How do we diagnose hypertension today?

Presentation Subtitle

Renata Cífková

Case 1

- **JM, a 64-year-old lady referred to our center because of undesirable effects of her antihypertensive medication**

- **Personal history: unremarkable, healthy, menopause at the age of 54**
- **2014 glaucoma diagnosed**

- **Hypertension diagnosed in October 2014 while having a preventive checkup (aged 62), antihypertensive medication was initiated immediately:**
  - **irbesartan 150 mg/hydrochlorothiazide 12.5 mg o.d.**
  - **bisoprolol 5 mg o.d.**

- **She felt dizzy while on medication, particularly when changing the position, therefore, she decided to reduce doses of her prescribed medication.**
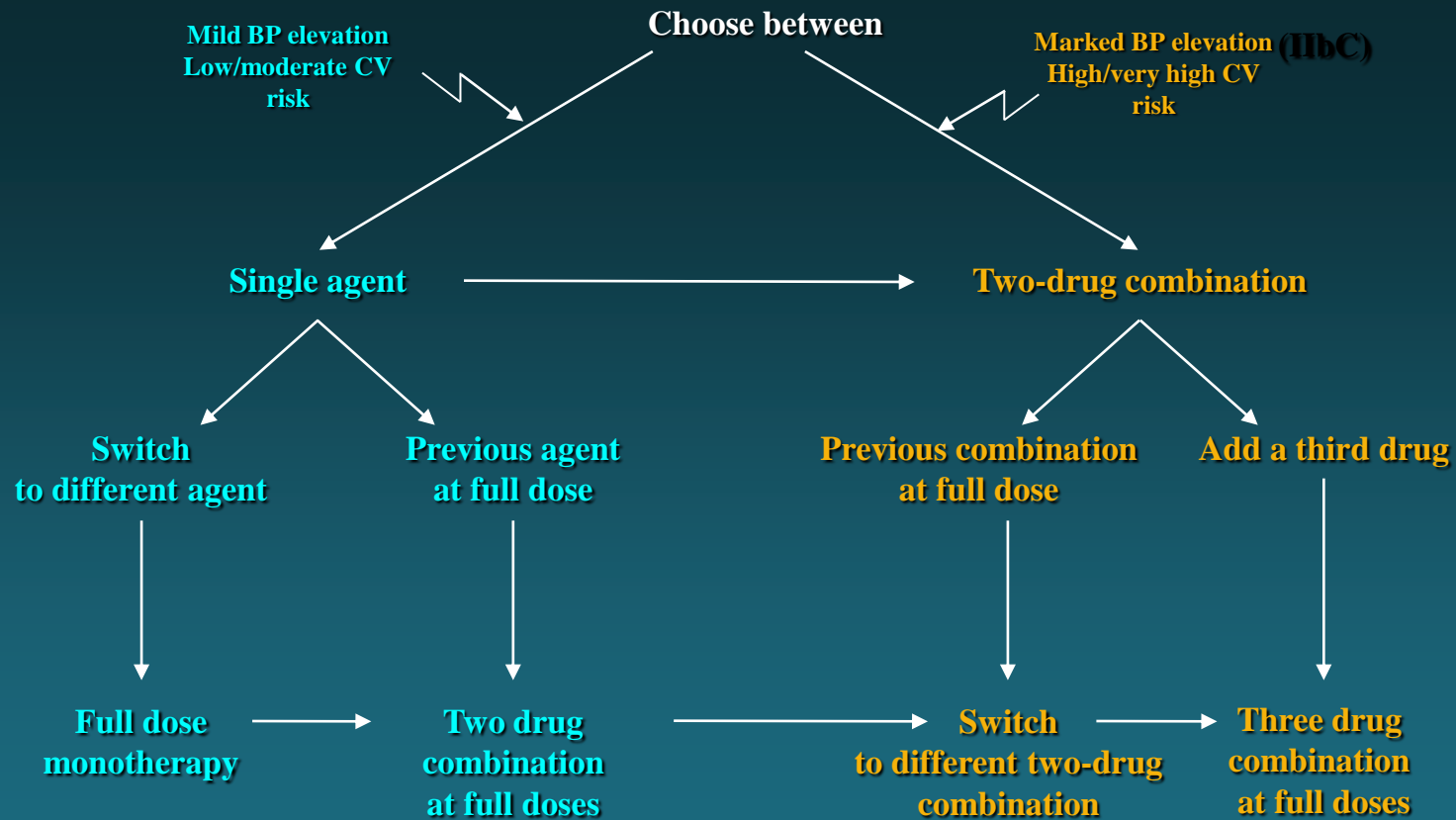
Renata Cífková

Case 1

- **Is it correct to initiate antihypertensive medication with a combination of drugs?**

  A. Yes

  B. No

Renata Cífková

Monotherapy vs. drug combination strategies to achieve target BP

Choose between

Mild BP elevation
Low/moderate CV
risk

Marked BP elevation **(IIbC)**
High/very high CV
risk

Single agent → Two-drug combination

Switch
to different agent

Previous agent
at full dose

Previous combination
at full dose

Add a third drug

Full dose
monotherapy → Two drug
combination
at full doses → Switch
to different two-drug
combination → Three drug
combination
at full doses

**Moving from a less intensive to a more intensive therapeutic strategy
should be done whenever BP target is not achieved.**

Case 1

- **Body weight 56.4 kg, height 156 cm, BMI 23.2 kg/m^2;**

- **Office BP** (mercury sphygmomanometer; Baumanometer; W.A. Baum Co. Inc., New York, NY, USA):
  - 184/102 mmHg
  - 164/94 mmHg
  - 156/96 mmHg
  - 174/94 mmHg

- **Mean of 4 readings: 170/97 mmHg**

Renata Cífková

Case 1

- **What is the BP goal for this patient?**

  A. < 130/80 mmHg

  B. < 140/90 mmHg

  C. < 150/90 mmHg

Renata Cífková

What the guidelines tell us

ESH and ESC Guidelines

2013 ESH/ESC Guidelines for the management of arterial hypertension

The Task Force for the management of arterial hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC)

List of authors/Task Force Members: Giuseppe Mancia (Chairperson) (Italy)*, Robert Fagard (Chairperson) (Belgium)*, Krzysztof Narkiewicz (Section co-ordinator) (Poland), Josep Redón (Section co-ordinator) (Spain), Alberto Zanchetti (Section co-ordinator) (Italy), Michael Böhm (Germany), Thierry Christiaens (Belgium), Renata Cifkova (Czech Republic), Guy De Backer (Belgium), Anna Dominiczak (UK), Maurizio Galderisi (Italy), Diederick E. Grobbee (Netherlands), Tiny Jaarsma (Sweden), Paulus Kirchhof (Germany/UK), Sverre E. Kjeldsen (Norway), Stéphane Laurent (France), Athanasios J. Manolis (Greece), Peter M. Nilsson (Sweden), Luis Miguel Ruilope (Spain), Roland E. Schmieder (Germany), Per Anton Sirnes (Norway), Peter Sleight (UK), Margus Viigimaa (Estonia), Bernard Waeber (Switzerland), and Faiez Zannad (France)

