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XXXIII.

VÝROČNÍ SJEZD
ČESKÉ KARDIOLOGICKÉ
SPOLEČNOSTI



Proč se léčbou hypertenze má zabývat intervenční kardiolog

MUDr. Tomáš Lazarák

Symposium Medtronic Czechia s.r.o.

Kardiologické centrum Agel , Pardubice

Kardiologické oddělení, Pardubická nemocnice



Hypertenze - Tichý zabiják

- AH is invisible killer that rarely cause symptoms
- People need to know why raised blood pressure is **dangerous** and how to take steps to control it
- **Měl jsem jasný pokyn**, Dušku, ukaž polymorbiditu těchto lidí (**hypertoniků**)
- Upozorňuji je **děsivá**
- Ta deprese během té přednášky bude narůstat
- Umírají taky předčasně, bohužel

Dr.Margaret Chan
director WHO (2013)



prof. RNDr. Ladislav Dušek, Ph.D.
Ředitel ÚZIS (2024)



Arteriální hypertenze

No. 1 cause of avoidable death

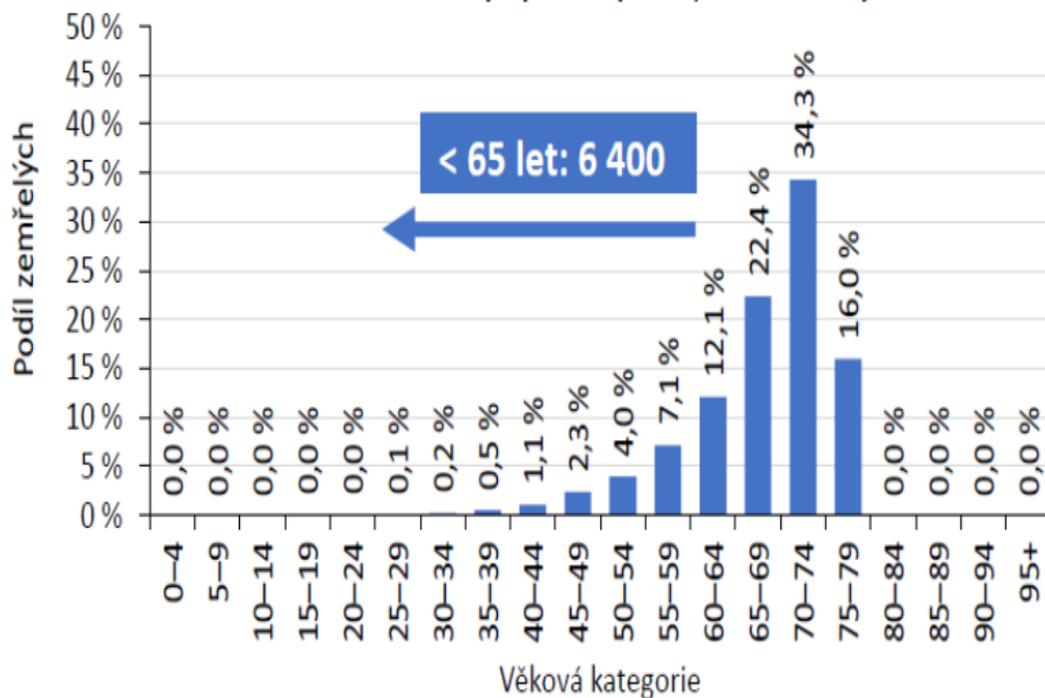
Deaths by risk factor, Europe, 2021

Our World
in Data

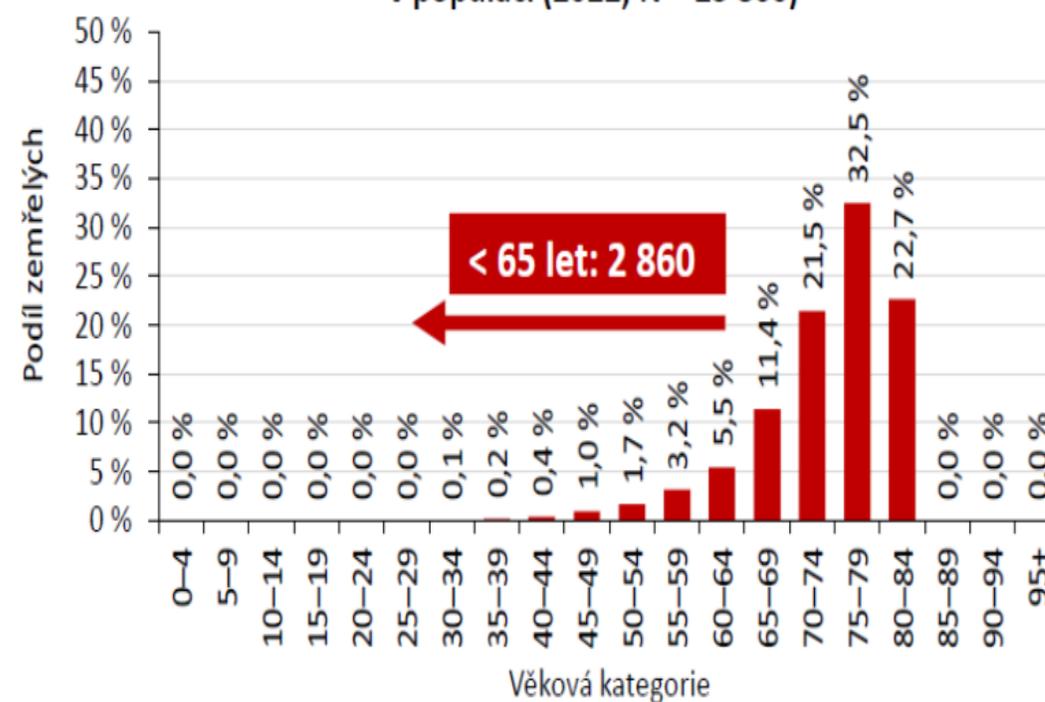
The estimated annual number of deaths attributed to each risk factor¹. Estimates come with wide uncertainties, especially for countries with poor vital registration².

High blood pressure 1.87 million

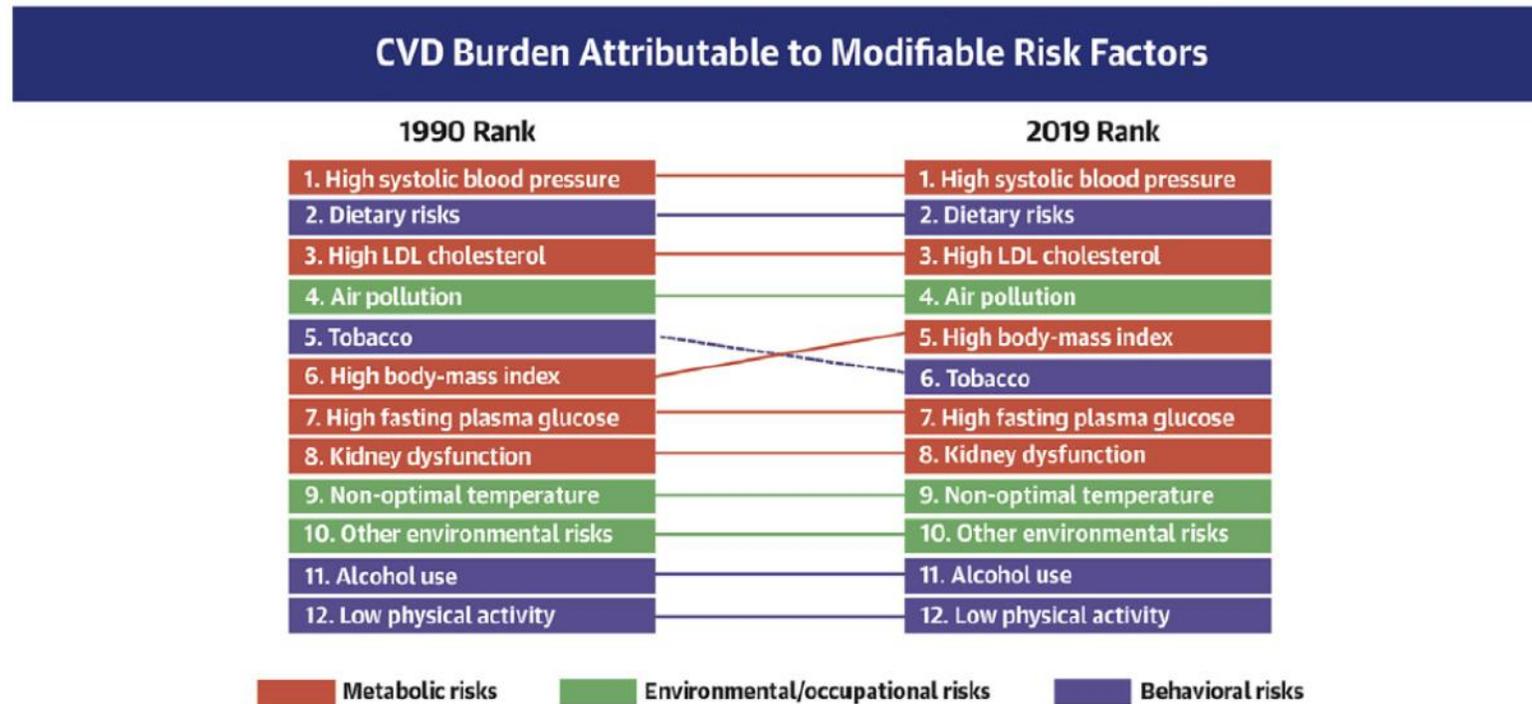
Podíl zemřelých mužů dříve než střední doba dožití mužů v populaci (2022; N = 23 690)



