Housekeeping Items

- Welcome to L.A. Care Provider Continuing Education (PCE) Program's Live Webinar!
- The Live Webinar is being recorded.
- Webinar participants are muted upon entry and exit of webinar.
- ***Webinar attendance will be noted via log in and call in with assigned unique Attendee ID #. Please log in through a computer (instead of cell phone) to Join Webinar / Join Event and choose the Call In option to call in by telephone with the event call in number, event access code and assigned unique attendee ID number. If your name does not appear on our WebEx Final Attendance and Activity Report (only as Caller User #) and no submission of online survey, no CME or CE certificate will be provided.***
- Questions will be managed through the Chat feature and will be answered at the end of the presentation. ***Please keep questions brief and send to All Panelists. One of our Learning and Development Team members and/or webinar host***, will read the questions via Chat when it's time for Q & A session (last 30 minutes of live webinar).
- Please send a message to the Host via Chat if you cannot hear the presenter or see the presentation slides.

L.A. Care PCE Program Friendly Reminders

- ***Partial credits are not allowed at L.A. Care's CME/CE activities for those who log in late (more than 15 minutes late) and/or log off early.***

- PowerPoint Presentation is allotted 60 minutes and last 30 minutes for Q&A session, total of 90-minute webinar, 1.50 CME credits for L.A. Care Providers and other Physicians, 1.50 CE credits for NPs, RNs, LCSWs, LMFTs, LPCCs, LEPs, and other healthcare professionals. Certificate of Attendance will be provided to webinar attendees without credentials.

- **Friendly Reminder,** a survey will pop up on your web browser after the webinar ends. Please do not close your web browser and wait a few seconds, and please complete the survey. ***Please note:*** ***the online survey may appear in another window or tab after the webinar ends.***

- Within two (2) weeks after webinar and upon completion of the online survey, you will receive the PDF CME or CE certificate based on your credential and after verification of your name and attendance duration time of at least 75 minutes for this 90-minute webinar.

- The PDF webinar presentation will be available within 6 weeks after webinar date on lacare.org website located at https://www.lacare.org/providers/provider-central/provider-programs/classes-seminars

- Any questions about L.A. Care Health Plan's Provider Continuing Education (PCE) Program and our CME/CE activities, please email Leilanie Mercurio at lmercurio@lacare.org

Presenter's Bio

Florian Rader, MD, MSc., is the Medical Director of the Hypertension Center of Excellence, Co-Director of the Hypertrophic Cardiomyopathy Center, and Associate Director of the Noninvasive Laboratory at Cedars-Sinai Smidt Heart Institute. He ranks as Associate Professor at Cedars-Sinai and UCLA.

Dr. Rader graduated from medical school at the University of Vienna, Austria. He completed the Physician Scientist Program at Case Western Reserve University, Metro Health Campus in Cleveland, Ohio, where he completed a research fellowship at the Cleveland Clinic and his clinical cardiology fellowship at Case Western Reserve University.

His clinical and research interests focus on new treatment options for hypertrophic cardiomyopathy and novel device-based treatment options for hypertension and valvular heart disease.

Dr. Rader is principal investigator on many hypertension and hypertrophic cardiomyopathy clinical trials and has published over 120 peer-reviewed manuscripts and book chapters.

Hypertension (HTN) and Stroke Prevention

Florian Rader, M.D, M.Sc.
Medical Director, Hypertension Center of Excellence
Associate Director, Non-invasive Laboratory
Co-Director, Clinic for Hypertrophic Cardiomyopathy and Aortopathies

July 25, 2024 Live Webinar, 12:00 pm to 1:30 pm PST, 1.50 CME/CE Credits
Directly Provided CME / CE Activity by L.A. Care Health Plan

Cedars Sinai

cedars-sinai.org

Disclosures

The following CME Planner do not have relevant financial relationships with ineligible companies in the past 24 months:

- Leilanie Mercurio, L.A. Care Provider Continuing Education (PCE) Program Manager, CME Planner.

The following ineligible companies have relevant financial relationships with CME Planner and Presenter Florian Rader, MD, MSc, Medical Director of the Hypertension Center of Excellence, Associate Director of the Non-invasive Laboratory and Co-Director of the Hypertrophic Cardiomyopathy Clinic at Cedars-Sinai Smidt Heart Institute.

- Bristol Myers Squibb, Recor Medical, Medtronic, and Mineralys.
- Dr. Florian Rader is a Consultant for the ineligible companies listed here.

All relevant financial relationships of Dr. Florian Rader, CME Planner and Faculty, with ineligible companies have been mitigated.

An ineligible company is any entity whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients.

Commercial support was not received for this CME/CE activity.

Learning Objectives

At the completion of the activity, learners can:

1) Define stroke and identify at least two (2) different underlying causes of stroke.

2) List at least two (2) modifiable and two (2) non-modifiable risk factors of stroke.

3) Summarize the close association between stroke and hypertension.

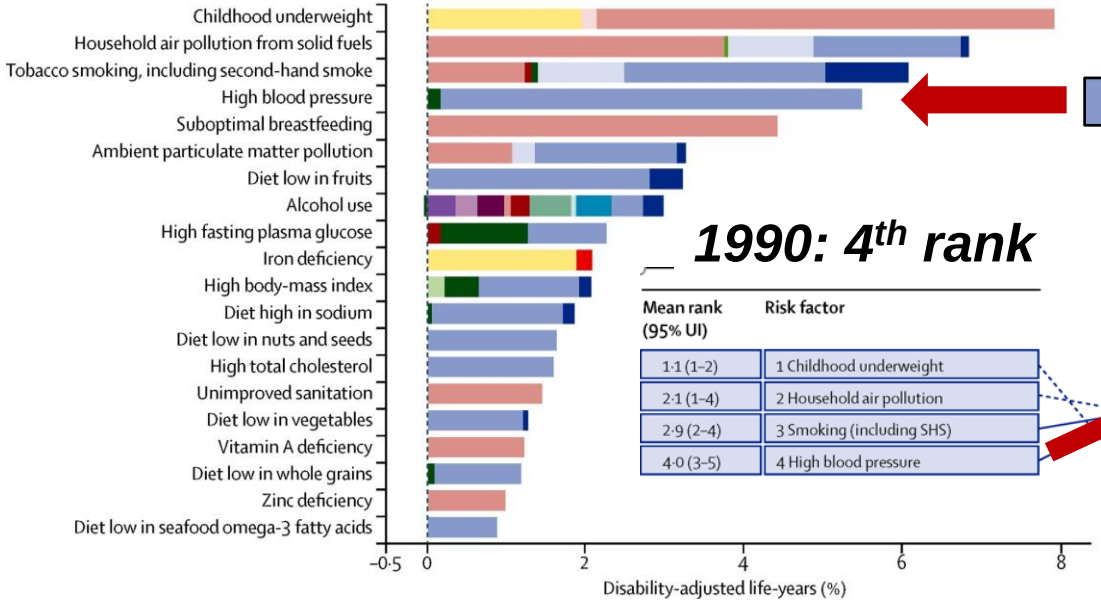
4) Specify at least two (2) differences in guideline-recommended blood pressure (BP) goals in the prevention of cardiovascular complications, including stroke.

*** Dr. Rader is a Cardiologist, not a Neurologist, so the focus here will be primary prevention of stroke rather than treatment or secondary prevention of stroke.**

Overview

1. **Hypertension’s global disease burden**
2. **Stroke: definitions and classifications**
3. **Non-modifiable risk factors of stroke**
4. **Modifiable risk factors of stroke**
5. **Reduction of blood pressure (BP) and primary prevention of stroke**
6. **Secondary prevention of stroke**
7. **The guideline debacle**
8. **Hypertension treatment: my approach**

Hypertension burden globally



Cardiovascular risk

1990: 4th rank

Mean rank (95% UI)	Risk factor
1·1 (1–2)	1 Childhood underweight
2·1 (1–4)	2 Household air pollution
2·9 (2–4)	3 Smoking (including SHS)
4·0 (3–5)	4 High blood pressure

2010: 1st rank

Risk factor	Mean rank (95% UI)	% change (95% UI)
1 High blood pressure	1·1 (1–2)	27% (19 to 34)
2 Smoking (including SHS)	1·9 (1–2)	3% (−5 to 11)
3 Household air pollution	4·6 (3–7)	−37% (−44 to −29)
4 Low fruit	5·0 (4–8)	29% (25 to 34)

