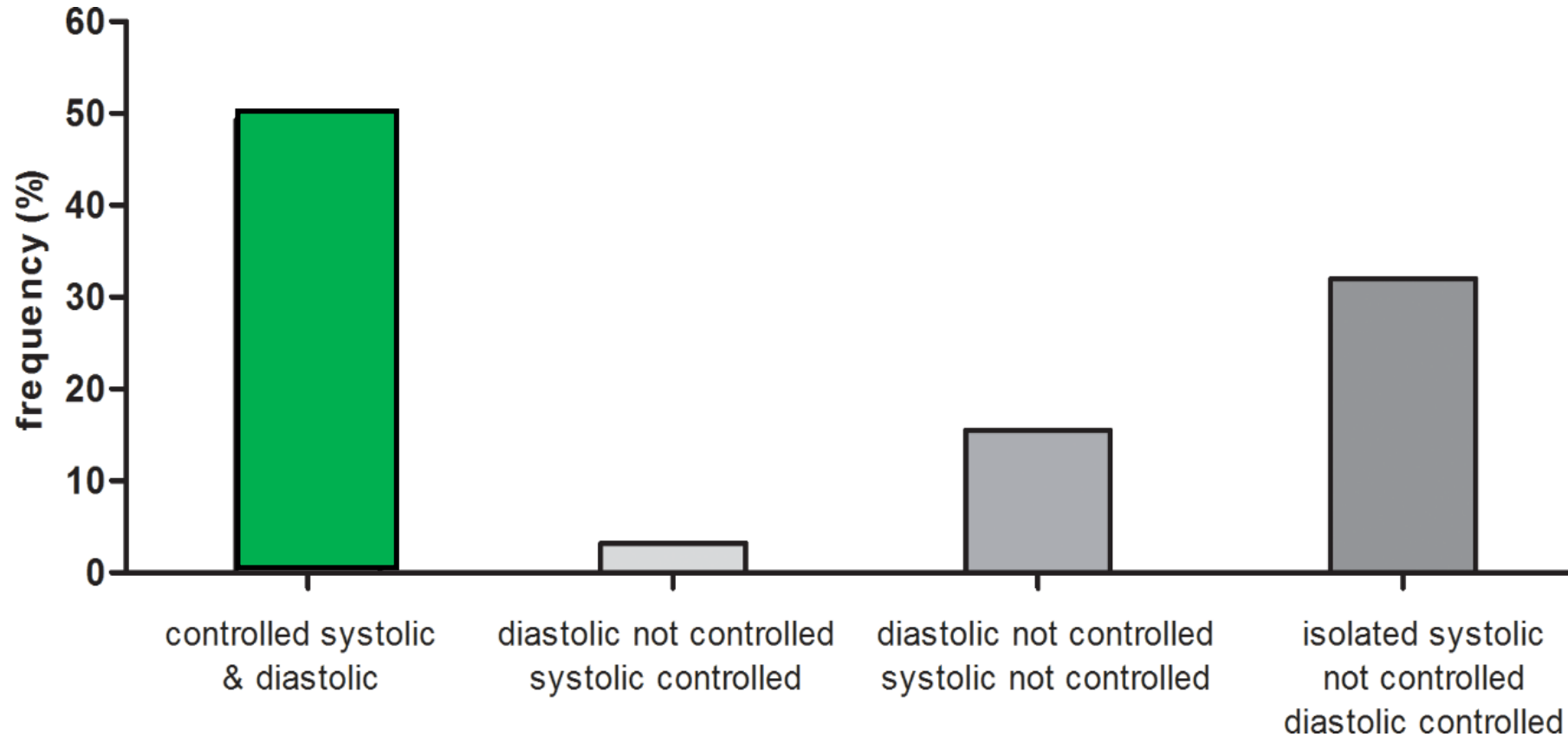
- L'ipertensione difficile da trattare (resistente, non controllata) ha una elevata prevalenza nella malattia renale cronica
- L'iperattività del SNS è una caratteristica peculiare della malattia renale cronica ed è sempre più evidente quanto maggiore è la sua gravità
- Cosa dicono le linee Guida delle Società dell'Ipertensione arteriosa sul possibile utilizzo della denervazione renale nei pazienti con ipertensione difficile da trattare e malattia renale cronica