Podíl zemřelých žen dříve než střední doba dožití žen v populaci (2022; N = 23 860)



I přes účinnou farmakoterapii

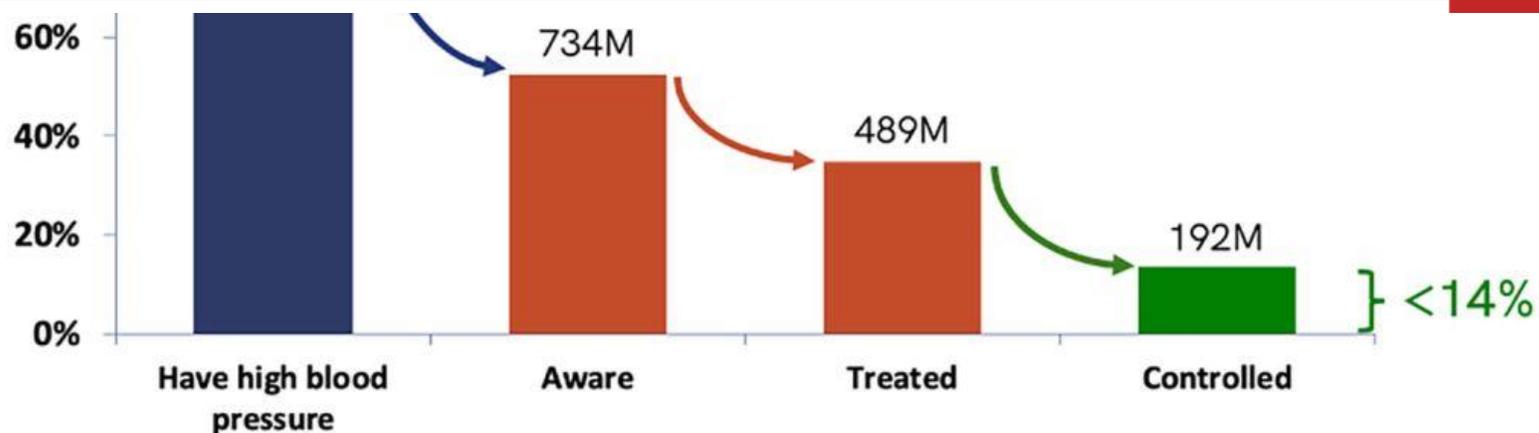


Roth, G.A. et al. J Am Coll Cardiol. 2020;76(25):2982-3021.

Prevalence a kontrola hypertenze

Kardiovaskulární onemocnění v ČR: prevalence pacientů

	2012	2022	% změna
↑ Nemoci oběhové soustavy (I00–I99; bez cévních nemocí mozku I60–I69)	2 277 340	2 659 848	+ 17%
↑ Hypertenze (I10)	1 763 304	2 176 163	+ 23%



Proč? Pacienti neradi užívají léky

- hodnocení adherence v klinických studiích hladinou léků v krvi a moči
- mezi léčenými nekontrolovanými hypertoniky