World Health Organization

IMPACT: >1 billion hypertensives globally → most are uncontrolled

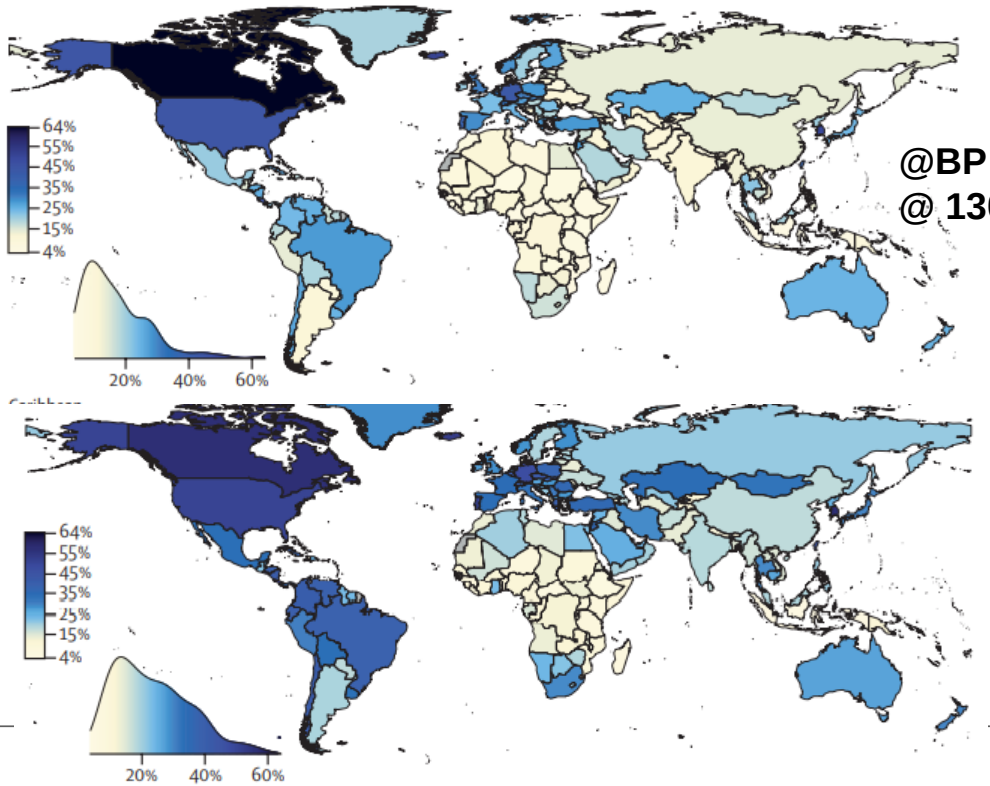
Lim et al. *The Lancet* 2012;380(9859):2224-2260

Global control rates

1.3 billion hypertensives and most are uncontrolled!

Men

Women

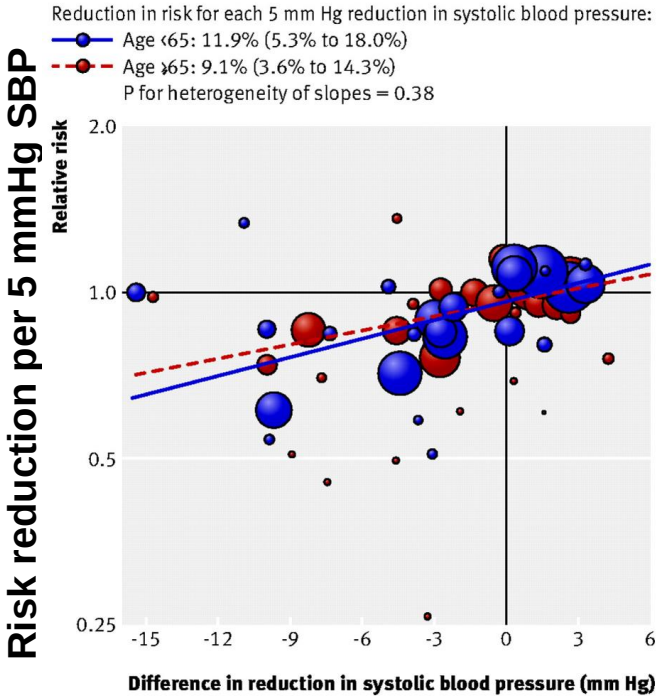


@BP goal ≤140/90 mmHg
@ 130/80 mmHg much worse!

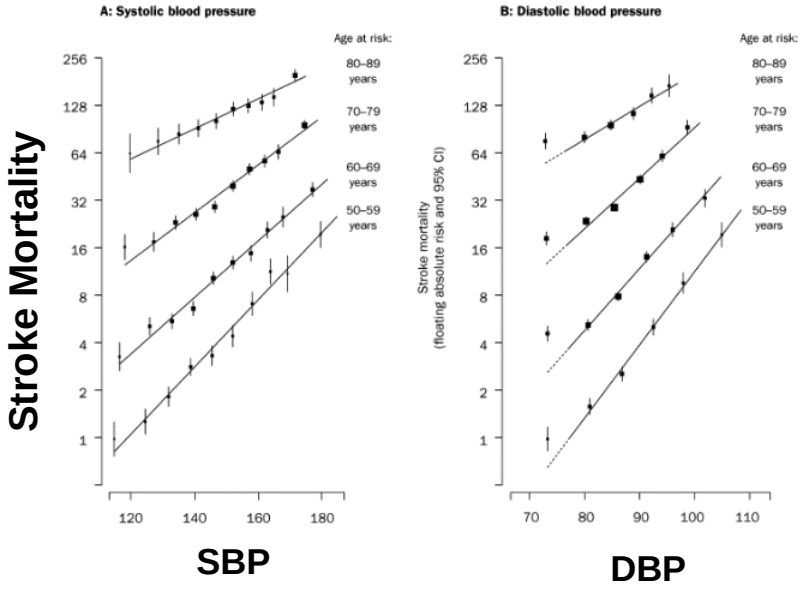
Cedars Sinai

NCD Risk Factor Collaboration. The Lancet 2021 ttps://doi.org/10.1016/ S0140-6736(21)01330-1

Reduction in Systolic Blood Pressure (SBP) = reduction in Cardiovascular (CV) risk (+stroke)



1 million adults in 61 prospective studies



Cedars Sinai

Turnbull et al. *BMJ* 2008;336:1121

Lewington et al. Lancet 2002; 360: 1903–13

Stroke Definition and Prevalence

Syndrome of acute, focal neurological deficit attributed to vascular injury (infarction, hemorrhage) of the central nervous system

-Globally, leading cause of acquired disability in adults

-Second leading cause of mortality in middle to high income countries

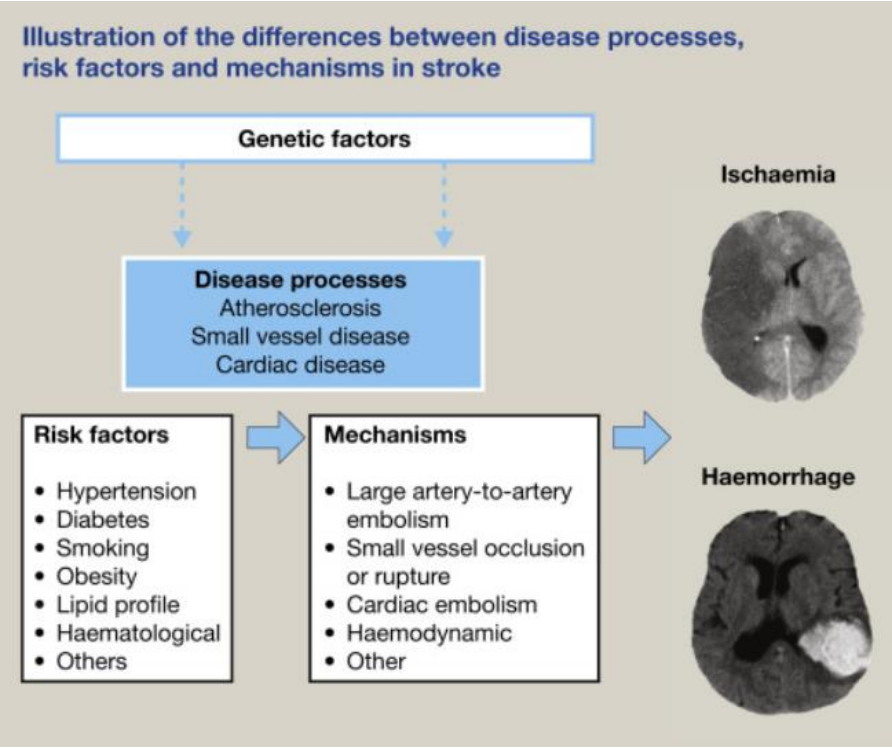
-Leading cause for epilepsy in elderly and 2nd leading cause of late-onset dementia

-Overall incidence: 85 to 94 per 100,000

-In >75 years old: 1151 to 1216 per 100,000

Murphy SJ, Werring DJ Medicine 2020 doi:10.1016/j.mpmed.2020.06.002.

Stroke Patho-mechanisms



85%

15%

Cedars Sinai

Murphy SJ, Werring DJ Medicine 2020 doi: 10.1016/j.mpmed.2020.06.002.

Transient Ischemic Attack (TIA)

Same mechanisms, however, neurologic deficits lasting less than 24 hours.

→ ***This classification is not useful because***

1. **Treatment of stroke symptoms is time-sensitive and thus 24-hour cut-off does not guide and should not delay treatment (tPA!).**
2. **Mechanisms/causes are the same and must be identified / treated.**
3. **30-50% of TIAs have imaging (MRI) evidence of infarction.**

Murphy SJ, Werring DJ Medicine 2020 doi: 10.1016/j.mpmed.2020.06.002

Non-modifiable Risk Factors

1. **Age: incidence doubles after age 55.**

2. **Gender: premenopausal women: pregnancy and OCP, older: men increased risk.**

3. **Genetics: CADASIL**, CARASIL, **Fabry's disease**, MELAS, homocystinuria, **sickle cell disease**, connective tissue/collagen vascular disorders; GWAS studies identified several loci associated with specific types of stroke mechanisms.