Blood Pressure Control in Chronic Kidney Disease

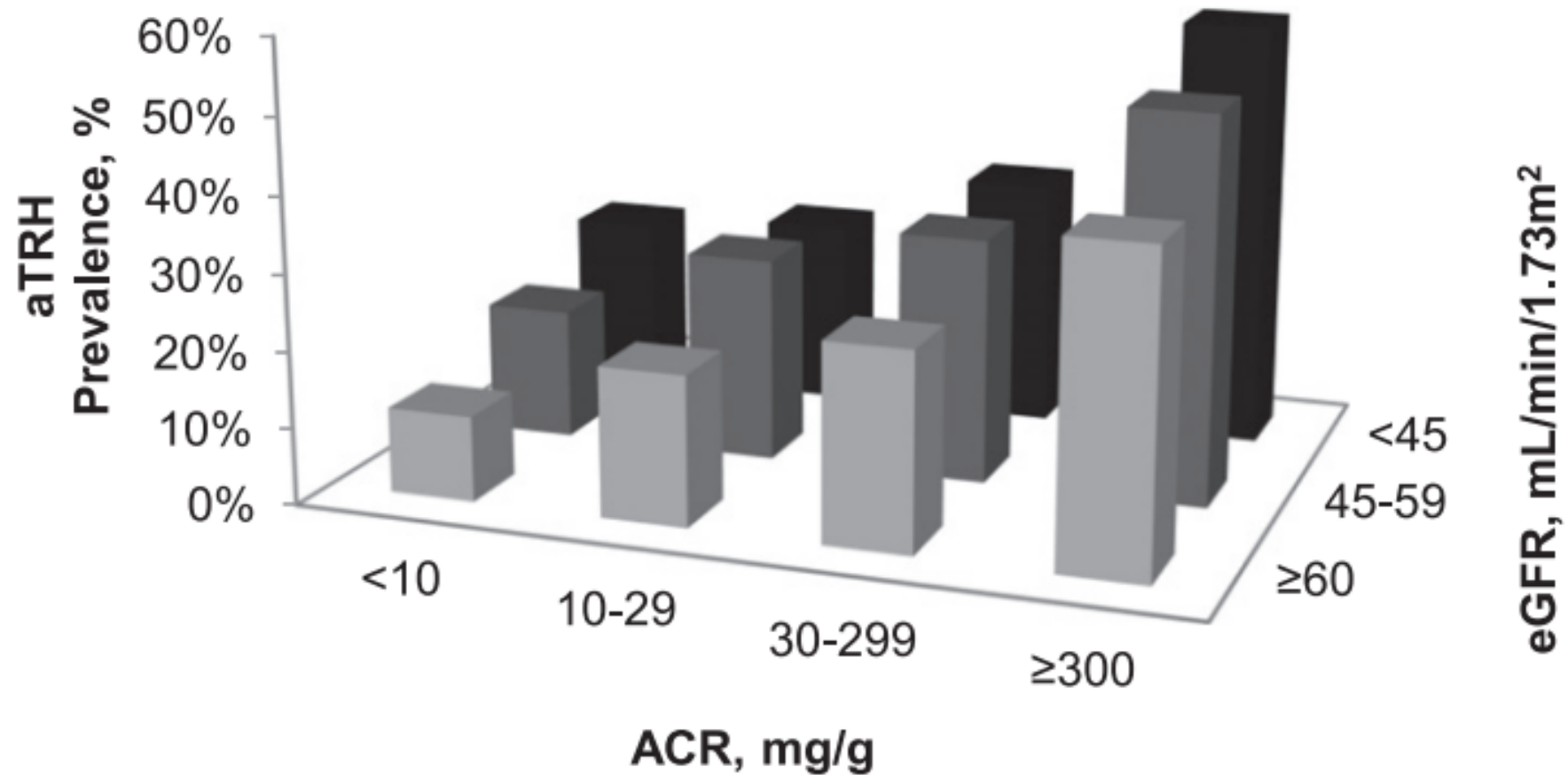
Analysis from the German Chronic Kidney Disease (GCKD) study (5217 pts)

eGFR of 30-60 mL/min/1.73 m² or overt proteinuria in the presence of an eGFR >60 mL/min/1.73 m²

Blood pressure was considered as controlled if systolic <140 mmHg and diastolic < 90 mmHg



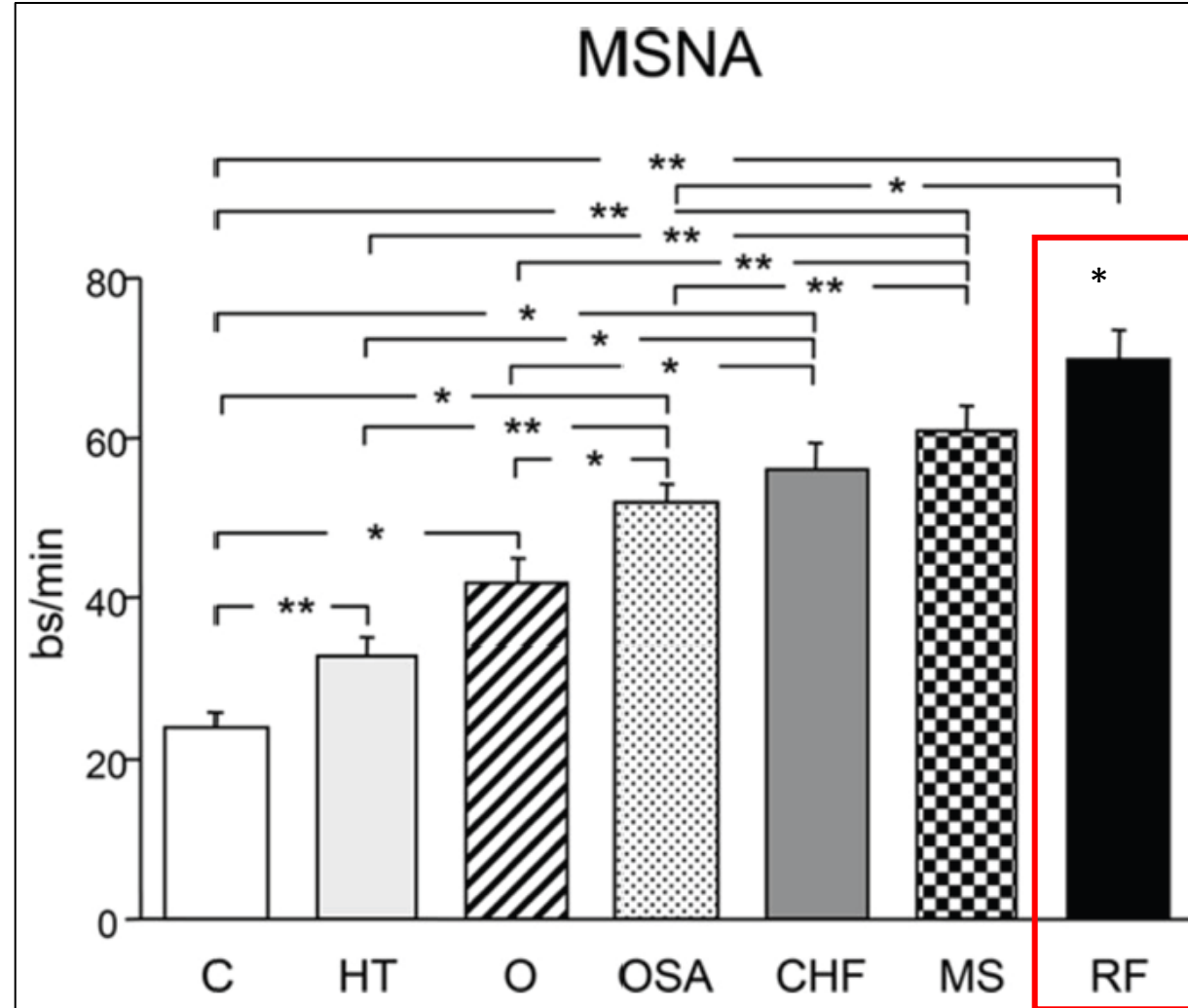
Resistant hypertension is highly prevalent in patients with chronic kidney disease