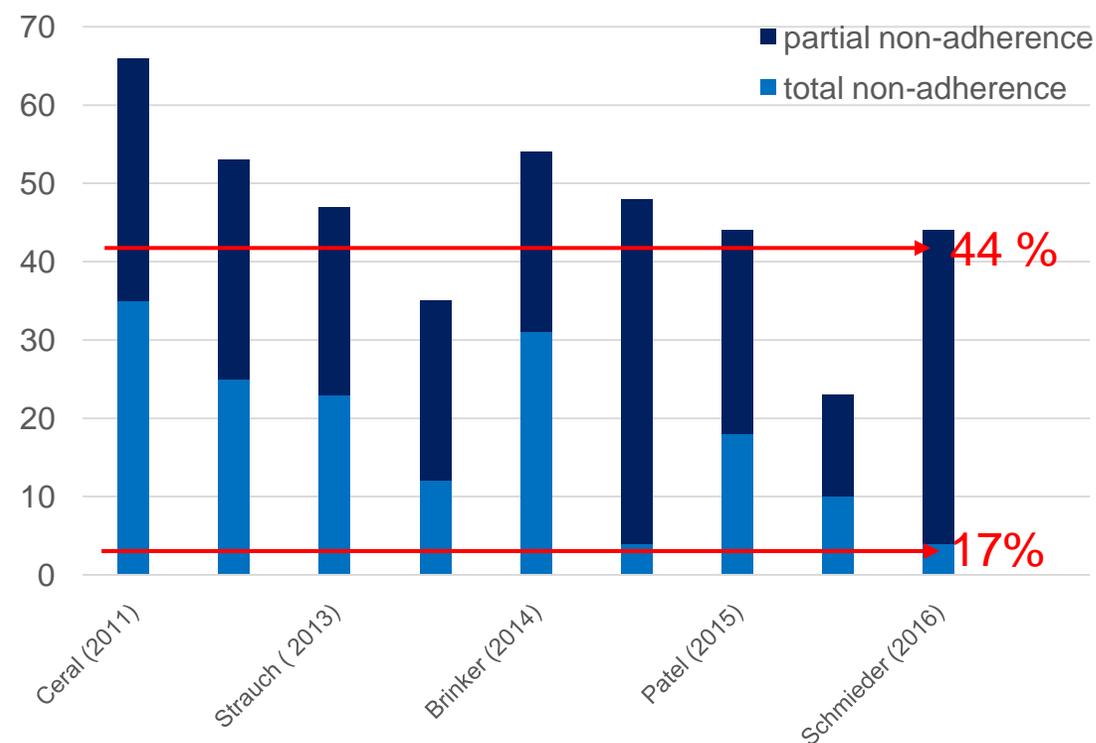
44 % nebralo **všechny**

antihypertenziva

17 % nebralo **žádné**

antihypertenzivum

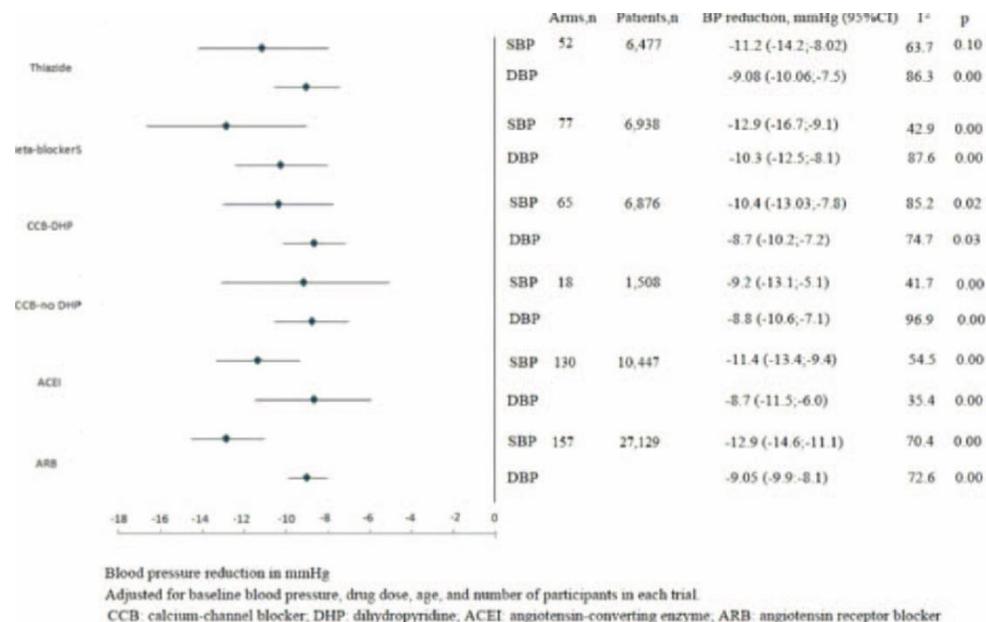
Adherence



Jaký je efekt antihypertenziiv

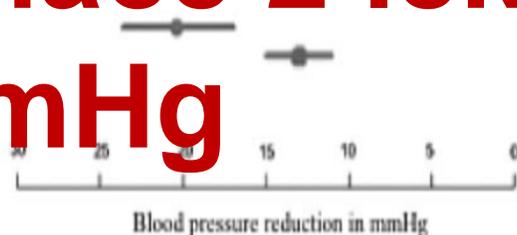
Treatment efficacy of anti-hypertensive drugs in monotherapy or combination
 ATOM systematic review and meta-analysis of randomized clinical trials according to PRISMA statement

Marco A. Paz, MD^{a,b}, Alejandro de-La-Sierra, MD, PhD^c, Marc Sáez, PhD^{c,d}, María Antonia Barceló, PhD^{c,d}, Juan José Rodríguez, MD^e, Sonia Castro, MD^f, Cristina Lagarón, MD^g, Josep M Garrido, MD^h, Pilar Vera, MDⁱ, Gabriel Coll-de-Tuero, MD, PhD^{d,e,g}



- Thiazide 11,2 mmHg
- Beta blockers 12,9 mmHg
- CCB DHP 10,4 mmHg
- CCB – non-DHP 9,2 mmHg
- ACEi 11,4 mmHg
- ARB 12,9 mmHg

Kombinace 2 léků
20,2 mmHg



Míra účinku antihypertenziv

- Lék 1 kolem 12 mmHg
- Lék 2 kolem 8 mmHg
- Co lék 4? (za předpokladu adherence) ?
- Pathway – 2 study

Already on
ACE/CBB/Thiazide
Randomize to 12 week
rotational treatment

Placebo

Spiro
lactone

Bisoprolol

Doxazosin

Pathway – 2

Spironolactone versus placebo, bisoprolol, and doxazosin to determine the optimal treatment for drug-resistant hypertension (PATHWAY-2): a randomised, double-blind, crossover trial



Bryan Williams, Thomas M MacDonald, Steve Morant, David J Webb, Peter Sever, Gordon McInnes, Ian Ford, J Kennedy Cruickshank, Mark J Caulfield, Jackie Salisbury, Isla Mackenzie, Sandosh Padmanabhan, Morris J Brown, for The British Hypertension Society's PATHWAY Studies Group*



Summary

Background Optimal drug treatment for patients with resistant hypertension is undefined. We aimed to test the hypotheses that resistant hypertension is most often caused by excessive sodium retention, and that spironolactone would therefore be superior to non-diuretic add-on drugs at lowering blood pressure.

January 2015; 386: 2059-68

Published Online

September 21, 2015

<http://dx.doi.org/10.1016/>

	Blood pressure (mm Hg)	Change from baseline (mm Hg)
Mean		
Spironolactone	134.9 (134.0 to 135.9)	-12.8 (-13.8 to -11.8)
Doxazosin	139.0 (138.0 to 140.0)	-8.7 (-9.7 to -7.7)
Bisoprolol	139.4 (138.4 to 140.4)	-8.3 (-9.3 to -7.3)
Placebo	143.6 (142.6 to 144.6)	-4.1 (-5.1 to -3.1)
Meandifferences		

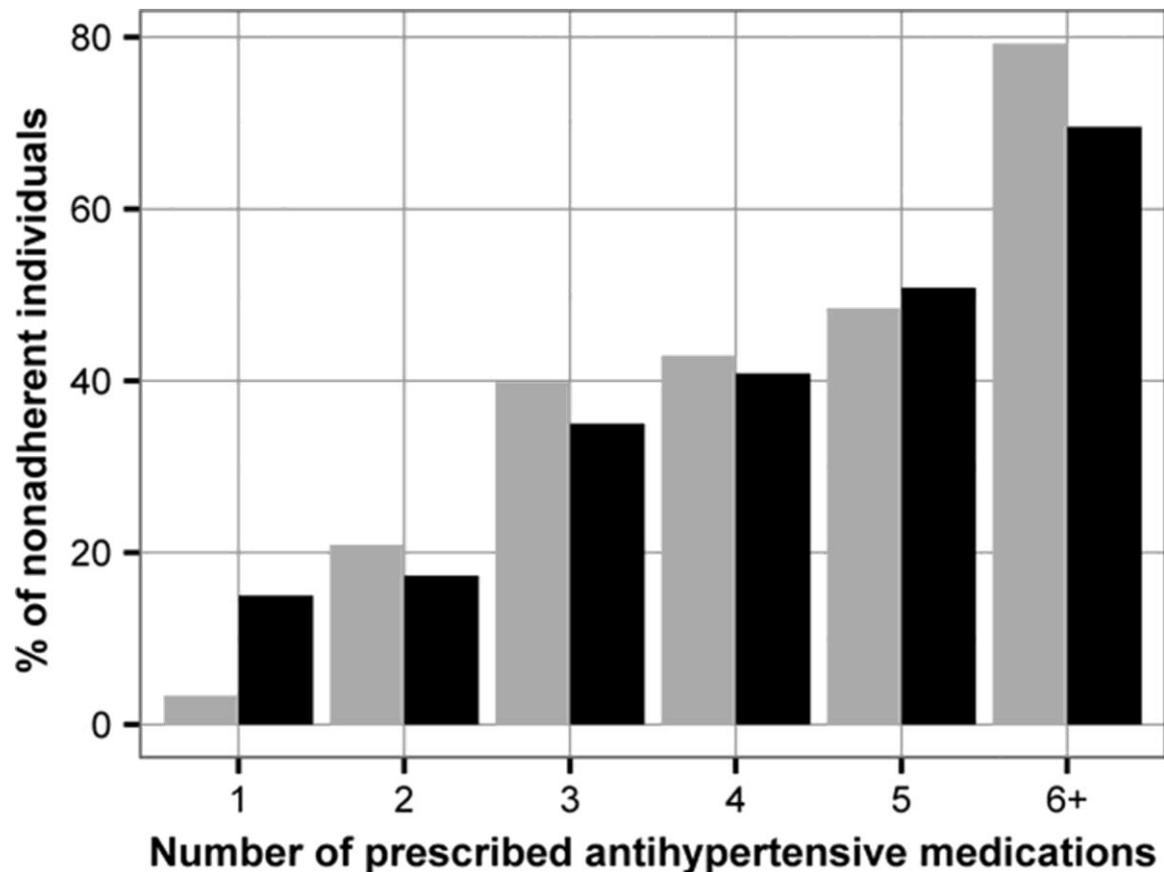
Přidáním 4 antihypertenziva:

Spiro: 8,7 mmHg

Doxazosin 4,6 mmHg

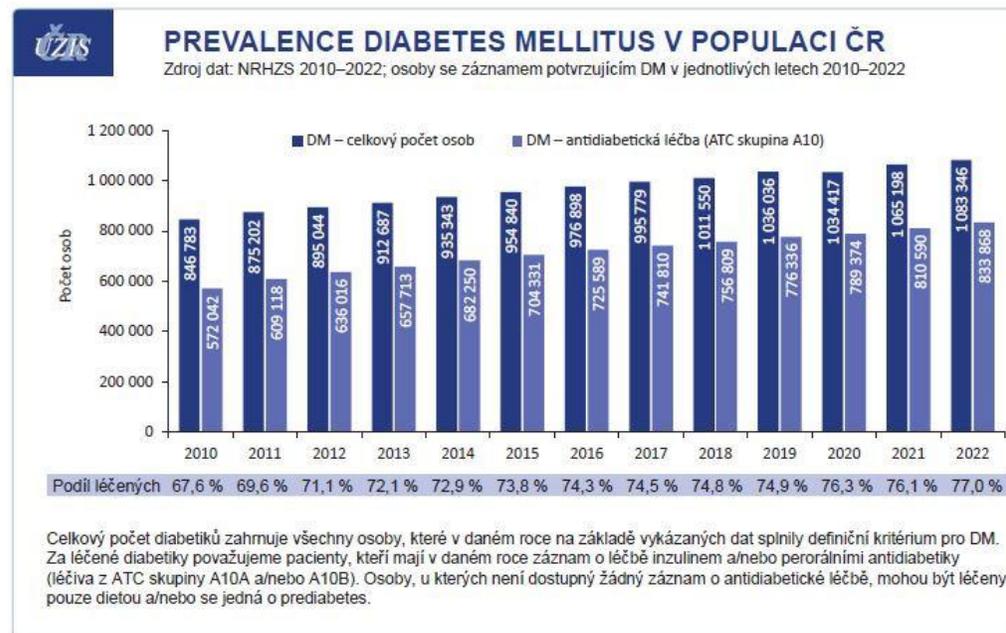
Bisoprolol 4,2 mmHg

Léky jistě fungují, ale...



Gupta et al *Hypertension*, 2017;69:1113-1120

- The risk of nonadherence increases by >75% with every increase in the number of prescribed antihypertensives



Redukce příjmu soli?

[Intervention Review]

Effects of low sodium diet versus high sodium diet on blood pressure, renin, aldosterone, catecholamines, cholesterol, and triglyceride

Niels Albert Graudal¹, Thorbjørn Hubeck-Graudal², Gesche Jürgens³

¹Department of Rheumatology VRR4242, Copenhagen University Hospital Rigshospitalet, Copenhagen, Denmark; ²Department of Nuclear Medicine & PET-Centre, Aarhus University Hospital, Aarhus N, Denmark; ³Clinical Pharmacology Unit, Roskilde Hospital, Roskilde, Denmark

Contact: Niels Albert Graudal, graudal@dadlnet.dk

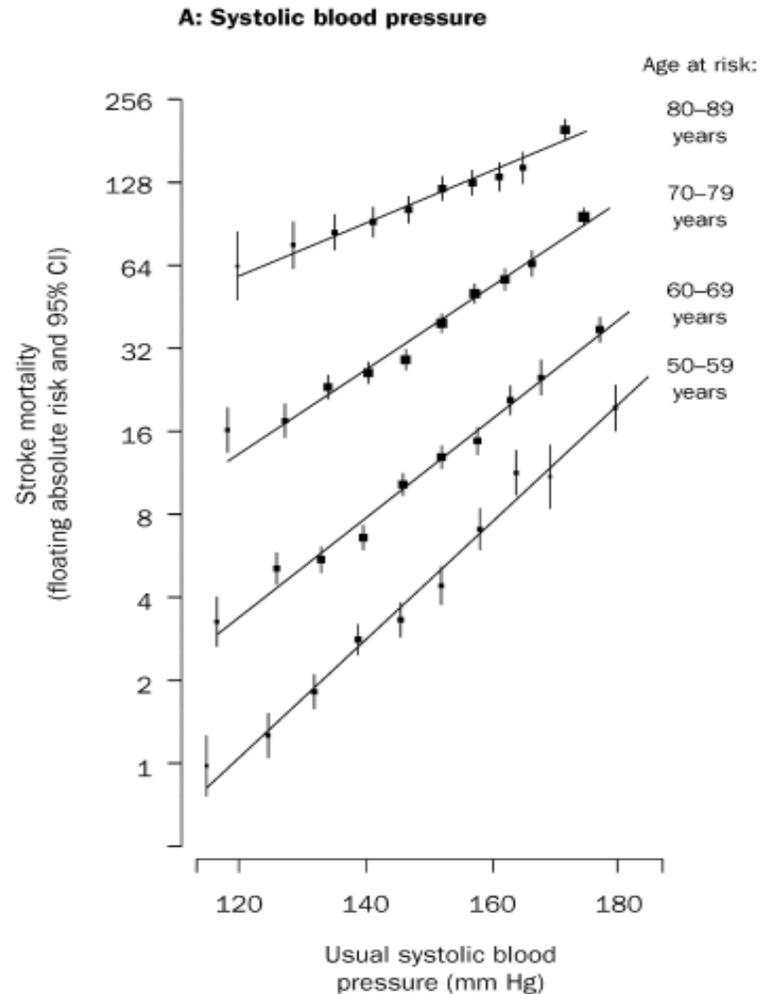
Editorial group: Cochrane Hypertension Group.

Publication status and date: Edited (no change to conclusions), published in Issue 8, 2021.

The mean salt intake was reduced from 11.5 g per day to 3.8 g per day. The reduction in SBP/DBP in people with hypertension **5.7/2.9 mmHg** (about 3%).

Outcomes	Mean Difference (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
- White population, hypertensive, SBP	-5.71 [-6.67 to -4.74]			3998
- mmHg	-5.32 [-6.26, -4.28]*			(88)

Proč doporučujeme redukci soli a antihypertenziva?



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ARTICLES · Volume 360, Issue 9349, P1903-1913, December 14, 2002

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Age-specific relevance of usual blood pressure to vascular mortality: a meta-analysis of individual data for one million adults in 61 prospective studies

[Prospective Studies Collaboration](#)

[Article info](#)

Pharmacological blood pressure lowering for primary and secondary prevention of cardiovascular disease across different levels of blood pressure: an individual participant-level data meta-analysis



On average, a **5 mm Hg reduction** of SBP reduced the risk of a major CV event **by 10%**