Renata Cífková

Case 1

- **What is the BP goal for this patient?**

  A. < 130/80 mmHg

  B. < 140/90 mmHg

  C. < 150/90 mmHg

Renata Cífková

2013 ESH/ESC guidelines for management of arterial hypertension

Key points

- **Prompt initiation of drug treatment is recommended in individuals with grade 2-3 hypertension at any level of CV risk**

- **Initiation of antihypertensive drug treatment should also be considered in grade 1 hypertensive patients at low-to-moderate risk**

- **Main benefit of antihypertensive medication is from BP lowering *per se***

- **Diuretic, beta-blockers, calcium antagonists, ACE inhibitors, and ARBs are all suitable for the initiation and maintenance of antihypertensive treatment**

- **A goal BP of < 140/90 mmHg is recommended for most hypertensive patients.**

What the guidelines tell us

Recommendations	Class[a]	Level[b]
A SBP goal <140 mmHg:		
a) is recommended in patients at low–moderate CV risk;	I	B
b) is recommended in patients with diabetes;	I	A
c) should be considered in patients with previous stroke or TIA;	IIa	B
d) should be considered in patients with CHD;	IIa	B
e) should be considered in patients with diabetic or non-diabetic CKD.	IIa	B
In elderly hypertensives less than 80 years old with SBP ≥160 mmHg there is solid evidence to recommend reducing SBP to between 150 and 140 mmHg.	I	A
In fit elderly patients less than 80 years old SBP values <140 mmHg may be considered, whereas in the fragile elderly population SBP goals should be adapted to individual tolerability.	IIb	C
In individuals older than 80 years and with initial SBP ≥160 mmHg, it is recommended to reduce SBP to between 150 and 140 mmHg provided they are in good physical and mental conditions.	I	B
A DBP target of <90 mmHg is always recommended, except in patients with diabetes, in whom values <85 mmHg are recommended. It should nevertheless be considered that DBP values between 80 and 85 mmHg are safe and well tolerated.	I	A

J Hypertens 2013;31:1281–1357

Renata Cífková

Case 1

- **Body weight 56.4 kg, height 156 cm, BMI 23.2 kg/m^2;**

- **Office BP** (mercury sphygmomanometer; Baumanometer; W.A. Baum Co. Inc., New York, NY, USA):

• 184/102 mmHg	• ~~184/102 mmHg~~
• 164/94 mmHg	• 164/94 mmHg
• 156/96 mmHg	• 156/96 mmHg
• 174/94 mmHg	• 174/94 mmHg

- **Mean of 4 readings: 170/97 mmHg**
- **Mean of the last 3 readings: 165/95 mmHg**

Renata Cífková

EAPC
European Association
of Preventive Cardiology
A Registered Branch of the ESC

ESC COUNCIL
Cardiovascular Nursing
and Allied Professions

Acute
Cardiovascular
Care Association
ACCA
A Registered Branch of the ESC

EUROPEAN
SOCIETY OF
CARDIOLOGY®

Case 1

- **What would you do as the next step?**

    A. Increase her antihypertensive medication

    B. Ambulatory blood pressure monitoring

    C. Home blood pressure measurement

Renata Cífková

What the guidelines tell us

Office BP is recommended for screening and diagnosis of hypertension.	I	B
It is recommended that the diagnosis of hypertension be based on at least two BP measurements per visit and on at least two visits.	I	C
Out-of-office BP should be considered to confirm the diagnosis of hypertension, identify the type of hypertension, detect hypotensive episodes, and maximize prediction of CV risk.	IIa	B
For out-of-office BP measurements, ABPM or HBPM may be considered depending on indication, availability, ease, cost of use and, if appropriate, patient preference.	IIb	C

J Hypertens 2013;31:1281–1357

Renata Cífková

Renata Cífková
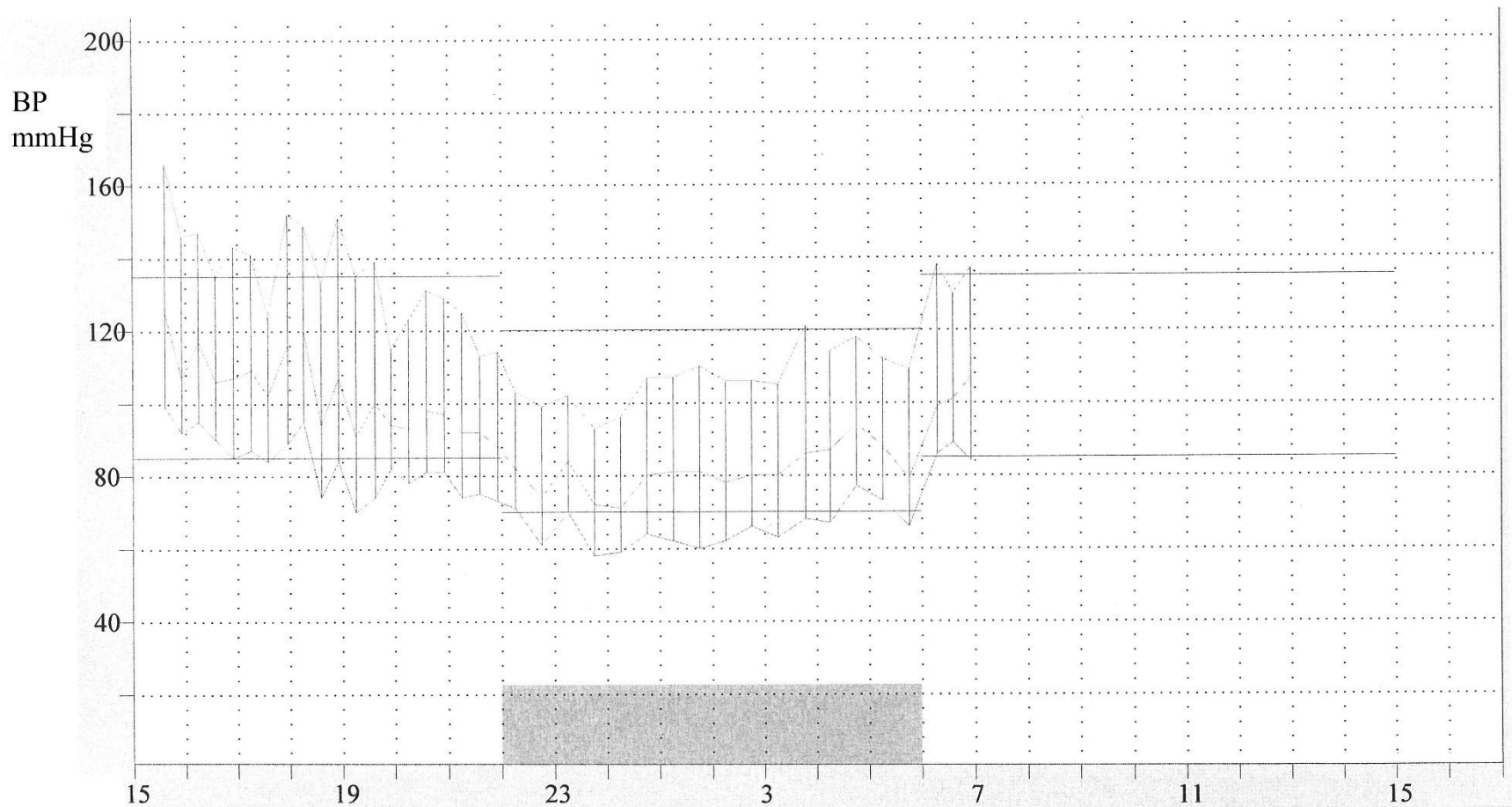
Case 1

- **24h ambulatory BP monitoring** (SpaceLab 90207; Spacelabs Healthcare Company, Issaquah, WA, USA)