Park et al. J Neurol Sci. 2016 June 15; 365: 203–206

Non-modifiable Risk Factors

Race/ethnicity: Black (Caribbean) double the risk of ischemic and hemorrhagic stroke compared to age-matched Whites.

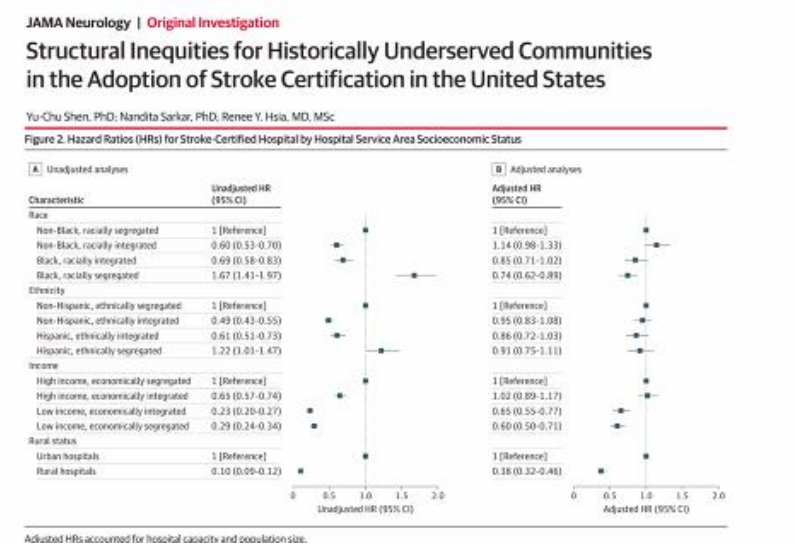
-One meta-analysis found 60% greater risk of recurrent stroke: surrogate for risk factors? Those risk factors were also much more prevalent (HTN, DM, smoking, prior stroke).

-In the Northern Manhattan Study, stroke was most common among Blacks (even after adjustment for socioeconomics): Blacks (13/1000 person-years), **Hispanics** (10/1000 person-years), and lowest in **Whites** (9/1000 person-years), until age 75; after that Hispanics had the highest incidence.

Park et al. J Neurol Sci. 2016 June 15; 365: 203–206
Gardner et al. Stroke. 2020 Apr; 51(4): 1064–1069.

Non-Hispanic (NH) Blacks have a dramatically higher rate of death from stroke

In a trans-continental study, NH indigenous African had a higher stroke risk than African Americans, which was at least in part explained by higher prevalence of cardiovascular (CV) risk factors and treatment resistant hypertension.



JAMA Neurology | Original Investigation

Structural Inequities for Historically Underserved Communities in the Adoption of Stroke Certification in the United States

Yu-Chu Shen, PhD; Nandita Sarkar, PhD; Renee Y. Hsia, MD, MSc

Figure 2. Hazard Ratios (HRs) for Stroke-Certified Hospital by Hospital Service Area Socioeconomic Status

A Unadjusted analyses

Characteristic	Unadjusted HR (95% CI)
Race	
Non-Black, racially segregated	1 [Reference]
Non-Black, racially integrated	0.60 (0.53-0.70)
Black, racially integrated	0.69 (0.58-0.83)
Black, racially segregated	1.67 (1.41-1.97)
Ethnicity	
Non-Hispanic, ethnically segregated	1 [Reference]
Non-Hispanic, ethnically integrated	0.49 (0.43-0.55)
Hispanic, ethnically integrated	0.61 (0.51-0.73)
Hispanic, ethnically segregated	1.22 (1.01-1.47)
Income	
High income, economically segregated	1 [Reference]
High income, economically integrated	0.65 (0.57-0.74)
Low income, economically integrated	0.23 (0.20-0.27)
Low income, economically segregated	0.29 (0.24-0.34)
Rural status	
Urban hospitals	1 [Reference]
Rural hospitals	0.10 (0.09-0.12)

B Adjusted analyses

Adjusted HR (95% CI)
1 [Reference]
1.14 (0.98-1.33)
0.85 (0.71-1.02)
0.74 (0.62-0.89)
1 [Reference]
0.95 (0.83-1.08)
0.86 (0.72-1.03)
0.91 (0.75-1.11)
1 [Reference]
1.02 (0.89-1.17)
0.65 (0.55-0.77)
0.60 (0.50-0.71)
1 [Reference]
0.38 (0.32-0.46)

Adjusted HRs accounted for hospital capacity and population size.

Cedars Sinai

Sarfo FS et al. Am J Hypertens 2022;35(8)715-722

Modifiable Risk Factors

Up to 90% of strokes are preventable and attributable to modifiable risk factors!

Hypertension accounts for 1/3 of all strokes in developing countries and 2/3 in developed countries.

Lifestyle and Screening for presence of risk factors is key!

Diener HC and Hankey GJ. J Am Coll Cardiol 2020;75:1804–18)

Modifiable Risk Factors

1. **Hypertension #1**, risk factor even below cut-offs for “normotension”, accounts for up to 70% of strokes, relative risk ~3.5 in younger adults and decreases with increasing risk (competing risks, e.g., AFIB).
2. **Diabetes Mellitus (DM):** doubles the risk.
3. **Cardiac:** Atrial Fibrillation (AFib): 25% of strokes >80 years; AFib risk increases with age and correlates with HTN; also PFOs, myxomas, fibroelastomas, endocarditis.
4. **Smoking:** doubles the risk.
5. **Hyperlipidemia:** total cholesterol (TC) and LDL increase and HDL reduces ischemic stroke risk but lower TC is associated with increased hemorrhagic stroke risk. However, statins lower ischemic stroke risk and probably do not increase hemorrhagic stroke risk (debatable).
6. **Alcohol:** light/moderate use may lower risk but overall the correlation with stroke risk is linear.
7. **Inflammation:** modest association of CRP and stroke risk, influenza vaccination associated with lower stroke risk, COVID-19 shown to cause large vessel thrombosis and strokes.

Diener HC and Hankey GJ. J Am Coll Cardiol 2020;75:1804–18)

Treatment Options for Primary Prevention before a Stroke occurs

Lifestyle modifications

1. **Healthy diet** (Mediterranean diet: 3 randomized controlled trials (RCTs), 9,052 adults, 167 strokes; RR: 0.65; 95% CI: 0.39 to 1.11)
2. **Weight loss**
3. **Smoking cessation:** nearly disappears 2 - 4 years after quitting!
4. **Physical activity**
5. **Folic acid may reduce stroke risk** (in a meta-analysis: RR: 0.80; 95% CI 0.67 to 0.96)
6. **Ca-Vit D may increase stroke risk** (7 RCTs, 19,227 adults, 484 strokes; RR: 1.17; 95% CI: 1.06 to 1.30)

Diener HC and Hankey GJ. J Am Coll Cardiol 2020;75:1804–18)

Treatment Options for Primary Prevention before a Stroke occurs

Cholesterol and Statins

1. Statins are more effective in lowering risk of Myocardial infarction (MI) and Cardiovascular (CV) death than that of stroke but they do work!

A meta-analysis of randomized controlled trials (RCTs) including 94,283 adults:

-reductions on nonfatal MI (RR: 0.62)

-CV mortality (RR: 0.80)

-nonfatal stroke (RR: 0.83)

2. Lowering LDL by 77 mg/dl with atorvastatin 40 mg for 5 years will prevent 5 strokes in 100 patients (5%), cause 0.5-1 new onset DM in 100 (1%), and 0.05 to 0.1 in 100 intracerebral hemorrhage (0.1%)-although in a large meta-analysis of 287,651 patients, there was **no statistically significant increase in ICH risk** (OR: 1.12; 95% CI: 0.98 to 1.28).

3. Proprotein Convertase Subtilisin / Kexin type 9 (PCSK-9) inhibitors: meta-analysis of 20 RCTs: OR 0.77; 95% CI: 0.67 to 0.89

Diener HC and Hankey GJ. J Am Coll Cardiol 2020;75:1804–18)

Treatment Options for Primary Prevention before a Stroke occurs

1. Aspirin

- Similar reduction of ischemic stroke (HR 0.81) as increase of hemorrhagic stroke (HR 1.34)

- Number-Needed-to-Treat (NNT) to prevent 1 stroke: 241

- NNT to cause major bleed: 210

2. Anticoagulation in AFib: ~64% risk reduction

3. Closure of Patent foramen ovale (PFO): not recommended in primary prevention but effective for secondary prevention.

Diener HC and Hankey GJ. J Am Coll Cardiol 2020;75:1804–18)

Treatment Options for Primary Prevention before a Stroke occurs

Reduction in Blood Pressure

- A 10/5 mmHg reduction of BP leads to

41% reduction of stroke (95% Cardiac index CI: 33% to 48%)

22% reduction of Coronary Artery Disease (CAD) events (95% CI: 17% to 27%)

In high-risk Black males, pharmacist-led barbershop HTN program lowered BP dramatically!