Struttura della presentazione (I)

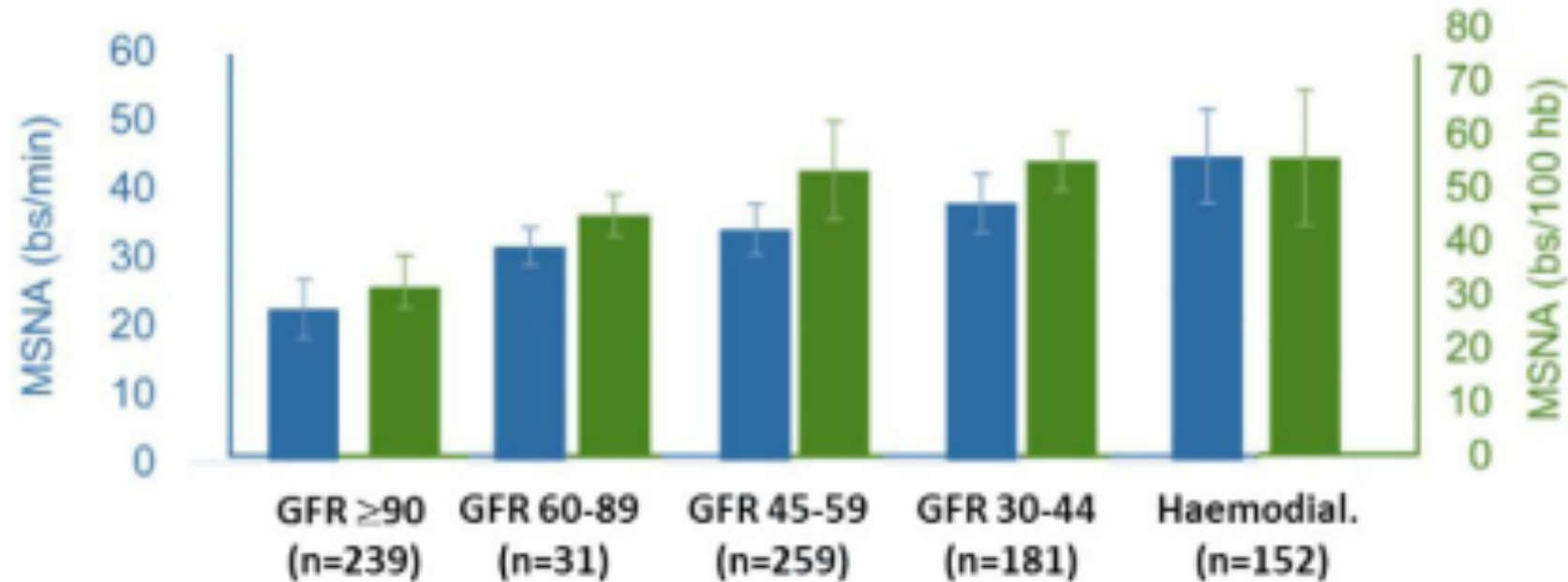
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Sympathetic overdrive in various clinical settings as assessed by MSNA



Healthy controls (C), hypertension (HT), obesity (O), obstructive sleep apnea (OSA), congestive heart failure (CHF), metabolic syndrome (MS), or renal failure (RF). MSNA, muscle sympathetic nerve activity

Muscle sympathetic nerve activity (MSNA) in patients with progressively more severe degrees of renal dysfunction