- **24-hour mean**: 124/76 mmHg
  - Daytime mean (06:00-22:00):   135/84 mmHg
  - Nighttime mean (22:00-06:00): 107/65 mmHg

Renata Cífková

Case 1

ABPM

- **24-hour mean: 124/76 mmHg**
  - **Daytime mean (06:00-22:00):   135/84 mmHg**
  - **Nighttime mean (22:00-06:00): 107/65 mmHg**

Office BP

- **Mean of 4 readings: 170/97 mmHg**

Renata Cífková

Case 1

ABPM

- **24-hour mean: 124/76 mmHg**
  - **Daytime mean (06:00-22:00):   135/84 mmHg**
  - **Nighttime mean (22:00-06:00): 107/65 mmHg**

Office BP

- **Mean of 4 readings: 170/97 mmHg**

Renata Cífková

Case 1

- **How would you conclude this case?**

Renata Cífková

Case 1

ABPM

- **24-hour mean: 124/76 mmHg**
  - **Daytime mean (06:00-22:00):   135/84 mmHg**
  - **Nighttime mean (22:00-06:00): 107/65 mmHg**

Office BP

- **Mean of 4 readings: 170/97 mmHg**

Conclusions   **Hypertension**
                  White-coat effect

Renata Cífková

White-coat effect

Clinic BP measurement elicits an alertic reaction that may elevate BP, sometimes to a marked degree

Renata Cífková

BP measurement

- **Office BP**

- ☺ simplest
- ☺ most large clinical trials are based on office BP
  - very variable
  - very inaccurate

- **Home BP**

- ☺ improves patient adherence to medication
- ☺ has some prognostic value
  - not accepted by some patients; some patients are upset
  - patients report only BP values they like to be reported
  - some patients perform self-adjustment of medication

- **24-hour ambulatory BP monitoring**

- ☺ provides the largest number of BP measurements
- ☺ circadian BP profile
  - bothersome and stressful examination for some patients

Renata Cífková

Automated office BP measurement

- **The patient is seated in a quiet room**

- **BpTRU: oscillometric device**

  six BP readings taken automatically, without the presence of health care personnel

  reading 1 is automatically deleted;

  readings 2-6 are shown on display,

  and the **mean of the last 5 readings is calculated**

Renata Cífková

Renata Cífková

Automated office BP measurement in 284 patients during their first visit

BP measurement	BP (mmHg)
1	147 (20)/82 (12)*
2	140 (20)/79 (12)
3	136 (19)/78 (13)
4	134 (18)/77 (12)
5	132 (18)/76 (12)
6	133 (18)/77 (12)
Mean of readings 2-6	136 (18)/78 (11)

*p<0,001 vs all subsequent measurements

BMJ 2011; 342:d286. http://doi.org/10.1136/bmj.d286

Renata Cífková

Automated office vs. office BP

|	BP_{auto} (mmHg)	BP_{office} (mmHg)
Andreadis EA	140/88	163/96
Myers MG	136/78	150/81

Correlation of automated office BP in 3 consecutive visits:
SBP 0.896, DBP 0.873

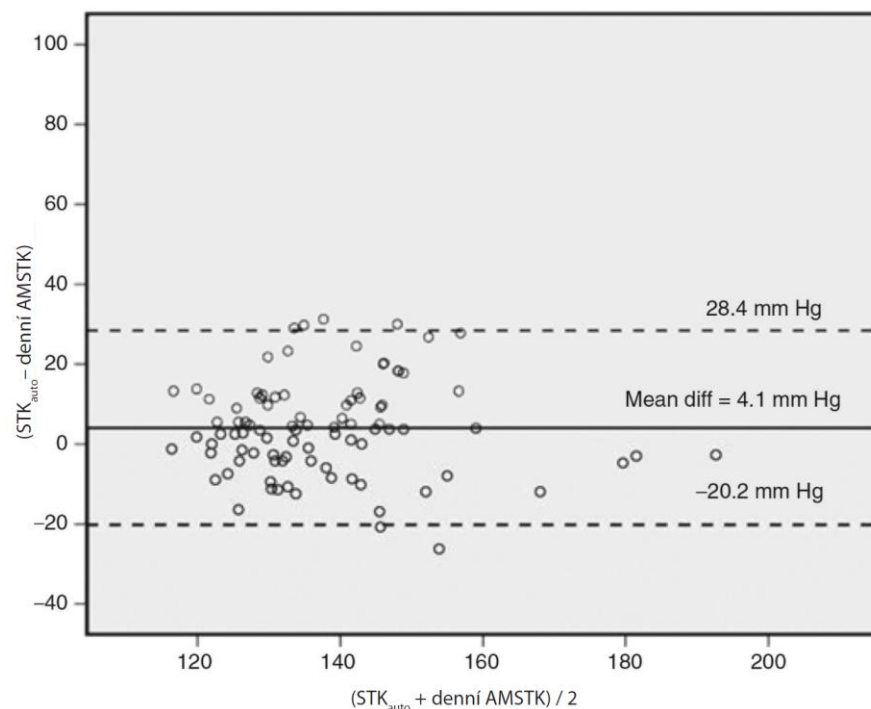*Myers MG et al., BP Monitoring 2009;14: 108-111*

Office BP and automated office BP vs daytime ABPM

Untreated hypertensives (n = 94), mean age 55 years

Office BP

Automated office BP

Andreadis EA et al., Am J Hypertens 2011;24:661-6
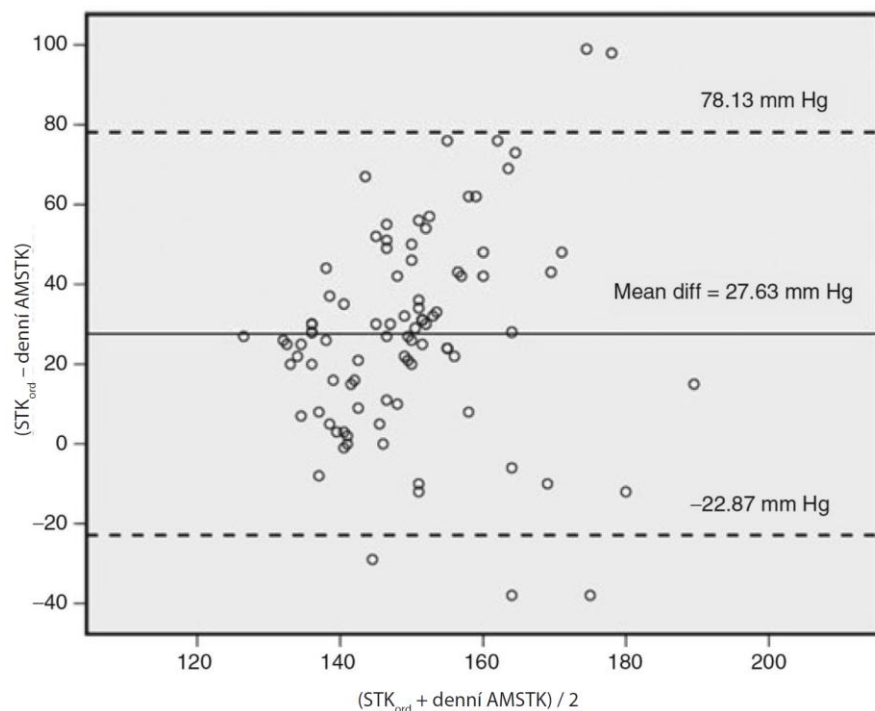
Comparison of automated office BP and awake ABPM