CMP (13 %), HF (13%), ICHS (8%), CV úmrtí 5 %

Patofysiologie hypertenze

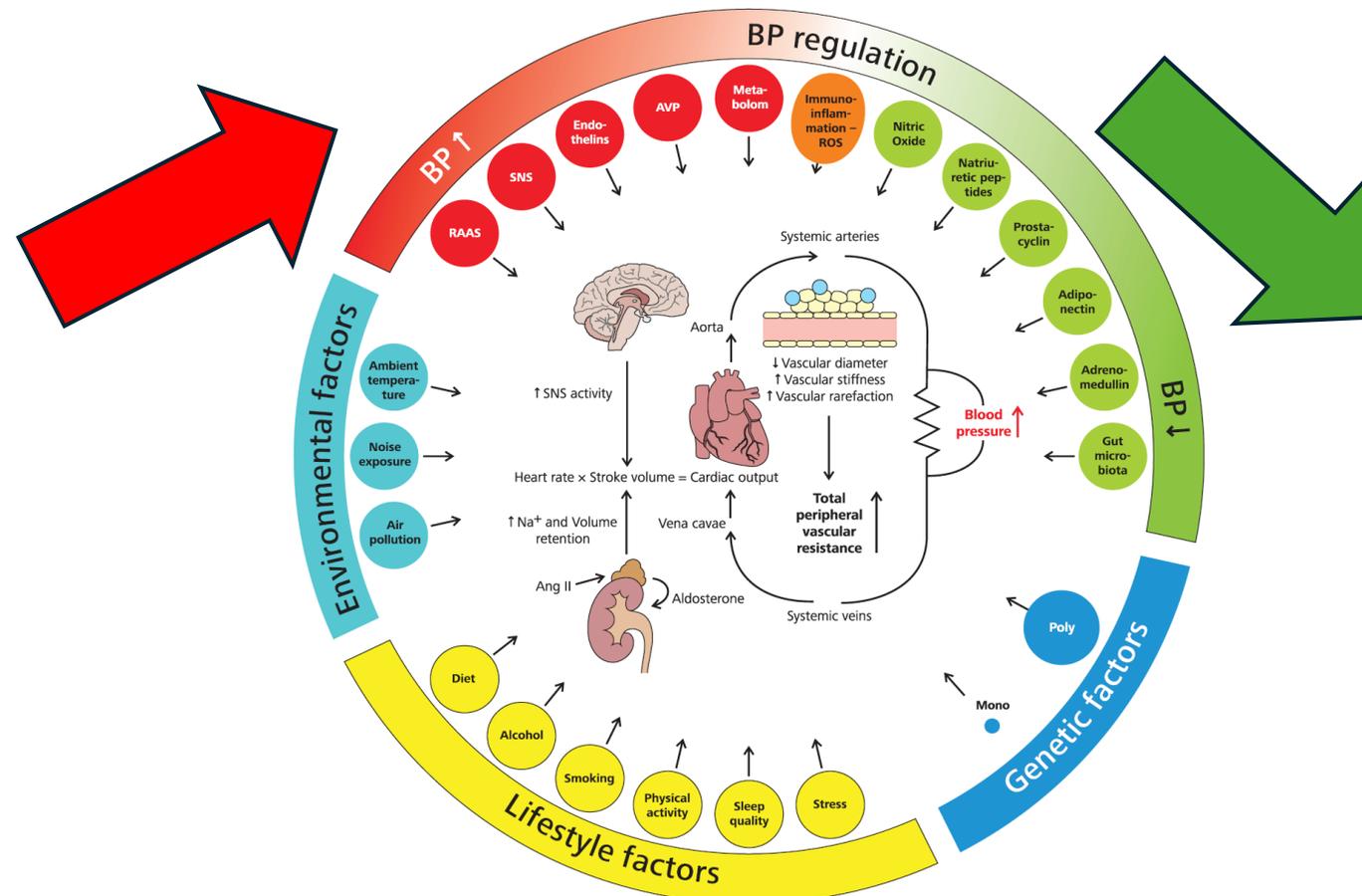
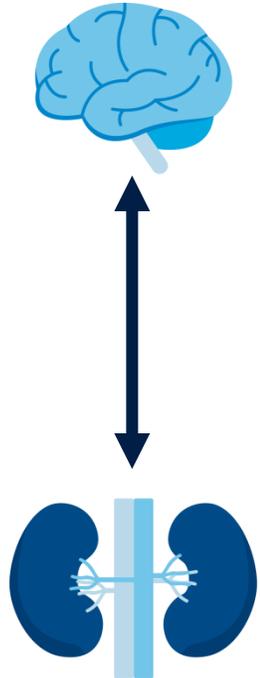


FIGURE 3 Mechanisms involved in BP regulation and the pathophysiology of hypertension.

The overactive sympathetic nervous system (SNA)

Native SNA signaling



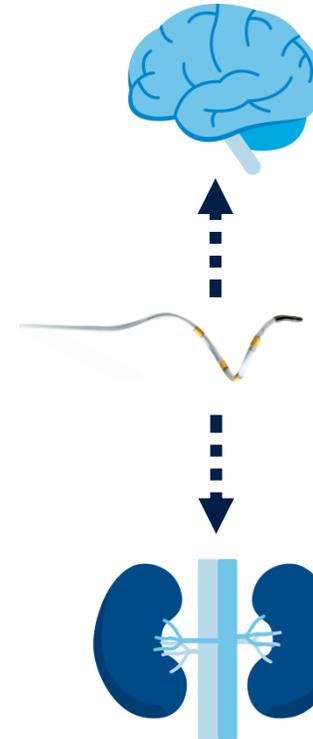
Inappropriately increased sympathetic signaling

- ↑ renin release
- ↑ RAAS activation
- ↑ sodium retention
- ↓ renal blood flow

... and, consequently,

↑ **blood pressure**

Post-RDN attenuation



RDN disrupts the sympathetic signals

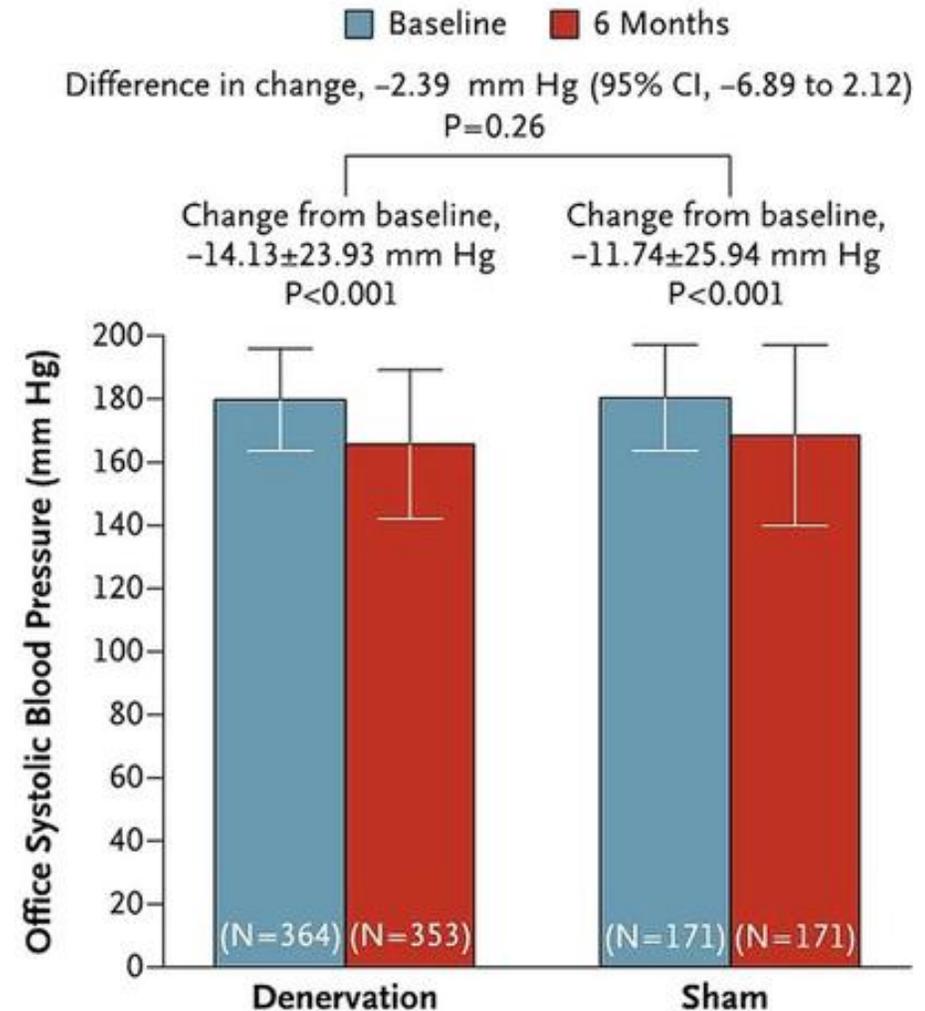
... and, consequently, ...

↓ **blood pressure**

Co se stalo v roce 2014?