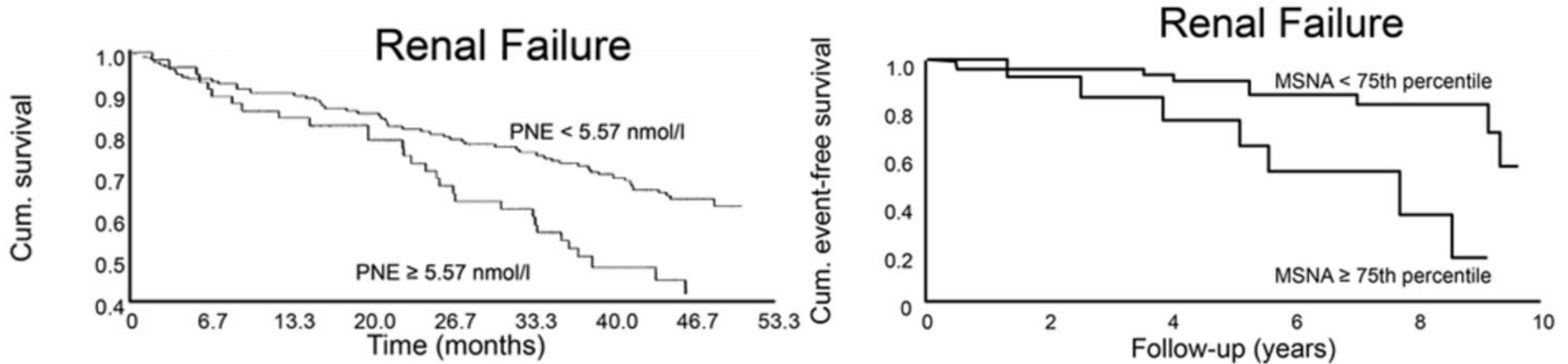


Muscle sympathetic nerve activity (MSNA) expressed as burst frequency (bs/min; blue bars; left-hand scale) and burst incidence (bs/100 heartbeats; green bars; right-hand scale) in patients and healthy individuals grouped according to progressively more severe degrees of renal dysfunction.

Nephrology Dialysis Transplantation, Volume 38, Issue 5, May 2023, Pages 1089–1096,

Mancia G and Grassi G. Circulation Research. 2014; Volume 114, Number 11 <https://doi.org/10.1161/CIRCRESAHA.114.302524>

Kaplan–Meyer curves of survival in patients with renal failure according to the presence of elevated or normal indices of sympathetic tone.



PNE, plasma norepinephrine; MSNA indicates muscle sympathetic nerve activity.

Struttura della presentazione (I)

- L'ipertensione difficile da trattare (resistente, non controllata) ha una elevata prevalenza nella malattia renale cronica
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2023 ESH Guidelines for the management of arterial hypertension

The Task Force for the management of arterial hypertension of the European Society of Hypertension

Endorsed by the International Society of Hypertension (ISH) and the European Renal Association (ERA)

Journal of Hypertension 2023, 41: 1874-20271



ESC

European Society
of Cardiology

European Heart Journal (2024) **45**, 3912–4018

<https://doi.org/10.1093/eurheartj/ehae178>

European Heart Journal (2024) 45, 3912–4018

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)

2025 AHA/ACC/AANP/AAPA/ABC/ACCP/ACPM/AGS/AMA/ASPC/NMA/PCNA/SGIM Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults

***Circulation*. 2025;152:e00–e00. DOI: 10.1161/CIR.0000000000001356**

La denervazione renale non è raccomandata come opzione terapeutica nel trattamento dell'ipertensione resistente in pazienti con funzione renale moderatamente o severamente ridotta (eGFR <40 mL/min/1.73 m²) fino a quando non sarà disponibile una più robusta evidenza di studi clinici.

Study design and key findings from the recent tclinical trials of RDN

Most RDN studies have restricted enrollment to patients with an eGFR>40-45 mL/min/1.73m² due to procedural safety concerns.

The average baseline eGFR of participants in the studies was around 80 mL/min/1.73m².

It also should be noted that all the studies shown on the left excluded patients with a kidney transplant and patients with a single functioning kidney.

Current Hypertension Reports (2026) 28:10
<https://doi.org/10.1007/s11906-025-01360-5>

	SPYRAL HTN ON MED [11, 13]	RADIANCE – HTN TRIO [14]	SPYRAL HTN OFF MED [15]	RADIANCE – HTN SOLO [8, 16]	RADIANCE II [17]
Device	Radiofrequency	Ultrasound	Radiofrequency	Ultrasound	Ultrasound
# Patients	337	136	331	146	224
Aim	Assess safety and efficacy of RDN when taking antihypertensives		Assess safety and efficacy of RDN in absence of antihypertensives		
Primary Endpoint	Δ 24-h ABPM SBP at 6 months	Δ Daytime ABPM at 2 months	Δ 24-h ABPM at 3 months	Δ Daytime ABPM at 2 months	Δ Daytime ABPM at 2 months
Key Inclusion Criteria	Office BP 150–180/≥90 mmHg on 1–3 BP meds	Office BP ≥ 140/90 mmHg while on triple drug combination (3 meds)	Office BP 150–180 mmHg/≥90 mmHg on no BP meds	Office BP 140–180/90–110 on no BP meds	Office BP 140–180/90–120 mmHg on no BP meds
eGFR Based Exclusion (ml/min/1.73 m ²)	GFR < 45	eGFR < 40	eGFR < 45	eGFR < 40	eGFR < 40
Baseline characteristics	Predominantly male and white population	Predominantly male and white population	Predominantly male and white population	Predominantly male and white population	Predominantly male and white population
Findings	Primary endpoint not met RDN safe and effective in lowering office SBP and nighttime SBP (secondary outcomes) in presence of 1–3 meds	Primary endpoint met. RDN safe and effective in lowering BP in true resistant hypertension	Primary endpoint met. RDN safe and effective in mild to moderate hypertension and not on BP lowering meds	Primary endpoint met. RDN safe and effective in mild to moderate HTN and not on BP lowering meds	