STUDY	NO. OF PATIENTS	POPULATION	AOBP, mm Hg	AABP, mm Hg
Myers et al,[5] 2009	309	ABPM unit	132/75	134/77
Myers et al,[21] 2008	200	ABPM unit	133/72	135/76
	200	ABPM unit	132/76	134/77
Myers et al,[22] 2010	139	ABPM unit	141/82	142/81
Beckett and Godwin,[25] 2005	481	Family practice	140/80	142/80
Myers et al,[26] 2009	62	Hypertension clinic	140/77	141/77
Myers,[27] 2010	254	ABPM unit	133/80	135/81
Godwin et al,[28] 2011	654	Family practice	139/80	141/80
Myers et al,[29] 2011	303	Family practice	135/77	133/74
Andreadis et al,[30] 2011	90	Research unit	140/88	136/87

AABP—awake ambulatory BP, ABPM—24-hour ambulatory BP monitoring, AOBP—automated office BP, BP—blood pressure.

Can Fam Physician 2014;60:127-32

Thresholds for Diagnosing Hypertension Based on Automated Office Blood Pressure Measurements and Cardiovascular Risk

Martin G. Myers, Janusz Kaczorowski, J. Michael Paterson, Lisa Dolovich, Karen Tu

Abstract—The risk of cardiovascular events in relation to blood pressure is largely based on readings taken with a mercury sphygmomanometer in populations which differ from those of today in terms of hypertension severity and drug therapy. Given replacement of the mercury sphygmomanometer with electronic devices, we sought to determine the blood pressure threshold for a significant increase in cardiovascular risk using a fully automated device, which takes multiple readings with the subject resting quietly alone. Participants were 3627 community-dwelling residents aged >65 years untreated for hypertension. Automated office blood pressure readings were obtained in a community pharmacy with subjects seated and undisturbed. This method for recording blood pressure produces similar readings in different settings, including a pharmacy and family doctor's office providing the above procedures are followed. Subjects were followed for a mean (SD) of 4.9 (1.0) years for fatal and nonfatal cardiovascular events. Adjusted hazard ratios (95% confidence intervals) were computed for 10 mm Hg increments in blood pressure (mm Hg) using Cox proportional hazards regression and the blood pressure category with the lowest event rate as the reference category. A total of 271 subjects experienced a cardiovascular event. There was a significant ($P=0.02$) increase in the hazard ratio of 1.66 (1.09, 2.54) at a systolic blood pressure of 135 to 144 and 1.72 (1.21, 2.45; $P=0.003$) at a diastolic blood pressure of 80 to 89. A significant ($P=0.03$) increase in hazard ratio of 1.73 (1.04, 2.86) occurred with a pulse pressure of 80 to 89. These findings are consistent with a threshold of 135/85 for diagnosing hypertension in older subjects using automated office blood pressure.

Advantages of automated office BP measurement

- **Simple**
- **Standardized**
- **Operator-independent**
- **More BP readings obtained than with office BP measurement**
- **White-coat effect amelioration/elimination**
- **Less discomfort than with 24h ABPM**

Renata Cífková

Case 1

- **Body weight 56.4 kg, height 156 cm, BMI 23.2 kg/m^2;**

- **Office BP** (mercury sphygmomanometer; Baumanometer; W.A. Baum Co. Inc., New York, NY, USA):

  - 184/102 mmHg
  - 164/94 mmHg
  - 156/96 mmHg
  - 174/94 mmHg

  - ~~184/102 mmHg~~
  - 164/94 mmHg
  - 156/96 mmHg
  - 174/94 mmHg

- **Mean of 4 readings: 170/97 mmHg**   - **Mean of the last 3 readings: 165/95 mmHg**

- **Automated office BP measurement** (BpTRU Medical Devices Inc., Coquitlam, BC, Canada):

  - 162/82 mmHg; HR 91 bpm
  - 165/80 mmHg; HR 96 bpm
  - 165/88 mmHg; HR 96 bpm
  - 160/83 mmHg; HR 95 bpm
  - 148/82 mmHg; HR 95 bpm

- **Mean BP: 160/83 mmHg; mean HR 94 bpm**

Renata Cífková

EAPC
European Association
of Preventive Cardiology
A Registered Branch of the ESC

ESC COUNCIL
Cardiovascular Nursing
and Allied Professions

Acute
Cardiovascular
Care Association
ACCA
A Registered Branch of the ESC

EUROPEAN
SOCIETY OF
CARDIOLOGY®

Questions to be answered

- **Standardization of BP measurement technique**
  - To initiate automated BP measurement right away/immediately or after 5 minutes᾽ rest
  - With health care personnel present or unattended

- **Correlation with other BP measurements (office, ABPM, home BP) in various patient subpopulations (patients with diabetes, CKD, elderly)**

- **Association with organ damage**
  - Arterial stiffness (pulse wave velocity)
  - Urinary albumin excretion