	Intervention, N = 125	Control, N =163	Intervention Effect	
Blood Pressure			Difference in Mean Change of BP (95% CI)	p-value†
Systolic Blood Pressure - mm Hg ‡				
Baseline	152.4 ± 10.1	154.6 ± 12.0		
12-months	123.8 ± 8.8	147.4 ± 15.7		
Change	-28.6 ± 12.7	-7.2 ± 17.7	**-20.8 (-27.7, -13.9)**	<0.0001

Cedars Sinai

Law MR et al. BMJ 2009;338:b1665.
Diener HC and Hankey GJ. J Am Coll Cardiol 2020;75:1804–18)
Victor RG et al Circulation. 2019 Jan 2; 139(1): 10–19

Primary Prevention of Hemorrhagic Stroke

Reduction in BP leads to decreased risk for Intracerebral Hemorrhage (ICH)

1. PROGRESS (Perindopril Protection Against Recurrent Stroke Study).

Perindopril and indapamide reduced the risks of first and recurrent ICH (HR: 0.44 and 0.37, respectively).

2. SPS3 (Secondary Prevention of Small Subcortical Strokes).

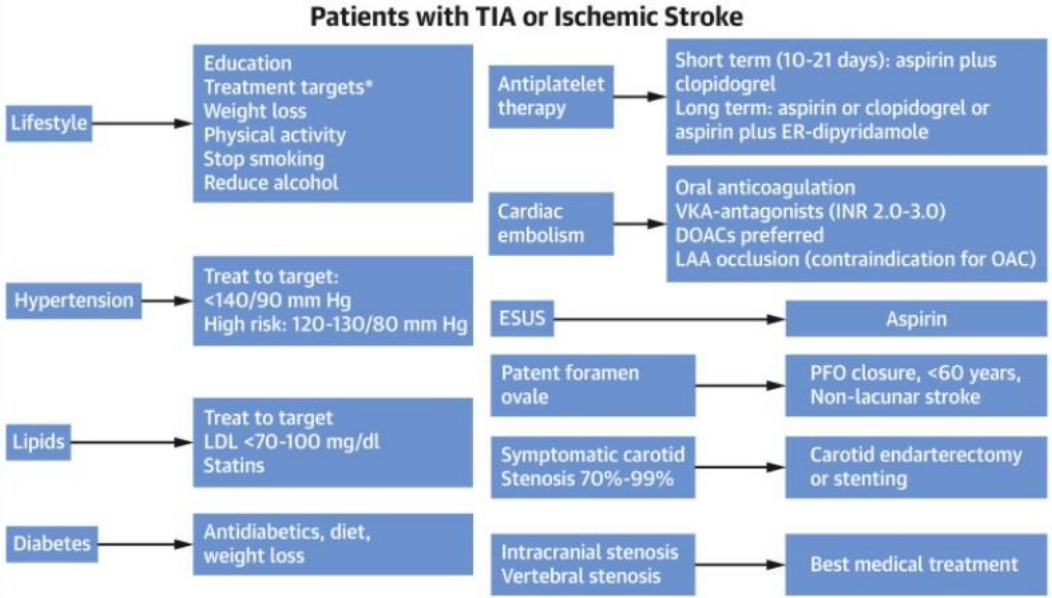
Lowering (systolic blood pressure) SBP <130 mm Hg in patients with small vessel disease reduced the risk of ICH (HR: 0.37).

3. In AFib, Direct Oral Anticoagulants (DOACs) reduce risk of ICH over warfarin by 50 to 80% and have a similar risk of ICH as seen with aspirin!

PROGRESS Arch Intern Med 2003;163:1069–75
Ruff et al. Lancet 2014;383:955–62.
Connolly et al N Engl J Med 2011;364:806–17.

Treatment Options for Secondary Prevention after Stroke

CENTRAL ILLUSTRATION: Treatment Options for Secondary Prevention After a Transient Ischemic Attack or Ischemic Stroke



Diener, H.-C. et al. J Am Coll Cardiol. 2020;75(15):1804-18.

So lowering of BP prevents strokes-but how low?

The guideline debacle
& some uncertainties

JAMA
The Journal of the American Medical Association

JAMA. doi:10.1001/jama.2013.284427
Published online December 18, 2013.

Special Communication

2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults

Report From the Panel Members Appointed to the Eighth Joint National Committee (JNC 8)*

Paul A. James, MD; Suzanne Oparil, MD; Barry L. Carter, PharmD; William C. Cushman, MD;

Relaxed Drug Rx Thresholds for Office BP

	Age ≥ 60	Age < 60	Diabetes, CKD
"JNC 8"* (2014)	150/90	140/90	140/90
JNC 7 (2003)	140/90		130/80

***Not endorsed by NIH or any medical society**

Trials leading to Joint National Committee (JNC)-8 Recommendations

JATOS: Japan, ages 65 to 85, 136/75 vs. 146/78: no difference, underpowered

VALISH: mostly Japan, mean age 76, <140 vs <150: no difference, numerically less events in intense arm, underpowered

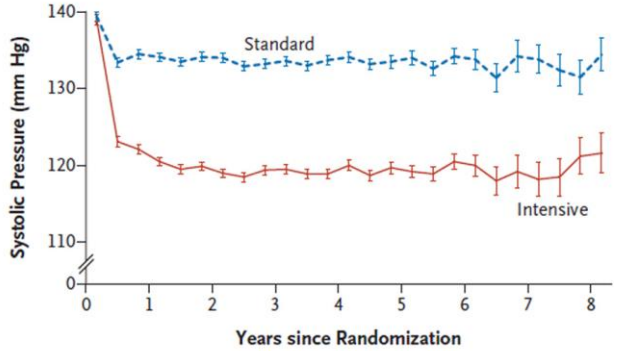
HYVET: >80 years, goal <150 (achieved 144) 39% stroke, 21% mortality, 64% CHF reduction!

Not considered: FEVER: China, 50 to 79, 137/83 vs. 143/85: 37% mortality and 27% stroke reduction

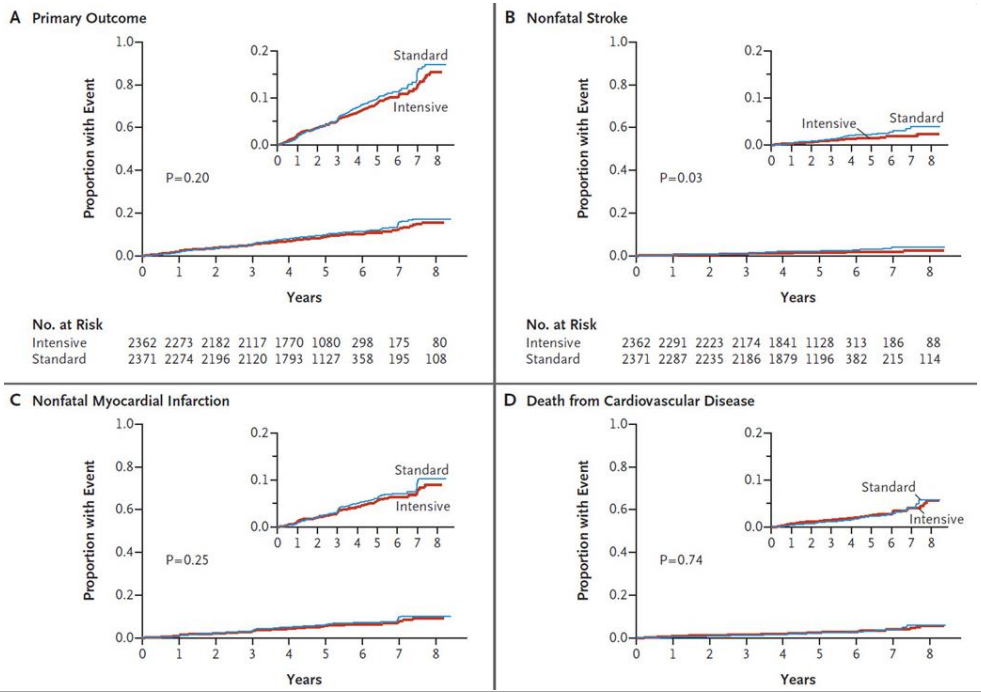
ACCORD…

Trials leading to JNC-8 Recommendations

ACCORD 4,733 diabetics, mean age 62, 48% female, 24% black



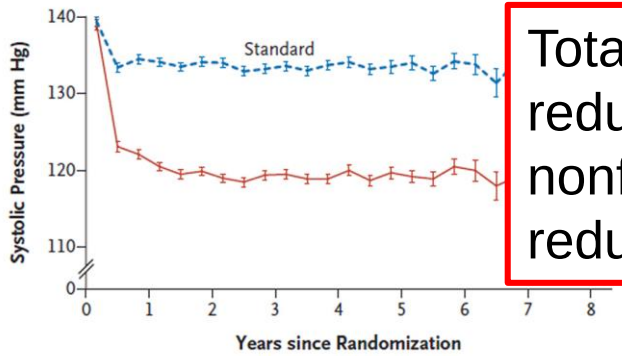
Mean No. of Medications Prescribed								
Intensive	3.2	3.4	3.4	3.5	3.5	3.5	3.4	3.4
Standard	1.9	2.1	2.1	2.2	2.2	2.3	2.3	2.3
No. of Patients								
Intensive	2174	2071	1973	1792	1150	445	156	156
Standard	2208	2136	2077	1860	1241	504	203	201



ACCORD Study Group *N Engl J Med*. 2010;362(17):1575-1585.