Struttura della presentazione (II)

Perche la RD non dovrebbe essere proposta nel paziente con malattia renale cronica evoluta?

- La riduzione dei valori pressori indotta dalla denervazione renale nei pazienti con $\text{eGFR} < 40 \text{ mL/min/1.73 m}^2$ è osservabile anche in coloro che hanno un $\text{eGFR} > 40 \text{ mL/min/1.73 m}^2$?
- Quale è la evoluzione della funzione renale dopo denervazione renale nei pazienti con $\text{eGFR} < 40 \text{ mL/min/1.73 m}^2$?
- Gli eventi avversi della deervazione renale sono più frequenti nei pazienti con $\text{eGFR} < 40 \text{ mL/min/1.73 m}^2$?

Renal Denervation in Patients With Moderate to Severe Chronic Kidney Disease

Markus P. Schlaich¹, Felix Mahfoud², Michael Böhm³, Krzysztof Narkiewicz⁴, Luis Ruilope⁵, Bryan Williams⁶, Giuseppe Mancina⁷, Faisal Sharif⁸, Flavio Ribichini⁹, Te-Hsin Lung¹⁰, Sharad Shetty¹¹, Roland E. Schmieder¹²

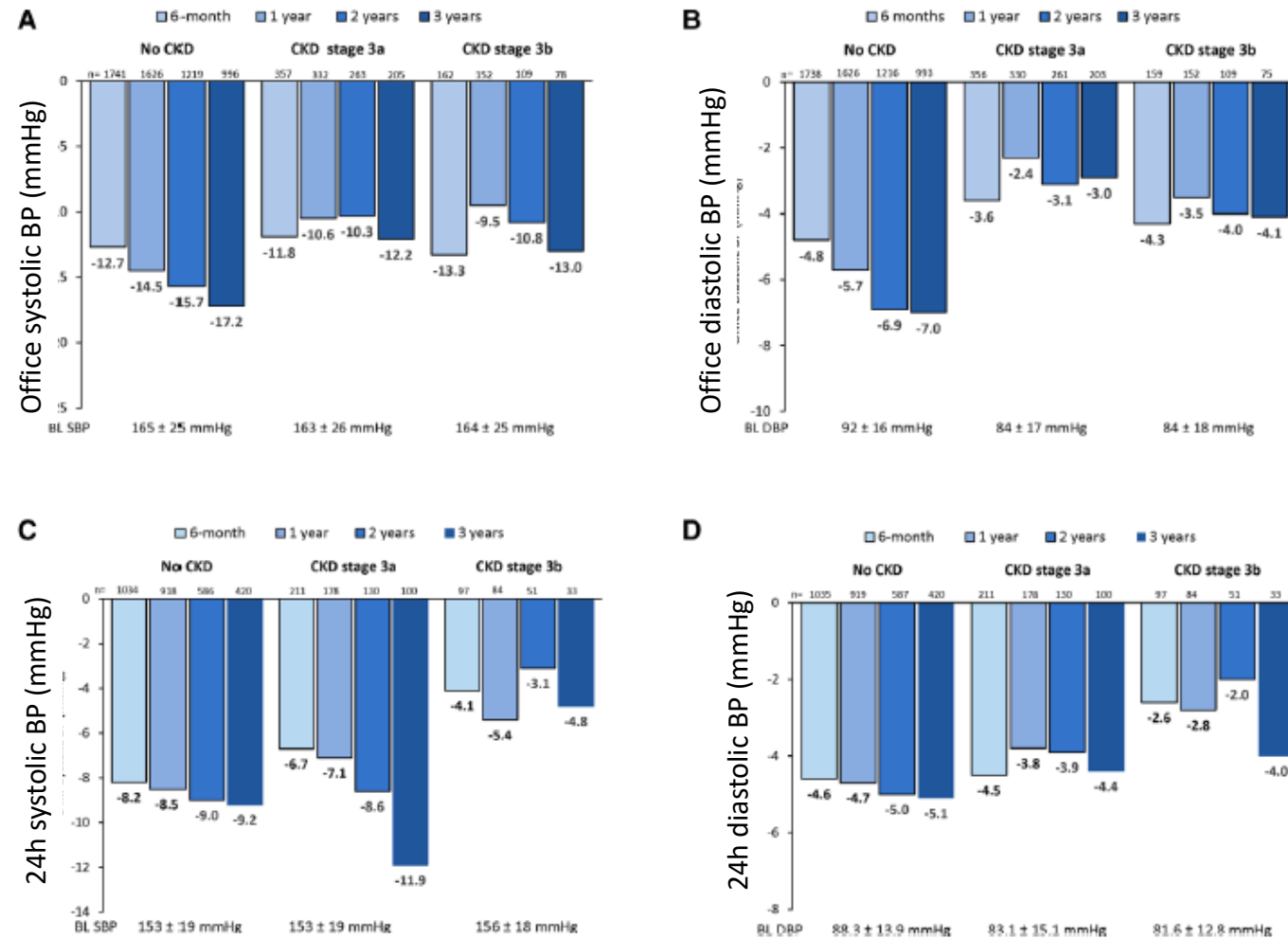
BACKGROUND: Uncontrolled hypertension is common in patients with chronic kidney disease (CKD), putting these patients at high risk for adverse cardiovascular events. Radiofrequency renal denervation (RDN) lowers blood pressure (BP) in patients with hypertension. The Global SYMPLICITY Registry DEFINE enrolled over 3500 patients with uncontrolled hypertension worldwide, including patients with moderate-to-severe CKD.