Renata Cífková

Manual Office vs Automated Office BP

Manual office and automated office SBP

Manual office and automated office DBP
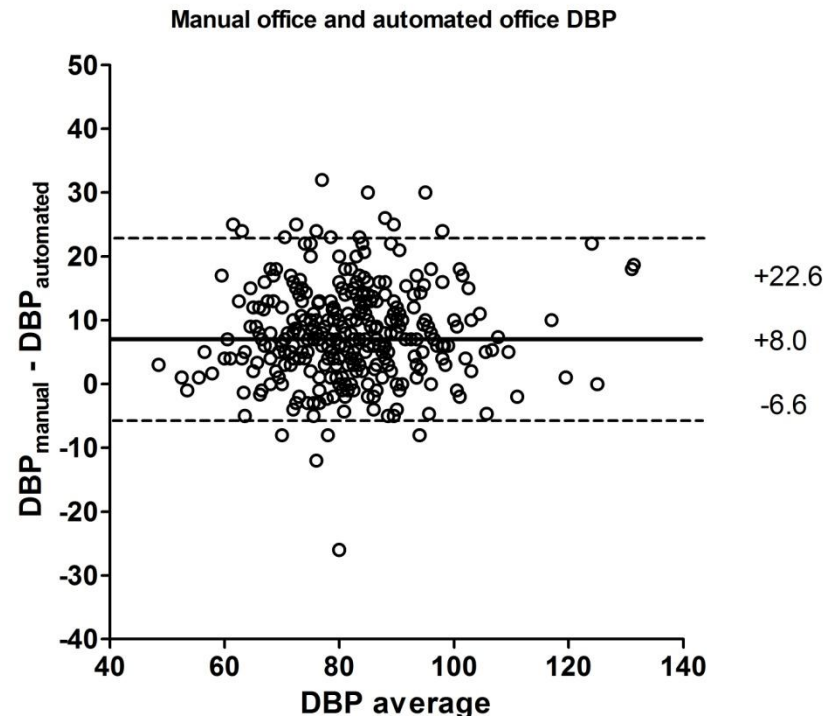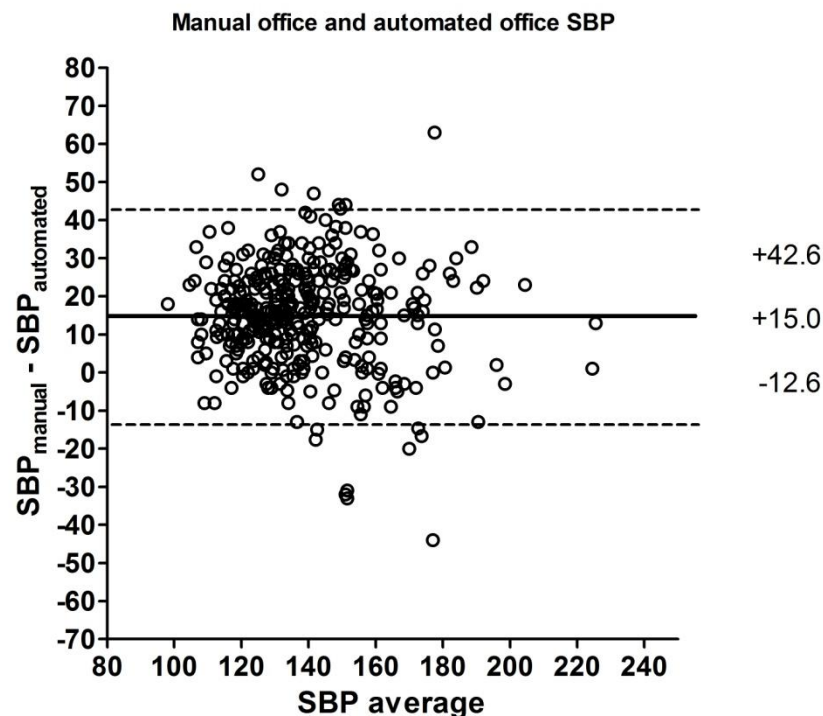
	Automated Office BP	Office BP	Office – automated office BP	Correlation coefficient	P
SBP	131.2±21.8	146.9±20.8	**15.0±13.8**	0.79	<0,.001
DBP	77.8±12.1	85.8±12.4	**8.0±7.3**	0.82	<0.0001

N = 354

Filipovský J et al., Blood Press 2016;25:228-34

...ního tlaku v čekárně

...ěte si s opřenými zády, pravou ruku položte

...5 minut (upozornění zazvoněním minutky)

...a přístroji tlačítko start.

...se bude měřit automaticky celkem 6x,

...asi jedné minuty mezi jednotlivými měřeními.

...ou zůstaňte, prosím, v klidu.

Děkujeme Prof. Jan Filipovský, dr. Jitka Mlíková Seidlerová

Home vs Automated Office BP Measurement

Home SBP and automated office SBP

Home DBP and automated office DBP
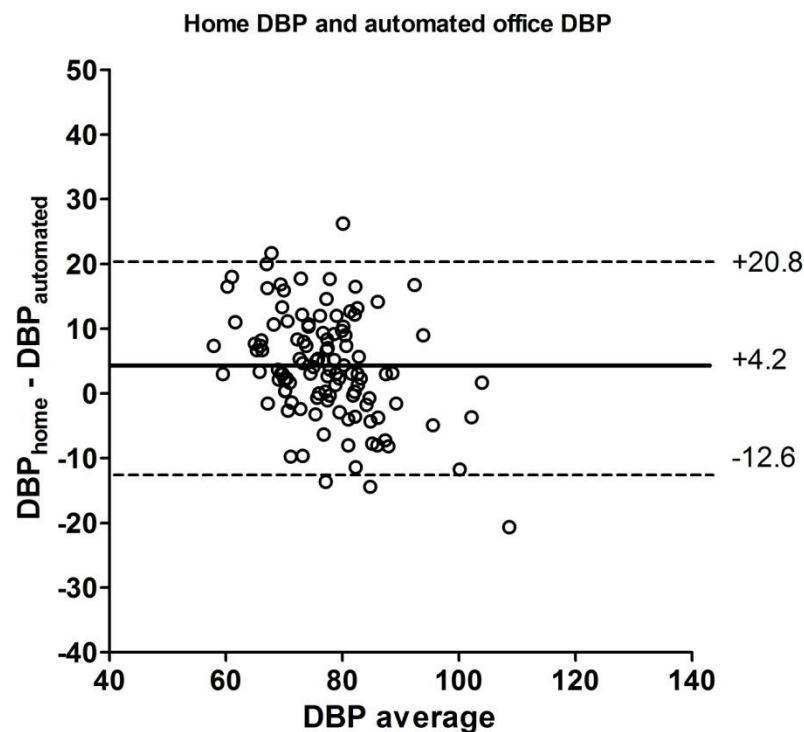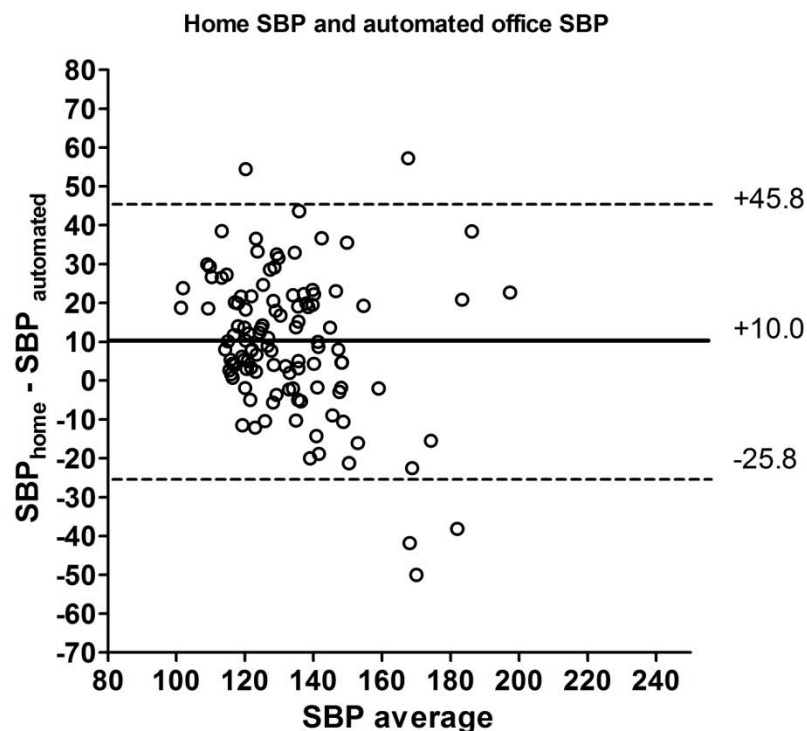
N = 114		Automated office BP	Home BP	Home – automated office BP	Correlation coefficient	P
	SBP	127.±22.0	137.7±17.7	**10.0±17.9**	0.65	<0.0001
	DBP	75.2±11.2	79.4±8.2	**4.2±8.3**	0.68	<0.0001

Filipovský J et al., Blood Press 2016;25:228-34

Case 2

- **LB, a 57-year-old lady referred to our center because of hypertension.**

- **Personal history: 2006 Hodgkin disease was diagnosed; treated with chemotherapy and subsequent radiation therapy resulting in disease remission.**