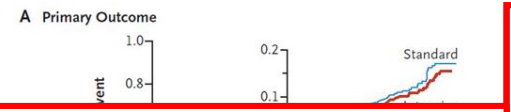
Trials leading to JNC-8 Recommendations

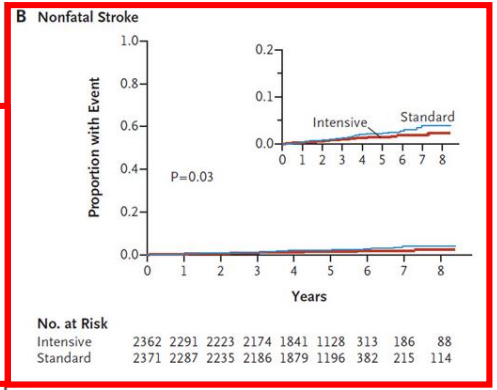
ACCORD

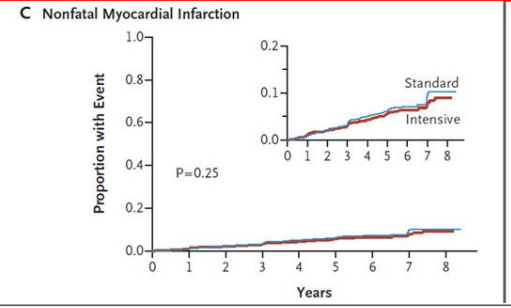


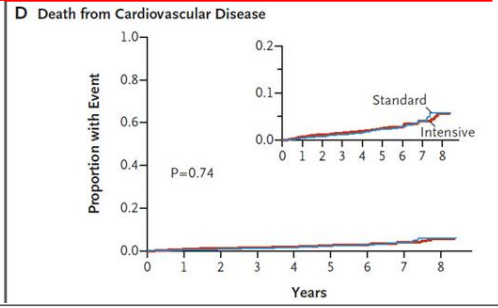
Mean No. of Medications Prescribed								
Intensive	3.2	3.4	3.4	3.5	3.5	3.5	3.4	3.4
Standard	1.9	2.1	2.1	2.2	2.2	2.3	2.3	2.3
No. of Patients								
Intensive	2174	2071	1973	1792	1150	445	156	156
Standard	2208	2136	2077	1860	1241	504	203	201

Total strokes were reduced by 41% and nonfatal strokes were reduced by 37%







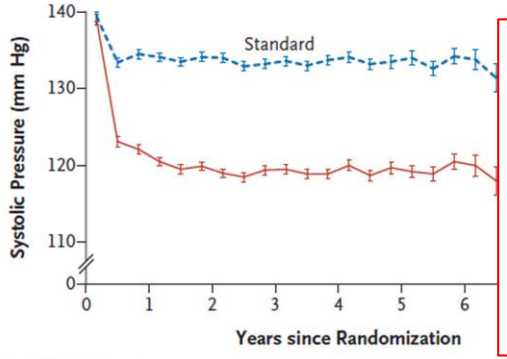


Cedars Sinai

ACCORD Study Group *N Engl J Med*. 2010;362(17):1575-1585.

Trials leading to JNC-8 Recommendations

ACCORD



Mean No. of Medications Prescribed

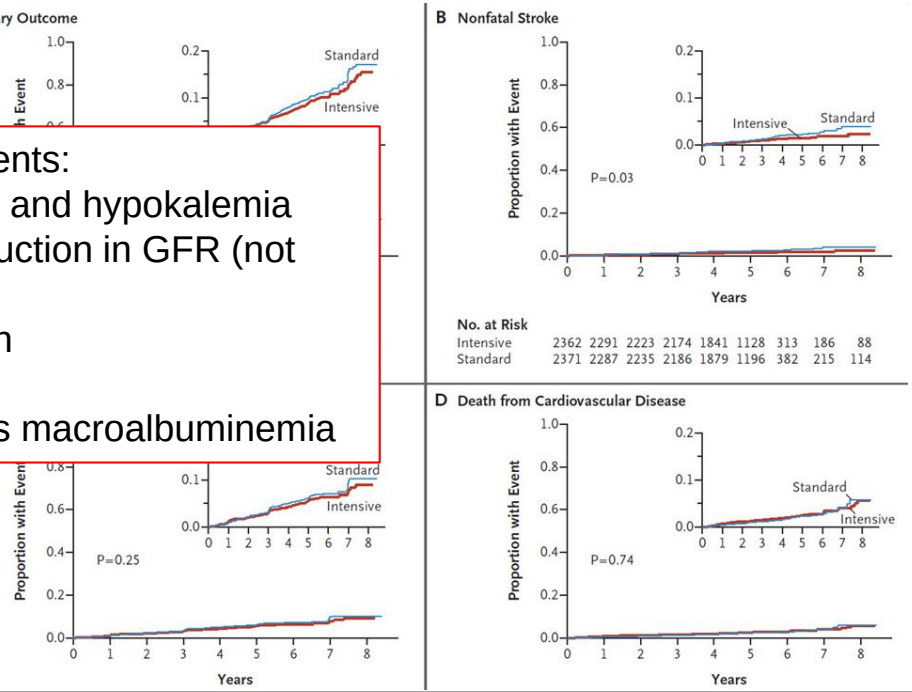
Intensive	3.2	3.4	3.4	3.5	3.5	3.5	3.4	3.4
Standard	1.9	2.1	2.1	2.2	2.2	2.3	2.3	2.3

No. of Patients

Intensive	2174	2071	1973	1792	1150	445	156	156
Standard	2208	2136	2077	1860	1241	504	203	201

Adverse Events:
-more hyper and hypokalemia
-greater reduction in GFR (not ESRD)
-hypotension

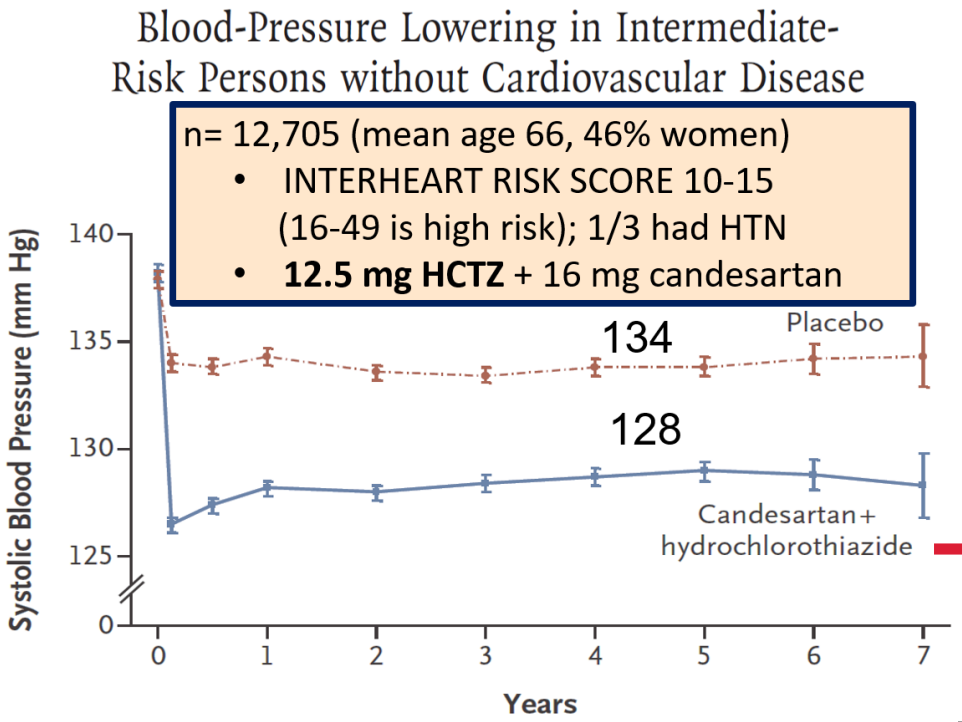
But also less macroalbuminemia



Cedars Sinai

ACCORD Study Group *N Engl J Med*. 2010;362(17):1575-1585.

Heart Outcomes Prevention Evaluation (HOPE)-3 Trial-A negative trial?



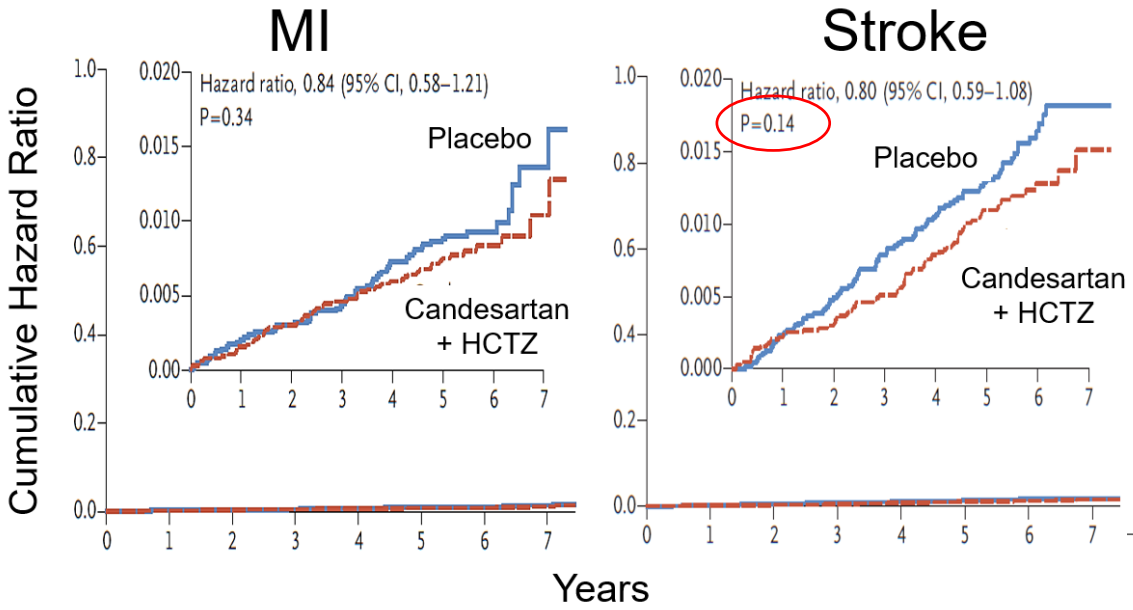
Only 6 mmHg difference

Weak and short-acting antihypertensives

HOPE-3 Trial

HOPE-3 Investigators

This article was published on April 2, 2016, at NEJM.org.