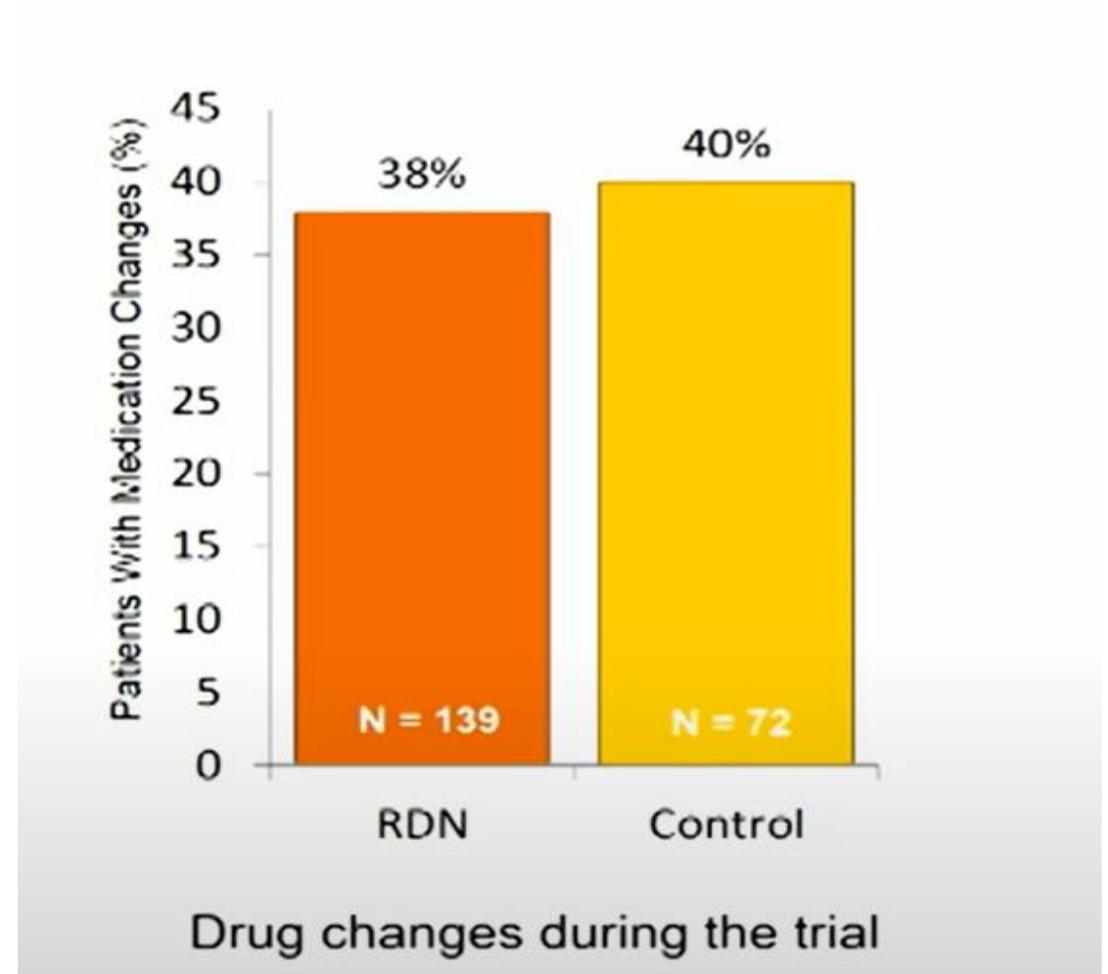
Aneb prvotní nadšení vystřídalo zklamání

- **Symplicity HTN-3**
- Rezistentní hypertenze (SBP 179 mmHg) na 5 lécích
- významný pokles TK v obou skupinách
- rozdíl 2,4 mmHg

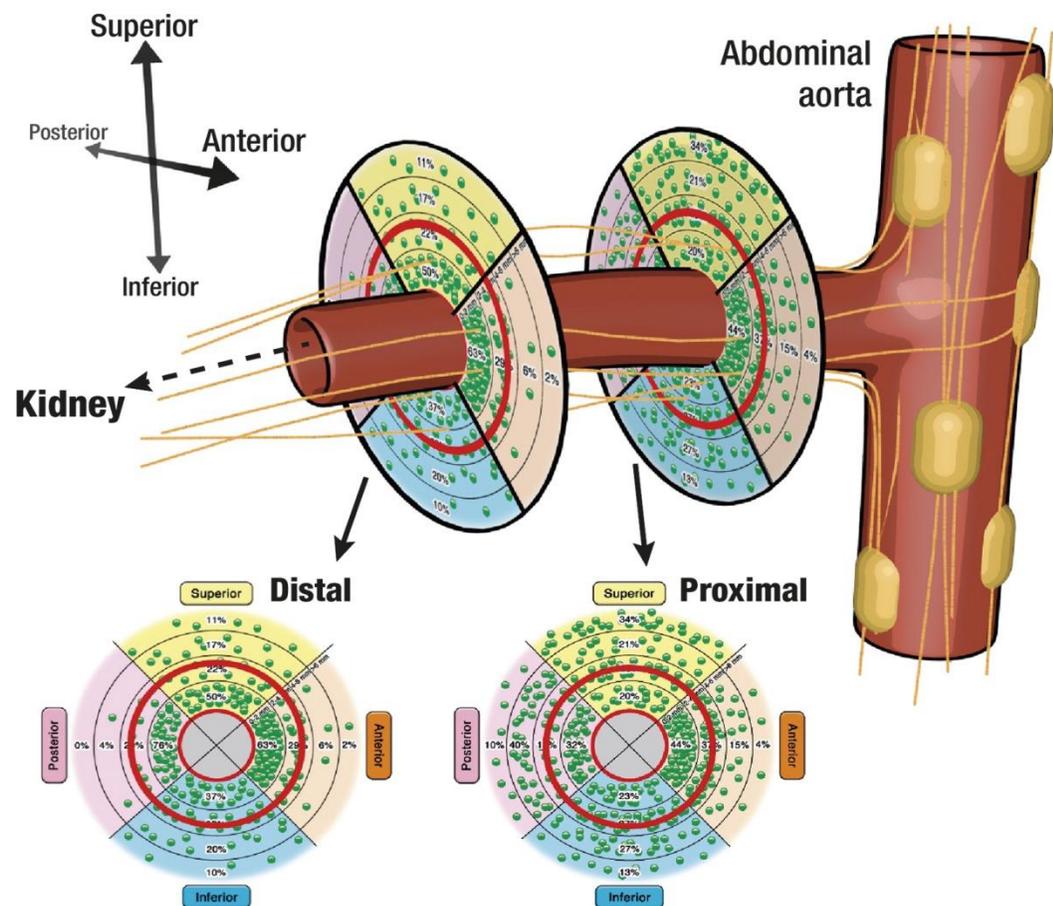


Změna medikace mezi randomizací a hodnocením

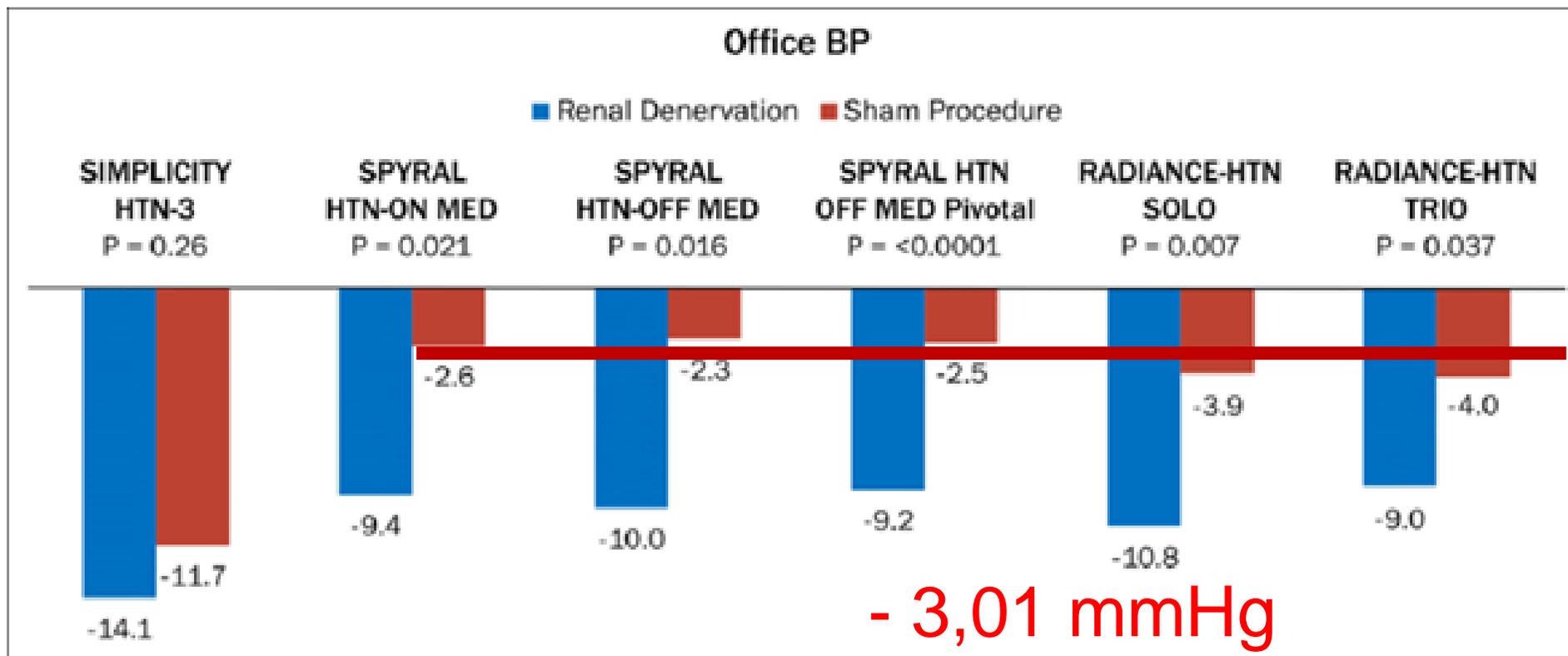
- změna medikace byla povolena v prvních 6 M jen v případě urgentní hypertenzní krize