- **No antihypertensive medication**

- **Body weight 65.4 kg, height 172 cm, BMI 22.1 kg/m^2;**

Renata Cífková

Case 2

- **Office BP** (mercury sphygmomanometer; Baumanometer; W.A. Baum Co. Inc., New York, NY, USA):
  - 134/90 mmHg
  - 134/86 mmHg
  - 134/90 mmHg

- **Mean of 3 readings: 134/88.7 mmHg**

- **Automated office BP measurement** (BpTRU Medical Devices Inc., Coquitlam, BC, Canada):
  - 125/78 mmHg; HR 92 bpm
  - 120/81 mmHg; HR 93 bpm
  - 121/79 mmHg; HR 91 bpm
  - 113/79 mmHg; HR 93 bpm
  - 118/71 mmHg; HR 96 bpm

- **Mean BP: 119/78 mmHg; mean HR 93 bpm**

- **Difference between office and automated office BP: 15/10 mmHg**

Renata Cífková

Case 2

- **Office BP** (mercury sphygmomanometer; Baumanometer; W.A. Baum Co. Inc., New York, NY, USA):
  - 134/90 mmHg
  - 134/86 mmHg
  - 134/90 mmHg

- **Mean of 3 readings: 134/88.7 mmHg**

- **Automated office BP measurement** (BpTRU Medical Devices Inc., Coquitlam, BC, Canada):
  - 125/78 mmHg; HR 92 bpm
  - 120/81 mmHg; HR 93 bpm
  - 121/79 mmHg; HR 91 bpm
  - 113/79 mmHg; HR 93 bpm
  - 118/71 mmHg; HR 96 bpm

- **Mean BP: 119/78 mmHg; mean HR 93 bpm**

- **Difference between office and automated office BP: 15/10 mmHg**

- Conclusions: High-normal BP
  White-coat effect

Renata Cífková

Summary

- **There is a huge difference between office BP and automated office BP**

- **Automated office BP correlates with mean daytime BP values obtained during 24h ABPM**

- **Automated office BP correlates with LV mass and intima-media thickness**

Renata Cífková

Presenter disclosure information
R. Fagard

- **No conflict of interest**

Speaker

Case - Medical history

- **58-year-old man, referred by general practitioner to hypertension clinic for uncontrolled hypertension**

- **Medical history.**
  - ✓ **father hypertension, myocardial infarction at age 52**
  - ✓ **hypertension, known for about 9 years (BP at diagnosis about 180/? mmHg)**
  - ✓ **dyslipidaemia**
  - ✓ **no cardiovascular events**
  - ✓ **no particular complaints/symptoms**

Speaker

Case - Lifestyle and Drug treatment

- **<u>Lifestyle</u>**
- ✓ **diet: salt restriction, low fat**
- ✓ **ex-smoker (about 9 years)**
- ✓ **physical activity: sedentary**
- ✓ **alcohol consumption: 1 glass of beer/day**
- **<u>Drug treatment</u>**
- ✓ **chlorthalidone 25 mg/day**
- ✓ **amlodipine   10 mg/day**
- ✓ **ramipril   10 mg/day**
- ✓ **simvastatin   40 mg/day**

Speaker

Case – Physical examination

- **<u>Physical examination</u>**
- ✓ **heart: nl auscultation; no signs of heart failure**
- ✓ **carotid and peripheral arteries: nl**
- ✓ **no abdominal bruit**
- ✓ **conventional blood pressure by physician (mmHg)**
    - **- sitting: 146/92; 148/94; 144/90**
    - **- standing: 138/94**
- ✓ **height: 1.73 m; weight: 74 kg; BMI: 24.7 kg/m^2**
- ✓ **waist circumference: 98 cm**

Speaker

Case – Laboratory & Technical examinations

- **Blood**
- ✓ **Na: 142 mmol/L; K: 3.8 mmol/L**
- ✓ **fasting glucose: 86 mg/dL (4.78 mmol/L)**
- ✓ **creatinine: 1.13 mg/dL (100 umol/L)**
    - **- eGFR: 65 mL/min/1.73m^2**
- ✓ **cholesterol:**
    - **- total: 246 mg/dL   (6.36 mmol/L)**
    - **- HDL: 34 mg/dL   (0.88 mmol/L)**
    - **- LDL: 187 mg/dL   (4.84 mmol/L)**
- ✓ **triglycerides: 125 mg/dL (1.41 mmol/L)**
- **Urine: nl**
- **ECG: Sokolow-Lyon index: 3.9 mV; no strain**
- **Echocardiogram: LV mass index: 146 g/m^2; nl LVEF**
- **Abdominal ultrasound: nl renal arteries**

Speaker

EAPC
European Association
of Preventive Cardiology
A Registered Branch of the ESC

ESC COUNCIL
Cardiovascular Nursing
and Allied Professions

Acute
Cardiovascular
Care Association
ACCA
A Registered Branch of the ESC

EUROPEAN
SOCIETY OF
CARDIOLOGY®

Question (1)

Would this man have been a candidate for the SPRINT trial*?

A. **Don't know**
B. **Yes**
C. **No**

* NEJM 2015; 373:2103-2116

Speaker

The SPRINT trial

- **A randomized trial of intensive versus standard blood pressure control.**
- **The SPRINT Research Group.**
- **NEJM 2015; 373:2103-2116.**

*Systolic Blood Pressure Intervention Trial

Speaker

The SPRINT trial
Study population: Inclusion & Exclusion criteria

- **Inclusion criteria:**
- ✓ **age ≥ 50 yrs (mean age: 67.9 yrs)**
- ✓ **SBP: 130-180 mmHg (mean SBP at baseline: 139.7 mmHg)***
- ✓ **increased risk of CV events, defined by one or more of the following:**
  - **- clinical or subclinical CV disease other than stroke**
  - **- chronic kidney disease**
  - **- 10-yr risk of CV disease ≥ 15% (Framingham risk score)**
  - **- age ≥ 75 yrs**
- **Exclusion criteria:**
- ✓ **diabetes, prior stroke, heart failure within past 6 months or LVEF < 35%, dementia, expected survival of < 3 yrs, unintentional weight loss of > 10% within past 6 months, SBP < 110 mmHg after 1 min standing, residing in nursing home**
- **9,361 hypertension patients randomized**

***90.6 % of patients on antihypertensive treatment;
true untreated baseline BP unknown**

10-yr cardiovascular risk according to the Framingham risk score

- **<u>Variables in the equation</u>**
- ✓ **man**
- ✓ **age: 58 yrs**
- ✓ **cholesterol**
    - **- total: 246 mg/dL**
    - **- HDL: 34 mg/dL**
- ✓ **systolic BP: 146 mmHg**
- ✓ **on treatment for high BP: yes**

- **<u>Result</u>: 21%**

Speaker

Total cardiovascular risk stratification

Other risk factors (RF), asymptomatic organ damage (OD) or disease	Blood Pressure (mmHg)			
	High normal SBP 130-139 or DBP 85-89	Grade 1 HT SBP 140-159 or DBP 90-99	Grade 2 HT SBP 160-179 or DBP 100-109	Grade 3 HT SBP ≥180 or DBP ≥110
No other RF		Low risk	Moderate risk	High risk
1-2 RF	Low risk	Moderate risk	Moderate to High risk	High risk
≥3 RF	Low to moderate risk	Moderate to high risk	High risk	High risk
OD, CKD stage 3 or diabetes	Moderate to high risk	High risk	High risk	High to very high risk
Symptomatic CVD, CKD stage ≥4 or diabetes with OD/RFs	Very high risk	Very high risk	Very high risk	Very high risk