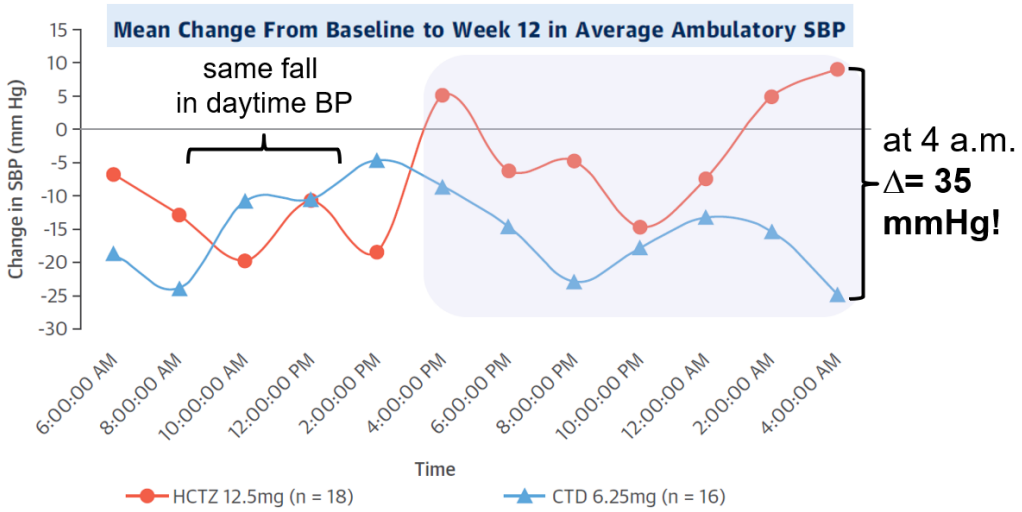
Cedars Sinai

HOPE-3

Efficacy of Low-Dose Chlorthalidone and Hydrochlorothiazide as Assessed by 24-h Ambulatory Blood Pressure Monitoring

Anil K. Pareek, MD,[a] Franz H. Messerli, MD,[b,c] Nitin B. Chandurkar, MPharma,[d] Shruti K. Dharmadhikari, MSc

(J Am Coll Cardiol 2016;67:379-89)



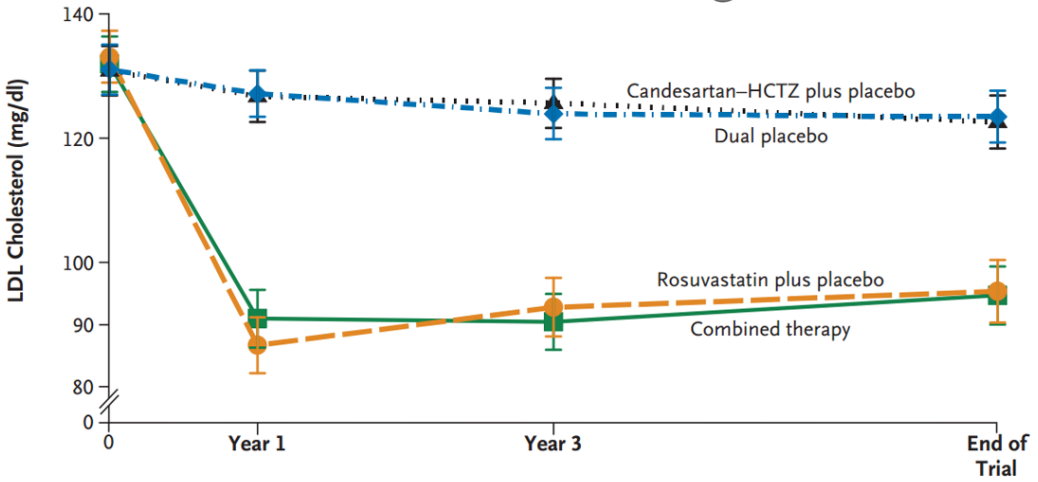
HOPE-3 Trial

Blood-Pressure and Cholesterol Lowering in Persons without Cardiovascular Disease

Salim Yusuf, M.B., B.S., D.Phil., Eva Lonn, M.D., Prem Pais, M.D.,

This article was published on April 2, 2016, at NEJM.org.

HOPE-3 Investigators



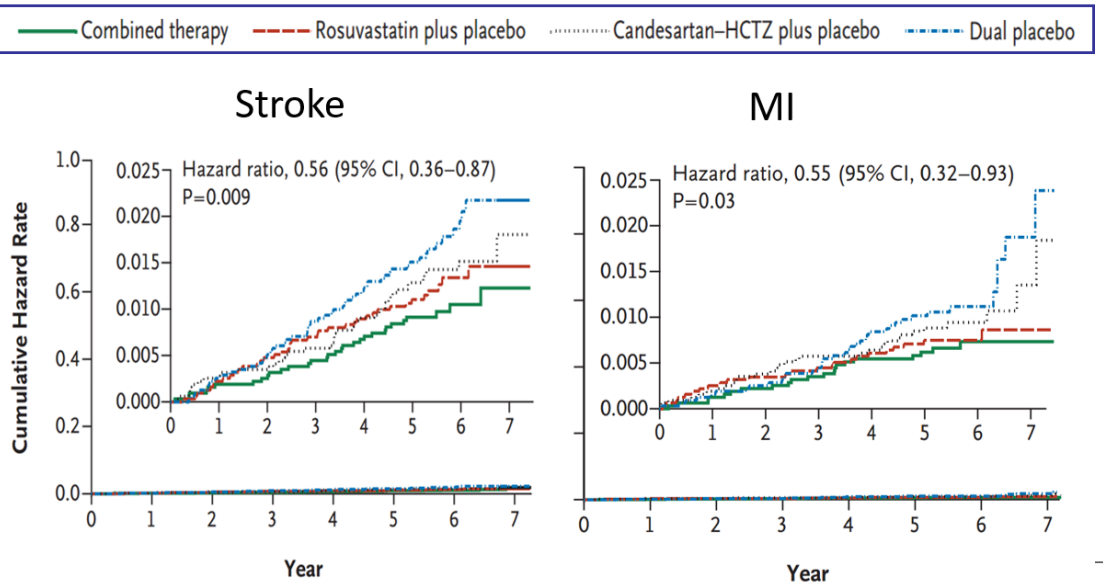
Cedars Sinai

HOPE-3 Trial

HOPE-3 Investigators

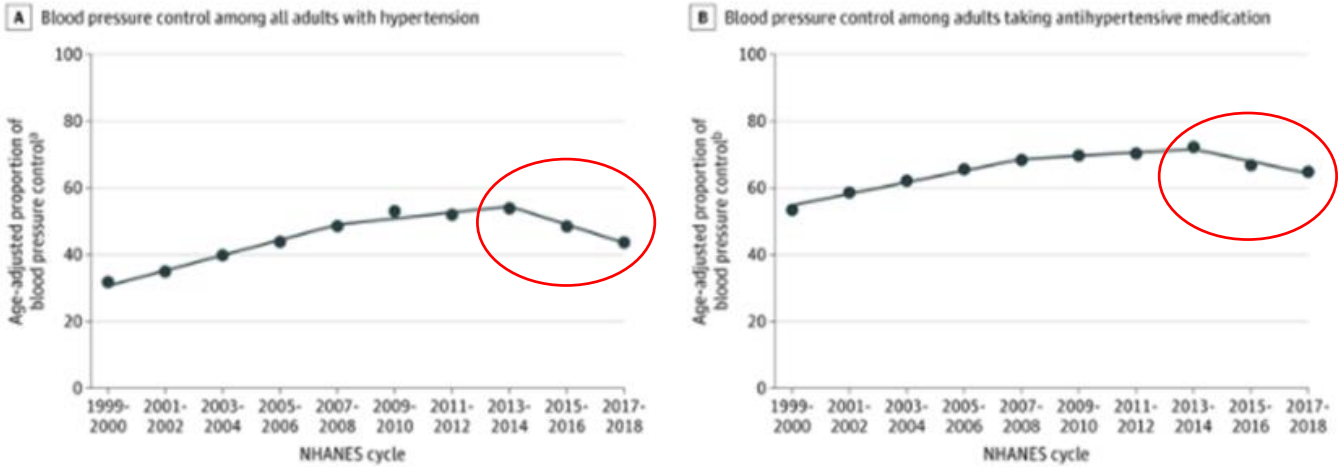
This article was published on April 2, 2016, at NEJM.org.