METHODS: Patients were categorized by their baseline estimated glomerular filtration rate (estimated glomerular filtration rate [eGFR], mL/min per 1.73 m²): eGFR ≥60 (no-CKD, n=2539), eGFR ≥45 to <60 (stage 3a, n=496), eGFR ≥30 to <45 (stage 3b, n=256). BP changes from baseline through 3 years were compared between groups. One-year data for 74 CKD stage 4 patients were also assessed. Safety events and eGFR were reported at all time points.

RESULTS: Average baseline office systolic BP was similar across the 3 comparator groups (range: 162.8±26.4–164.7±24.8 mmHg). At 3 years, office systolic BP reductions from baseline were −17.2±28.1 mmHg, −12.1±30.3 mmHg, and −13.0±27.3 mmHg in the no-CKD, CKD 3a, and CKD 3b groups, respectively (all $P<0.0001$). A mild decline in eGFR through 1 year occurred in the no-CKD group but not in any CKD group. Three-year mortality was 4.3%, 7.0%, and 15.2% in no-CKD, CKD 3a, and CKD 3b groups, respectively. Adverse renal events were rare (<1.0%) across all 3 groups. Antihypertensive medication burden remained high in the no-CKD and CKD 3a groups but declined over 3 years in the CKD 3b group ($P=0.007$).

CONCLUSIONS: In patients with uncontrolled hypertension and moderate-to-severe CKD, radiofrequency RDN results in clinically meaningful and durable BP reduction without renal or vascular safety concerns.

Systolic blood pressure (SBP) and diastolic blood pressure (DBP) change from baseline