Distribuce renální inervace



Sham procedure



Indikace RDN

Renal denervation in the management of hypertension in adults. A clinical consensus statement of the ESC Council on Hypertension and the European Association of Percutaneous Cardiovascular Interventions (EAPCI)

Emanuele Barbato¹, MD, PhD; Michel Azizi^{2,3}, MD; Roland E. Schmieder⁴, MD; Lucas Lauder⁵, MD; Michael Böhm⁶, MD; Sofie Brouwers⁷, MD, PhD; Rosa Maria Bruno^{2,3}, MD, PhD; Dariusz Dudek⁸, MD, PhD; Thomas Kahm⁹, MD, PhD; David E. Kandzan¹⁰, MD; Thomas F. Lüscher¹¹, MD; Gianfranco Parati^{12,13}, MD; Amir Poljak¹⁴, MD, PhD; Flavio L. Ribichini¹⁵, MD; Markus P. Schlaich¹⁶, MD; Andrew S.P. Slamp¹⁷, MD; Isabella Sudano¹⁸, MD, PhD; Massimo Volpe¹⁹, MD; Costas Tsioufis²⁰, MD; William Wijns^{21,22}, MD, PhD; Felix Mahfoud²³, MD, MA

ESH Guidelines

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)

28.2%
of patients already on HTN drugs prefer RDN⁴⁹

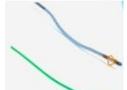
Table 2. Key statements on RDN in the 2022 ESC/EAPCI consensus statement and 2023 ESH hypertension guidelines.

	2022 ESC/EAPCI consensus statement	2023 ESH hypertension guidelines*
RDN in uncontrolled hypertension...	May be a possible treatment option for patients unable to tolerate antihypertensive drugs in the long term or patients who express a preference to undergo RDN	Can be considered as a treatment option if drug treatment elicits serious side effects and poor quality of life (COR II, LOE B)
RDN in resistant hypertension...	May be used	Can be considered as a treatment (LOE B)
Secondary hypertension	Secondary causes of hypertension should be excluded	Secondary causes of hypertension should be excluded
Lower eGFR threshold	≥40 ml/min/1.73 m ²	≥40 ml/min/1.73 m ²

38.2%
of patients not on medication prefer RDN⁴⁹

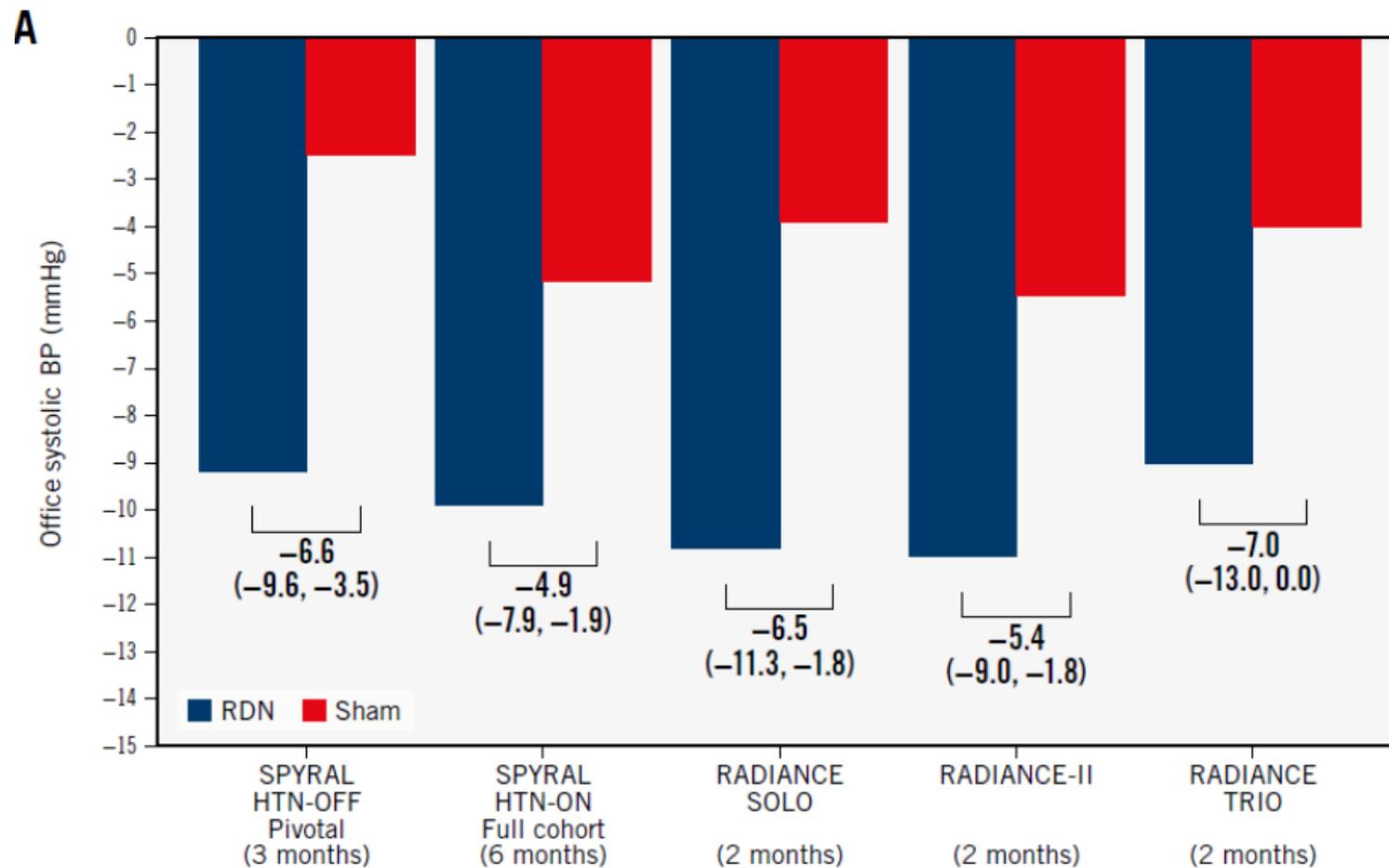
RDN katetrové systémy

Table 1. Characteristics of the most important RDN catheter systems.