ESH
European Society of Hypertension

EUROPEAN SOCIETY OF CARDIOLOGY®

www.escardio.org/guidelines

Question (2)

Further management of hypertension:

A. I am satisfied with the current BP control
B. I would intensify treatment to a target conventional systolic BP of < 140 mmHg
C. I would intensify treatment to a target conventional systolic BP of < 130 mmHg
D. I would intensify treatment to a target conventional systolic BP of < 120 mmHg
E. I would intensify treatment to a target conventional systolic BP of < 110 mmHg

Speaker

Target systolic blood pressure
2013 ESH/ESC Hypertension Guidelines

- **One of the important features of the '2013 ESH/ESC Guidelines for the management of arterial hypertension' was the recommendation to lower conventional systolic blood pressure to < 140 mmHg in nearly all hypertensive patients with few exceptions.**

- **Should this recommendation be revisited after SPRINT?**

Speaker

The SPRINT trial
Protocol

- Randomized controlled trial, open-label design
- Systolic blood pressure target:
- ✓ standard treatment group < 140 mmHg (135-139 mmHg)
- ✓ intensive treatment group < 120 mmHg
- Baseline antihypertensive regimens adjusted according to study-group assignment, similar to those used in the ACCORD trial
- Lifestyle modification encouraged in all participants:
- ✓ reduction of sodium intake
- ✓ alcohol consumption below maximum recommended levels
- ✓ a heart-healthy diet (e.g. the DASH diet)
- ✓ weight loss for overweight participants
- ✓ regular aerobic exercise
- ✓ smoking cessation

(Clin Trials 2014; 11:532-546)

Speaker

Recommendations on lifestyle changes

Are recommended	Class	LoE[a]	LoE[b]
Salt restriction to 5-6 g per day.	I	A	B
Moderation of alcohol consumption to no more than 20-30 g of ethanol per day in men and 10-20 g of ethanol per day in women.	I	A	B
Increased consumption of vegetables, fruits, and low-fat dairy products.	I	A	B
Reduction of weight to BMI of 25 kg/m^2 and of waist circumference to <102 cm in men and <88 cm in women, unless contraindicated.	I	A	B
Regular exercise, i.e. at least 30 min of moderate dynamic exercise on 5 to 7 days per week.	I	A	B
Advice to quit smoking and to offer assistance to all smokers.	I	A	B

[a] LoE: based on the effect on BP and/or CV risk profile
[b] LoE: based on outcome studies

www.escardio.org/guidelines

European Society of Hypertension

ESH

EUROPEAN SOCIETY OF CARDIOLOGY®

The SPRINT trial
Results

- **Blood pressure throughout the 3.26 yrs of follow-up:**
  - **- standard treatment group: 134.6 mmHg**
  - **- intensive treatment group: 121.5 mmHg**
- **Primary outcome (composite of MI, ACS, stroke, HF, CV death):**

  HR 0.75 (95% CI: 0.64-0.89) P<0.001
- **Secondary outcomes:**
  - **- death from any cause   HR 0.73 (0.60-0.90) P=0.003**
  - **- cardiovascular death   HR 0.57 (0.38-0.85) P=0.005**
  - **- heart failure   HR 0.62 (0.45-0.84) P=0.002**
  - **- not significant for MI, ACS or stroke**

The SPRINT trial
Serious adverse events (SAEs)

- **SAEs that were classified as possibly or definitely related to the intervention occurred in 4.7% in the intensive treatment group and in 2.5% in the standard treatment group (P<0.001).**

- **SAEs of hypotension, syncope, electrolyte abnormalities and acute kidney injury or acute renal failure occurred more frequently in the intensive treatment group (P<0.05 for each of them), but not injurious falls.**

Speaker

The SPRINT trial
Blood pressure measurement

- Description in main publication:
- ✓ BP measured at office visits
- ✓ 3 measurements at each visit, mean of 3 used in analyses
- ✓ seated position
- ✓ after 5 minutes of quiet rest
- ✓ use of validated automatic measurement system (Model 907, Omron Healthcare)

The SPRINT trial
Blood pressure measurement

- **Additional information:**
  the Manual of Operations and central training called for the study personnel to leave the room and the device was set to 5 minutes before starting the measurement.

- **Implications thereof are that BPs taken in SPRINT cannot be directly compared with BPs in other trials and that the treatment arm goal of < 120 mmHg in SPRINT compares with a higher SBP value in the other trials.**

Implications for guidelines

- **Based on:**
- ✓ **the implications of the unobserved automated BP measurement in SPRINT, an achieved SBP of 121.5 mmHg (not consistently < 120 mmHg in the majority of participants) in the intensive treatment group, and**
- ✓ **the conclusions from ACCORD that in patients with type 2 diabetes at high risk for CV events, targeting a (conventional) SBP of < 120 mmHg, as compared with < 140 mmHg, did not reduce the rate of a composite outcome of fatal and nonfatal major CV events (NEJM 2010; 362:1575-85),**
- ✓ **there appears to be no compelling reason for guidelines to lower conventional target SBP to < 120 mmHg in usual clinical practice, at least not in patients at high CV risk or with diabetes.**
- **Should target SBP be lowered to < 130 mmHg?**

How far to lower blood pressure? A meta-analysis

- **Effects of blood pressure lowering on outcome incidence in hypertension: 7.Effects of more vs less intensive blood pressure lowering and different achieved blood pressure levels – updated overview and meta-analyses of randomized trials.**
- **Thomopoulos C, Parati G, Zanchetti A.**
- **J Hypertension 2016; 34:613-622.**

Selection of studies

- **RCTs comparing**
- ✓ **more with less intense BP lowering, or**

  active antihypertensive treatment vs placebo,
- ✓ **enrolling hypertensive patients or cohorts with ≥ 40% hypertensive patients aged ≥ 18 yrs.**
- **Exclusion of trials investigating patients with acute MI, HF, acute stroke, renal dialysis or secondary hypertension.**
- **Between group difference of ≥ 2 mmHg in SBP or DBP.**
- **Follow-up of ≥ 6 months.**
- **Reporting ≥ one type of CV event or all-cause death, with minimum of 5 events during follow-up.**

Results

- **Effects of BP lowering in trials of active treatment vs placebo and more vs less intense treatment considered together, stratified in 3 strata with mean SBP achieved by active or more intense treatment vs mean SBP achieved in the placebo or less intense treatment:**

- ✓ **140-149 vs ≥ 150 mmHg   (143.3 vs 157.1 mmHg)**
- ✓ **130-139 vs ≥ 140 mmHg   (137.2 vs 144.3 mmHg)**
- ✓ **< 130 mmHg vs ≥ 130 mmHg (125.8 vs 134.9 mmHg)**
- **Standardized risk ratios to a SBP difference of -10 mmHg.**