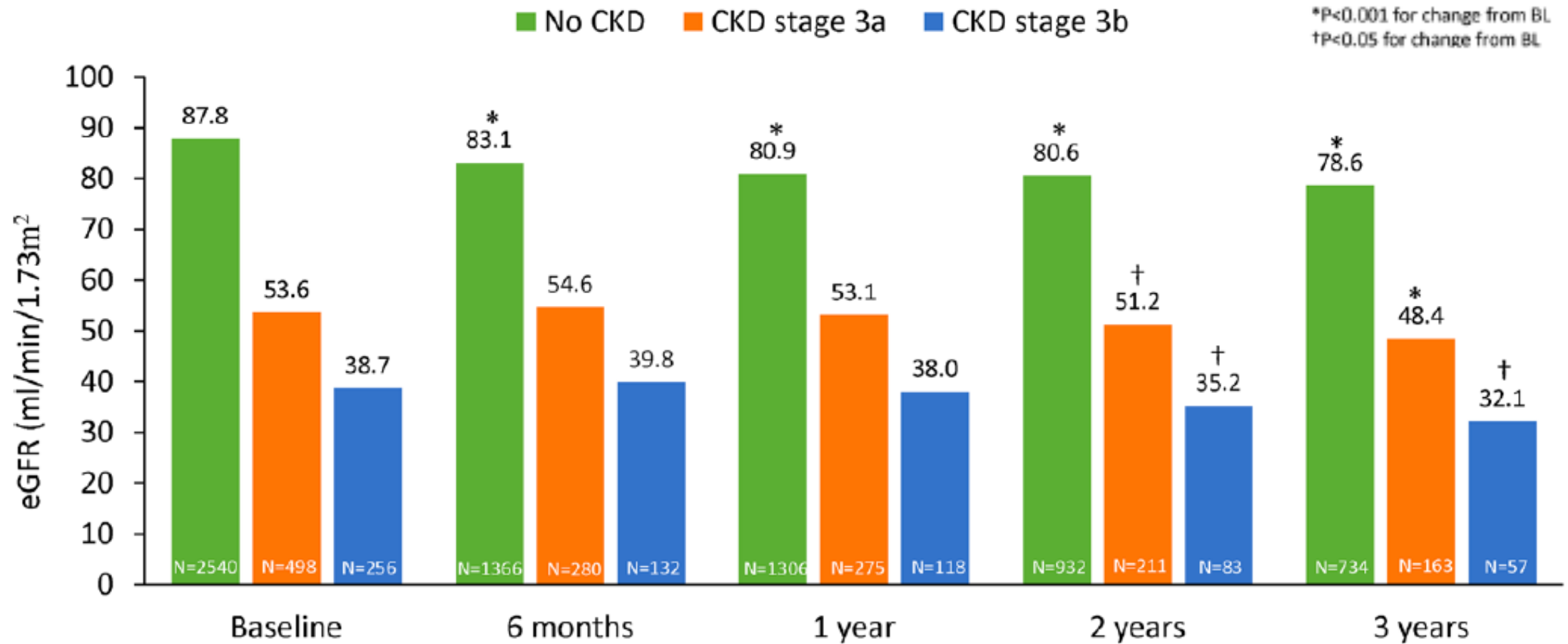


Office SBP (A) and DBP (B) measures at 6 months, 1, 2, and 3 years were all significantly lower than baseline blood pressure measures. The 24-h ambulatory systolic (C) and diastolic (D) blood pressure measures at 6 months, 1, 2, and 3 years were significantly lower than baseline in the no chronic kidney disease (CKD) and stage 3a groups. In the stage 3b group, the systolic 24-hour BP change from baseline was only significant at 1 year, but the diastolic 24-hour BP reduction from baseline was significant at 6 months, 1 year, and 3 years.

Struttura della presentazione (II) (I timori del nefrologo)

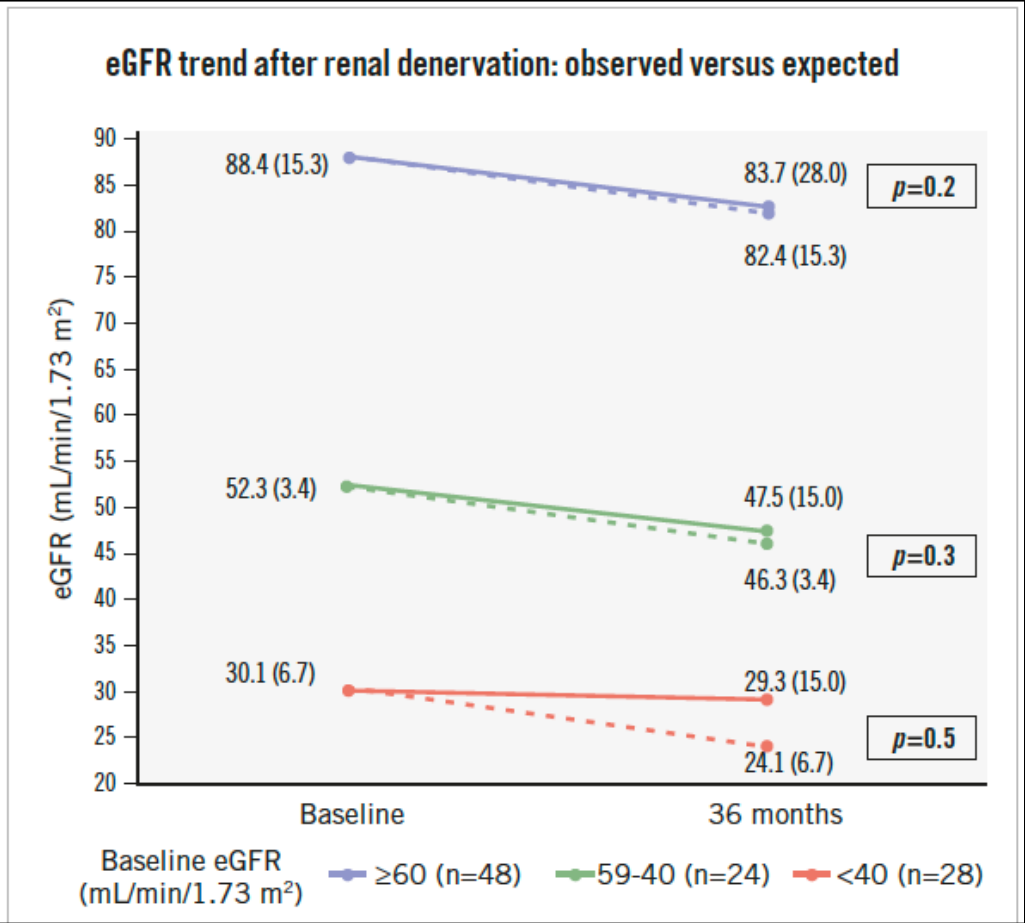
- La riduzione dei valori pressori indotta dalla denervazione renale nei pazienti con $\text{eGFR} < 40 \text{ mL/min/1.73 m}^2$ è simile a quella osservata in coloro che hanno un $\text{eGFR} > 40 \text{ mL/min/1.73 m}^2$?
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- Gli eventi avversi della deervazione renale sono più frequenti nei pazienti con $\text{eGFR} < 40 \text{ mL/min/1.73 m}^2$?