Statin+ARB-HCT combination beat statin alone!



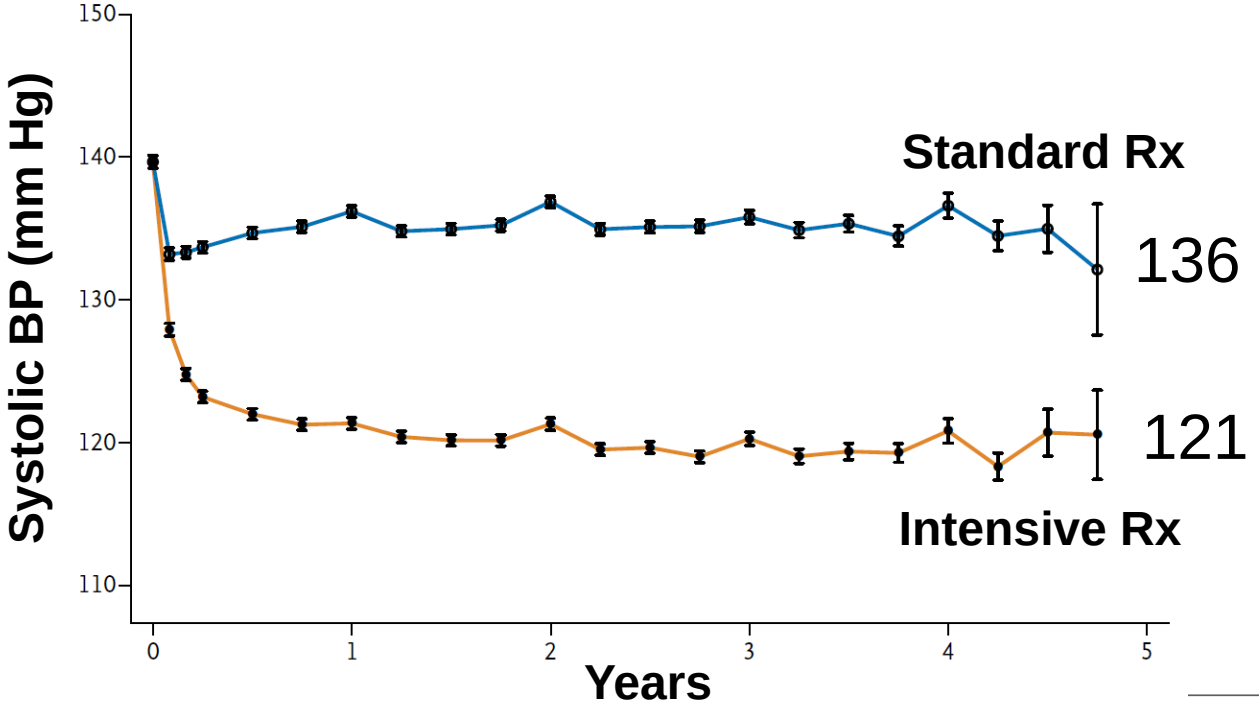
Cedars Sinai

Aftermath of 2014 guidelines: Hypertension control is worsening, even at 140/90 mmHg!



Muntner P et al. JAMA. 2020;324:1190.

SPRINT STUDY – achieved BP



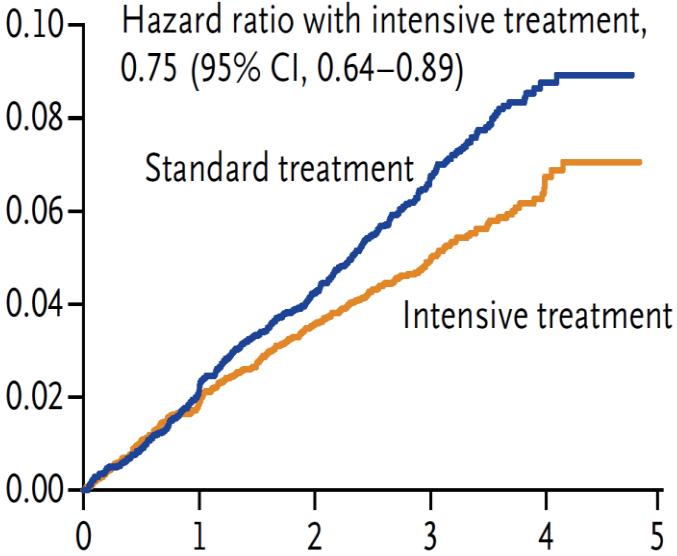
Cedars Sinai

The SPRINT Research Group· N Engl J Med 2015; 373:2103-2116

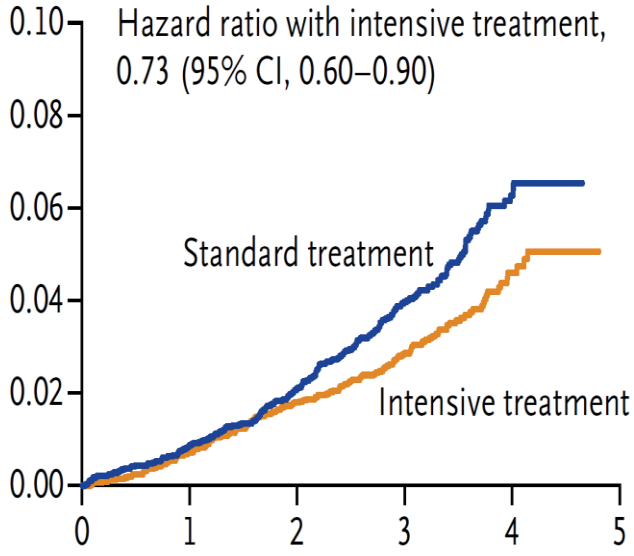
SPRINT STUDY – Outcomes

SPRINT
Systolic Blood Pressure Intervention Trial

CVD Event



Death*



Years of follow up

*Stopped early after mean follow up of 3.26 years.

SPRINT Result Components

	Intensive		Standard			
	No. of Events	Rate, %/year	No. of Events	Rate, %/year	HR (95% CI)	P value
Primary Outcome	243	1.65	319	2.19	0.75 (0.64, 0.89)	<0.001
All MI	97	0.65	116	0.78	0.83 (0.64, 1.09)	0.19
Non-MI ACS	40	0.27	40	0.27	1.00 (0.64, 1.55)	0.99
All Stroke	62	0.41	70	0.47	0.89 (0.63, 1.25)	0.50
All HF	62	0.41	100	0.67	0.62 (0.45, 0.84)	0.002
CVD Death	37	0.25	65	0.43	0.57 (0.38, 0.85)	0.005

However, excess of emergency department visits for hypotension, syncope, electrolyte abnormalities, and acute kidney injury have occurred

The SPRINT Research Group· N Engl J Med 2015; 373:2103-2116

SPRINT
Systolic Blood Pressure Intervention Trial

Intensive vs Standard Blood Pressure Control and Cardiovascular Disease Outcomes in Adults Aged ≥75 Years

A Randomized Clinical Trial (n=2,636)

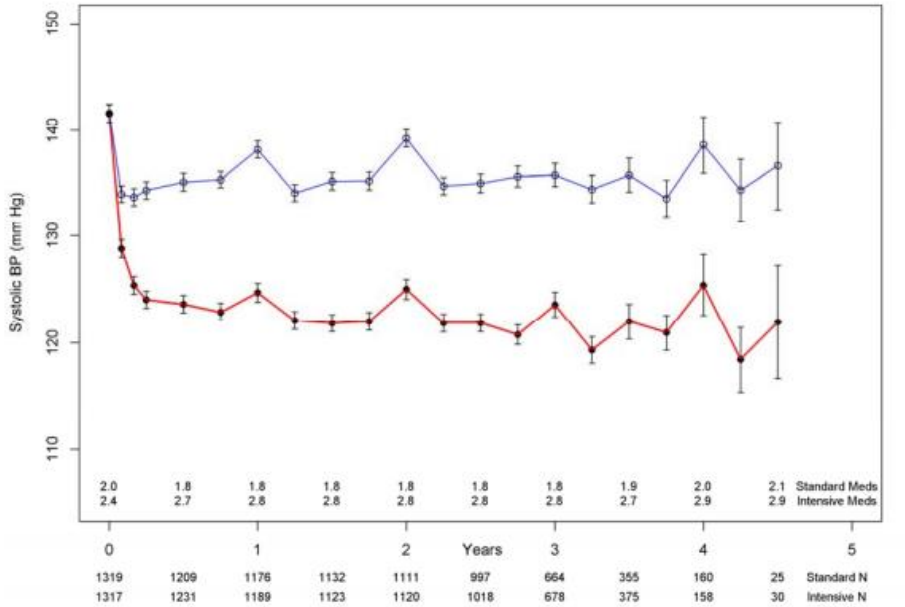
Jeff D. Williamson, MD, MHS; Mark A. Supiano, MD; William B. Applegate, MD, MPH; Dan R. Berlowitz, MD; Ruth C. Campbell, MD, MSPH;

Question: Do we need higher BP goals in frail elderly patients?