Results
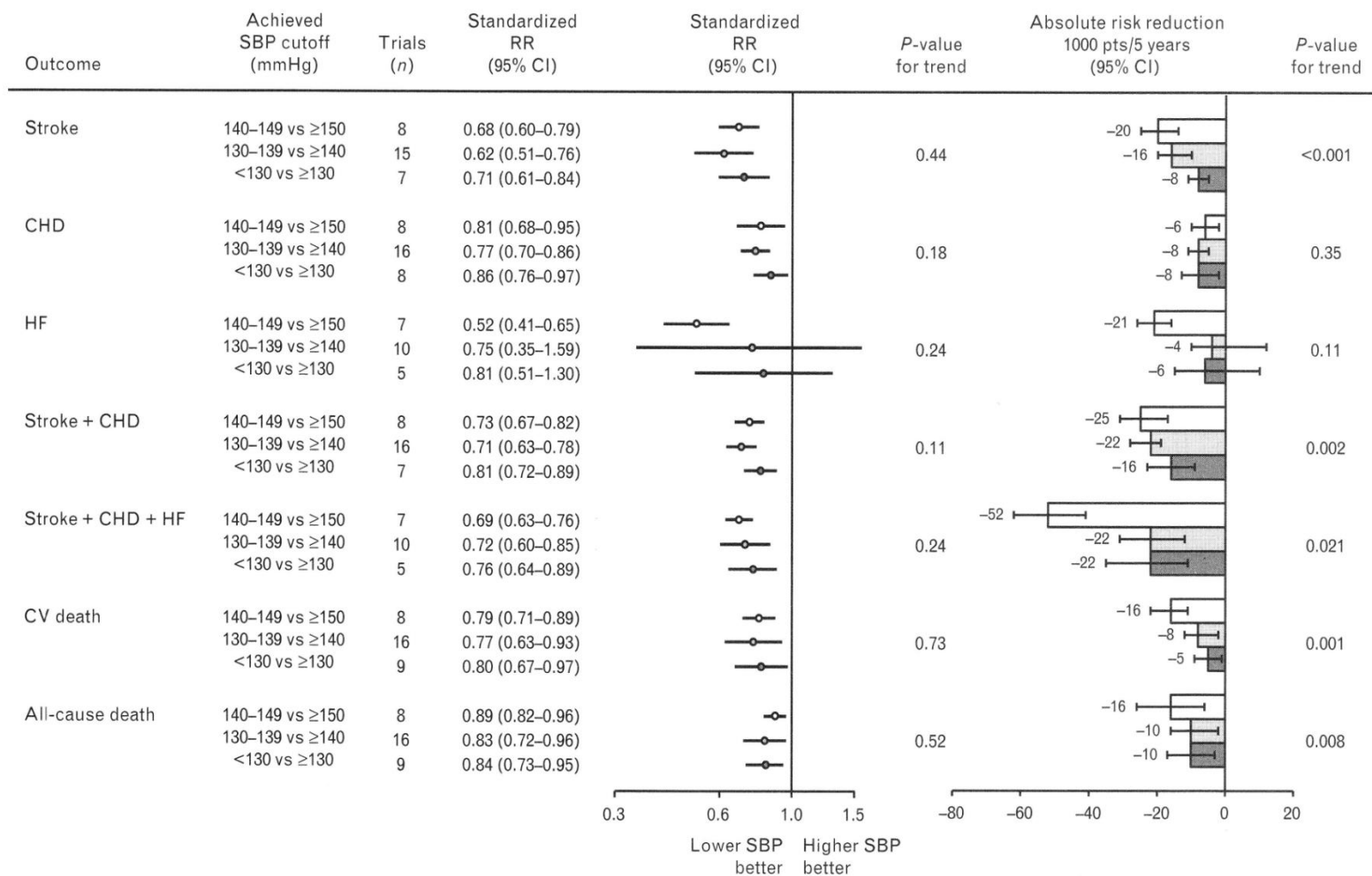
Discussion (1)

- **The updated meta-analysis of RCTs shows that all major outcomes can be reduced by lowering SBP a few mmHg below vs above 130 mmHg.**

- **For the same BP reduction, however, the absolute risk reduction is smaller at lower BP targets.**

- **This smaller benefit should be considered when deciding the BP target to achieve in the individual patient, especially in front of a possible increase of adverse effects and a consequent decrease in the patient's adherence to the treatment.**

Discussion (2)

- **Meta-analyses are not a real substitute of large and good RCTs.**

- **Meta-analyses comprise trials with heterogeneous cohorts and thus identifying those individuals who would benefit most from intensive treatment to lower BP targets is difficult.**

- **The only three large RCTs (SPRINT, ACCORD, SPS3) that specifically aimed at investigating the possible benefits of lowering SBP quite below 130 mmHg have given some contrasting results and had important limitations.**

Hope-3 study

- **Blood pressure lowering in intermediate-risk persons without cardiovascular disease.**

- **Lonn et al, for the HOPE-3 Investigators.**

- **NEJM 2016; 374:2009-2020.**

*Heart Outcomes Prevention Evaluation

Hope-3 study

- **To evaluate the role of BP lowering therapy in persons at intermediate risk defined as an annual risk of major CV events of about 1%, without CV disease or renal dysfunction, and with SBP < 160 mmHg without symptomatic hypotension.**

- **Double-blind, randomized placebo-controlled trial of a fixed-dose combination of candesartan (16 mg) and HCT (12.5 mg) vs placebo.**

- **Inclusion of men aged ≥ 55 yrs and women aged ≥ 65 yrs with ≥ 1 CV risk factor, and women aged ≥ 60 yrs with ≥ 2 CV risk factors.**

- **Participants were not selected on the basis of history of hypertension.**

- **12,705 participants; mean age 65.7 yrs; 38% with history of hypertension.**

Hope 3 study
Results

- **SBP (mmHg) at baseline and change during 5.6 yrs of follow-up:**
- ✓ **placebo group :   137.9,   - 4.0, (133.9)**
- ✓ **active treatment group: 138.2, - 10.0, (128.2)**
- **First primary outcome (composite of CV death, MI, stroke):**
  HR 0.93 (95% CI: 0.79-1.10) P= 0.40
- **Second primary outcome (first primary outcome + resuscitated cardiac arrest, HF, revascularization):**
  HR 0.95 (95% CI: 0.81-1.11) P= 0.51
- **No significant difference in stroke, heart failure, mortality from CV causes of from any cause.**

Conclusions
Should target systolic BP pressure be revisited?

- **Based on:**
- ✓ **the issue of unattended automated BP measurements,**
- ✓ **the heterogeneity of trials included in meta-analyses,**
- ✓ **meta-analyses not being substitute for large RCTs,**
- ✓ **the contrasting results and limitations of RCTs with regard to the possible benefits of lowering SBP to < 130 mmHg,**
- ✓ **the possible increase of adverse events at lower target SBP,**
- **there appears to be no compelling indication for a change in the current recommendation to reduce the conventional target SBP of < 140 mmHg to a lower level in usual clinical practice in the large majority of hypertensive patients.**
- **It is up to Guidelines Committees to carefully consider levels of evidence and classes of recommendation based on current and future evidence.**

Question (3)

How to intensify antihypertensive treatment?*

A. Increase the dose of amlodipine?

B. Increase the dose of ramipril?

C. Add spironolactone?

D. Add a beta-blocker?

E. Apply renal denervation?

(*apart from improving lipid control and starting aspirin)

Speaker