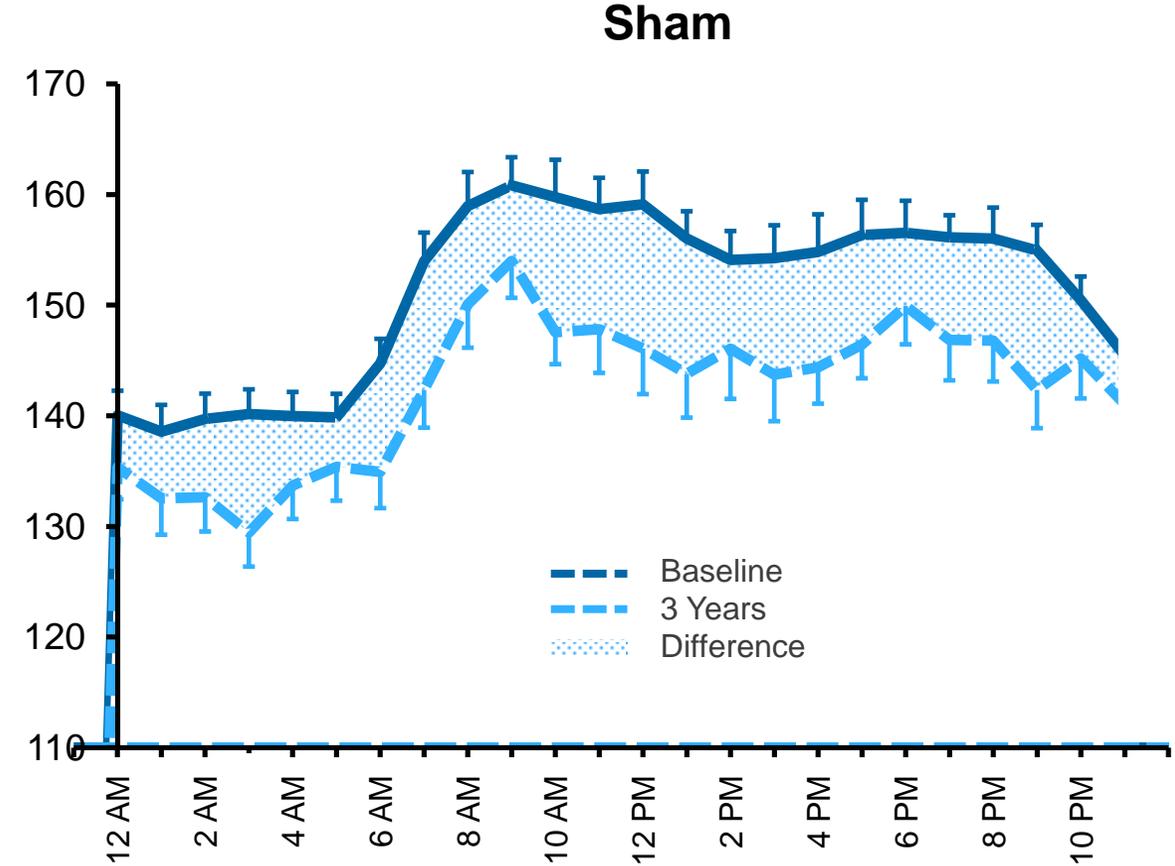
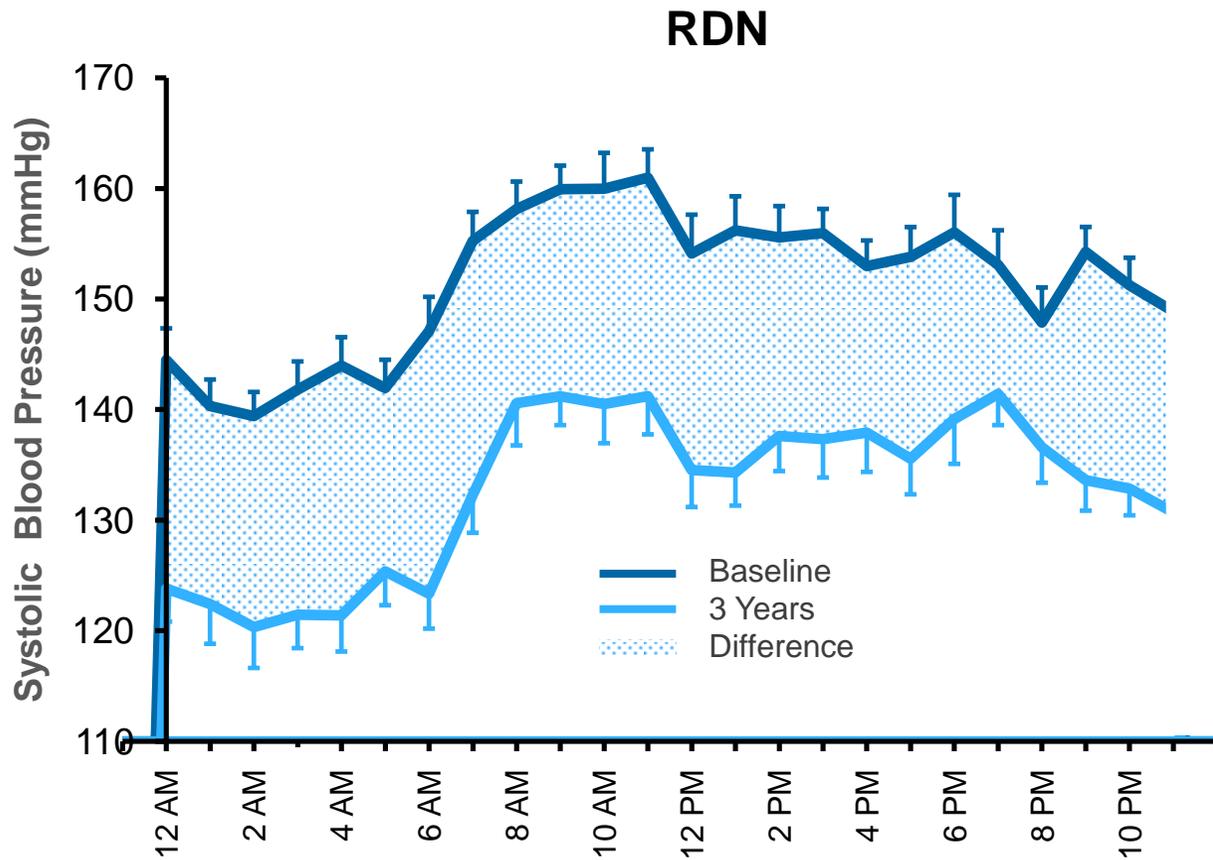
Catheter	Design	Access site	Ablation sites	Efficacy confirmed in sham-controlled trial?
Radiofrequency				
	Simplicity Spyral (Medtronic) Multielectrode (4 monopolar gold electrodes), helical design, rapid exchange monorail catheter, 60 seconds per ablation cycle	F (6 Fr)	Main and accessory arteries, including branches (diameter 3-8 mm)	Yes, multiple trials
	Netrod (Shanghai Golden Leaf Medtec) Multielectrode (6 electrodes), basket-shaped tip, 120 seconds per ablation cycle	F (8 Fr)	Main and accessory arteries, including branches (diameter 3-12 mm)	Yes, single study (EuroPCR 2023, publication pending)
	Iberis 2nd-generation (AngioCare and Terumo) Multielectrode (4 monopolar electrodes), helical design, over-the-wire catheter, 60 seconds per ablation cycle, 90 cm catheter length for transfemoral and 160 cm for transradial RDN	F/R (6 Fr)	Main and accessory arteries, including branches (diameter 3-8 mm)	Yes, single study (CIT Congress 2023, publication pending)
	SyMapCath I Steerable monoelectrode stimulation and ablation catheter, stimulation time 20-120 seconds, 120 seconds per ablation cycle	F (6-7 Fr)	Main renal arteries	Yes, single study
Ultrasound				
	TIVUS (SoniVie) Unidirectional steerable or multidirectional, over-the-wire, 30 seconds per emission	F (6 Fr)	Main and accessory arteries (diameter >4 mm)	No
	Paradise (ReCor Medical) Piezoelectric ceramic transducer within a fluid-cooled, low-pressure balloon, over-the-wire, 7 seconds per emission	F (7 Fr)	Main and accessory arteries (different catheter sizes for diameters of 3-8 mm)	Yes, multiple studies
Neurolysis				
	Peregrine (Ablative Solutions) 3 extendable microneedles	F (7 Fr)	Main and accessory arteries (4-7 mm)	No, TARGET-BP I ongoing

F: femoral; Fr: French; R: radial; RDN: renal denervation

Na každém mmHg záleží



RDN demonstrated an “always on” effect on 24-hour BP lowering



Proč se léčbou hypertenze má/musí zabývat intervenční kardiolog

- současný přístup ke kontrole hypertenze **nestačí**
- potřebujeme řešení nonadherence
- redukce **každého mmHg** se počítá
- RDN je **účinná** metoda
- sham controlled studie (devices Symplicity SPYRAL, Paradise)
- dlouhodobé data s trváním efektu (3 roky)
- **bezpečná** metoda
- prediktory účinné intervence, selekce pacientů?