Mean estimated glomerular filtration rate (eGFR) through 3 years



Long-term effects of radiofrequency-based renal denervation on blood pressure and renal function by degree of renal dysfunction

Verdiana Galli^{1,2}, MD; Enrico Galuppi¹, MD; Domenico Tavella¹, MD; Concetta Gangemi³, MD; Alessia Gambaro¹, MD, PhD; Matteo Casal¹, MD; Aurora Trevisanello¹, MD; Simone Fezzi¹, MD; Roberto Scarsini¹, MD, PhD; Valeria Ferrero¹, MD; Gabriele Pesarini^{1*}, MD, PhD; Giovanni Gambaro³, MD, PhD; Pietro Manuel Ferraro³, MD; Flavio Ribichini¹, MD



Trend of kidney function after renal denervation at three years of follow-up. Values of eGFR are expressed as mean (SD). The continuous lines represent the mean (SD) observed eGFR at follow-up, for each group we considered (eGFR ≥60, 59-40, <40 mL/min/1.73 m²). Dashed lines represent the expected mean (SD) eGFR, considering an estimated physiological mean reduction of 2 mL/min/1.73 m²/year for patients with hypertensive nephropathy. The observed mild eGFR decline was lower than expected in each subgroup. Even though statistically non-significant ($p>0.05$), this may suggest a possible slowing-down effect on the progression of kidney dysfunction, related to a reduction of blood pressure values and a decrease in the excessive adrenergic activation that typically characterise patients with CKD

Struttura della presentazione (II) (I timori del nefrologo)

- La riduzione dei valori pressori indotta dalla denervazione renale nei pazienti con $\text{eGFR} < 40 \text{ mL/min/1.73 m}^2$ è simile a quella osservata in coloro che hanno un $\text{eGFR} > 40 \text{ mL/min/1.73 m}^2$?
- Quale è la evoluzione della funzione renale dopo denervazione renale nei pazienti con $\text{eGFR} < 40 \text{ mL/min/1.73 m}^2$?
- Gli eventi avversi della deervazione renale sono più frequenti nei pazienti con $\text{eGFR} < 40 \text{ mL/min/1.73 m}^2$?

Major Adverse Events Through 3 Years

Event	No CKD (eGFR ≥60; n=1472)	CKD stage 3a (eGFR ≥45 to <60; n=300)	CKD stage 3b (eGFR ≥30 to <45; n=145)	P value
Death	63 (4.3%)	21 (7.0%)	22 (15.2%)	<0.0001
CV death	32 (2.2%)	13 (4.3%)	10 (6.9%)	0.002
New onset of ESRD	3 (0.2%)	8 (2.7%)	11 (7.6%)	<0.0001
Renal artery reintervention	9 (0.6%)	1 (0.3%)	1 (0.7%)	0.75
Due to perforation	0	0	0	
Due to dissection	4 (0.3%)	0	0	
Ballooning/stenting	0	0	1 (0.7%)	
Other	6 (0.4%)	1 (0.3%)	0	
New renal artery stenosis >70%	0.3%	0.3%	0.0%	1.00

Data is displayed as n (%). P values represent the comparison between the 3 CKD groups. AV indicates arteriovenous; CKD, chronic kidney disease; CV, cardiovascular; eGFR, estimated glomerular filtration rate; and ESRD, end-stage renal disease. were reported in-hospital or at 3 mo follow-up.

Major Adverse Events Through 3 Years

	No CKD (eGFR	CKD stage 3a (eGFR ≥45 to	CKD stage 3b (eGFR ≥30 to	
Vascular complication*	14 (1.0%)	5 (1.7%)	1 (0.7%)	0.51
Retroperitoneal bleed	0.0%	1 (0.3%)	0.0%	
Pseudoaneurysm	9 (0.6%)	2 (1.0%)	0.0%	
AV fistula	1 (0.1%)	0.0%	0.0%	
Hematoma	1 (0.1%)	1 (0.3%)	0.0%	
Excessive bleeding	1 (0.1%)	0.0%	0.0%	
Other	3 (0.2%)	1 (0.3%)	1 (0.7%)	
Hospitalization for hypertensive crisis/ hypertensive emergency	37 (2.5%)	11 (3.7%)	7 (4.8%)	0.16
Significant embolic event resulting in end-organ damage	0.0%	0.0%	0.0%	...

Data is displayed as n (%). P values represent the comparison between the 3 CKD groups. AV indicates arteriovenous; CKD, chronic kidney disease; CV, cardiovascular; eGFR, estimated glomerular filtration rate; and ESRD, end-stage renal disease. were reported in-hospital or at 3 mo follow-up.



The role of renal denervation for the treatment of hypertension in patients with chronic kidney disease: a position paper of the Italian Society of Nephrology

Sandro Feriozzi¹  · Yuri Battaglia^{2,3} · Calogero Lino Cirami⁴ · Concetta Gangemi⁵ · Gaetano La Manna⁶ · Loreto Gesualdo⁷ · Maria Lorenza Muiesan⁸ · Antonello Pani⁹ · Federico Pieruzzi^{10,11} · Flavio Ribichini¹² ·

CONCLUSIONS

Renal denervation is a safe and effective procedure in the treatment of uncontrolled or resistant hypertension, also in patients with advanced CKD. In kidney transplant patients, more evidence is still needed before making specific recommendations.

defined as patients with uncontrolled or resistant hypertension. Renal denervation has been successfully proposed to mitigate the hyperactivity of the sympathetic nervous system in patients with uncontrolled/resistant hypertension. The guidelines of the European Society of Cardiology and the European Society of Hypertension include renal denervation as a therapeutic option for treating hypertension in patients with uncontrolled or resistant hypertension. However, in patients with CKD, diffusion of the procedure has been limited by concerns over possible adverse effects on kidney function. Over the last few years, the improvement of the device-based procedure and the growing experience accumulated in several Nephrology centers