JAMA. 2016;315(24):2673-2682.

SPRINT Results: 75+

Ambulatory, 38% female, mean age 80y, 17% black, 16% CKD (GFR<45), 50% used statin



Achieved BP was similar to main trial

Williamson JD et al. JAMA. 2016;315(24):2673-2682

SPRINT Results: 75+

Composite: Heart Rate (*HR) 0.66* (CI 0.51 - 0.85) – Heart Failure (*HF) and mortality driven*

All-cause mortality: *HR 0.67* (Cardiac index CI 049-0.91)

Serious Adverse Event (SAE): *HR 0.99* (Cardiac index CI 0.89-1.11)

(+) Risks of more intensive Rx? (-)

No increase in:

- Injurious falls
- Symptomatic orthostatic hypotension
- Acute coronary syndrome (ACS)

Increase in:

- Hyponatremia +76%
- Hypokalemia +50%
- Acute kidney injury +71%

→ Use of a potent azilsartan-chlorthalidone combination

Cedars Sinai

Williamson JD et al. JAMA. 2016;315(24):2673-2682

SPRINT Results: 75+

Fit: group diff: -13.5 mmHg

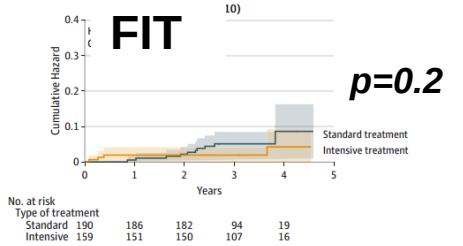
→HR 0.47 (CI 0.13 - 1.39)

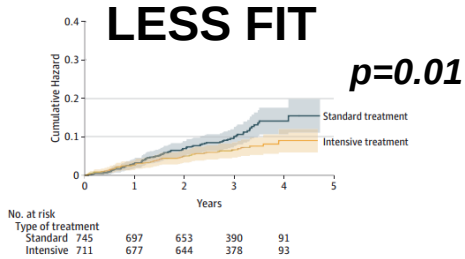
Less fit: group diff: -11.3 mmHg

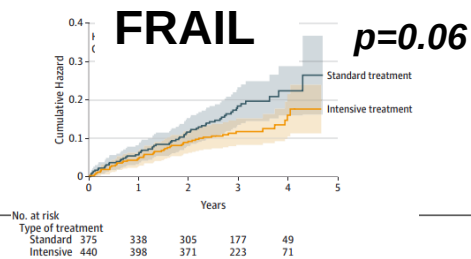
→HR 0.63 (CI 0.43 - 0.91)

Frail: group diff: -10.8 mmHg

→HR 0.68 (CI 0.45 - 1.01)







Cedars Sinai

Williamson JD et al. JAMA. 2016;315(24):2673-2682

How to translate SPRINT data into clinical practice?

In most patients, irrespective of their age or frailty status, lowering systolic BP closer to 121 (or <130) lowers CV risk. Regarding lowering of stroke risk, SPRINT does not provide additional data, however post-hoc analysis of ACCORD and population based data suggest lower BP also lowers stroke risk.

However, considerations of how BP is measured (AOBP) and potential AE of lower BP and more intense antihypertensive treatment are important.

2017 American College of Cardiology (ACC) / American Heart Association (AHA) Hypertension (HTN) Guidelines

SBP		DBP	JNC 7	2017
<120	and	<80	Normal BP	Normal BP
120-129	and	<80	Pre-HTN	Elevated BP
130-139	or	80-89	Pre-HTN	Stage 1 HTN
140-159	or	90-99	Stage 1 HTN	Stage 2 HTN
≥160	or	≥100	Stage 2 HTN	Stage 2 HTN
US Prevalence			**72 mio (32%)**	**103 mio (46%)**
US Control Rates			**53.4%**	**39.0%**

Cedars Sinai

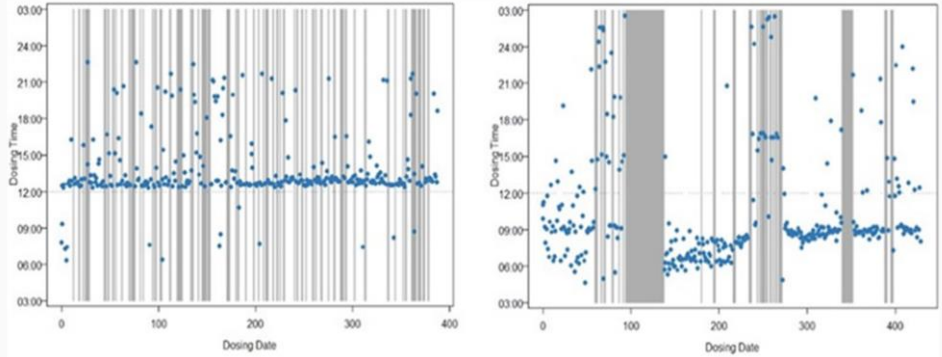
SBP = Systolic blood pressure
DBP = Diastolic blood pressure

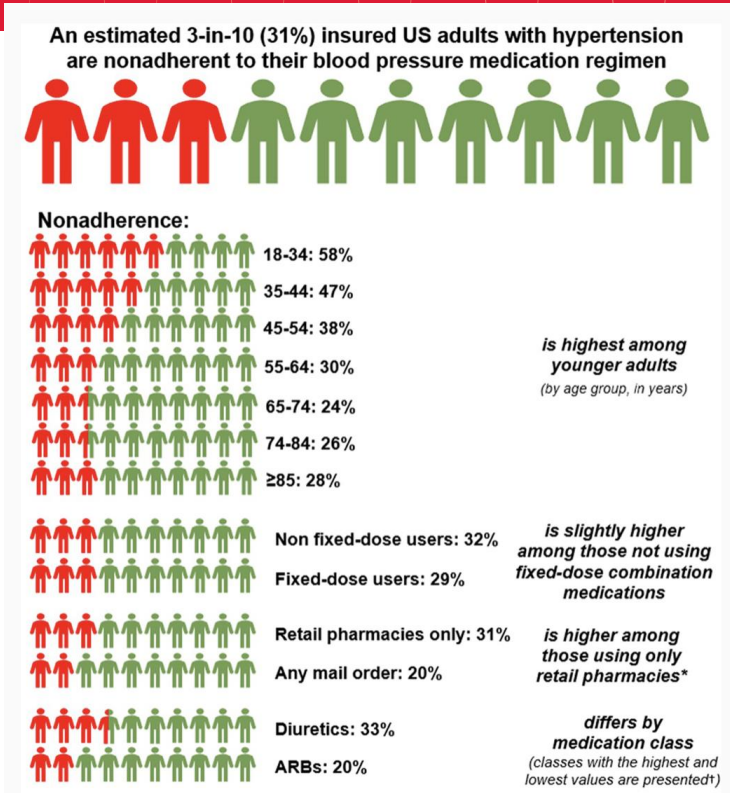
Muntner P et al. Circulation. 2018 Jan 9;137(2):109-118
Whelton et al. Circulation. 2018 Oct 23;138(17):e426-e483

Barrier to control: Nonadherence to antihypertensive medications

Data from several insurance claims databases in combination with National Health Interview Survey a total of 24 million hypertensives ≥18 years projecting national estimates of non-adherence to antihypertensive medications (they did not fill, “compliant patients” may still not take!)

2 Patients with >80% compliance based on med refills





Cedars Sinai

Chang et al. Hypertension. 2019;74:1324–1332

Consequences of nonadherence to antihypertensive Medications

Adverse Outcome	References
1. Uncontrolled hypertension	Abegaz et al,[116] Butler et al,[117] and Breekveldt-Postma et al[118]
2. Progression to hypertensive crisis	Saguner et al[119]
3. Vascular stiffness	Berni et al[120]
4. Left ventricular hypertrophy	Comberg et al[121] and Bruno et al[122]
5. Microalbuminuria	Kim et al[123]
6. Myocardial infarction	Mazzagliaet al,[124] Corrao et al,[125] Chowdhury et al,[126] Herttuaet al,[127] Yang et al,[128] Perreault et al,[129,130] and Breekveldt-Postma et al[131]
7. Stroke	Mazzagliaet al,[124] Corrao et al,[125] Chowdhury et al,[126] Herttuaet al,[127] Yang et al,[128] Perreault et al,[129,130] and Breekveldt-Postma et al[131]
8. Chronic heart failure	Mazzagliaet al,[124] Corrao et al,[125] Chowdhury et al,[126] Herttuaet al,[127] Yang et al,[128] Perreault et al,[129,130] and Breekveldt-Postma et al[131]
9. Chronic kidney and end-stage renal disease	Cedillo-Couvert et al[132] and Roy et al[133]
10. Cognitive dysfunction, dementia	Poon et al[134] and Vik et al[135]
10. Excess emergency department and hospital admissions	Herttuaet al,[127] Heaton et al,[136] and Pittman et al[137]
11. Reduced quality of life	Wiklund et al[138]
12. Impaired work productivity, disability	Mokdad et al[139] and Wagner et al[140]
13. Increased healthcare costs	Pittman et al[137], Iuga et al,[141] Cherry et al,[142] and Roebuck et al[143]
14. Death	Cherry et al[142]

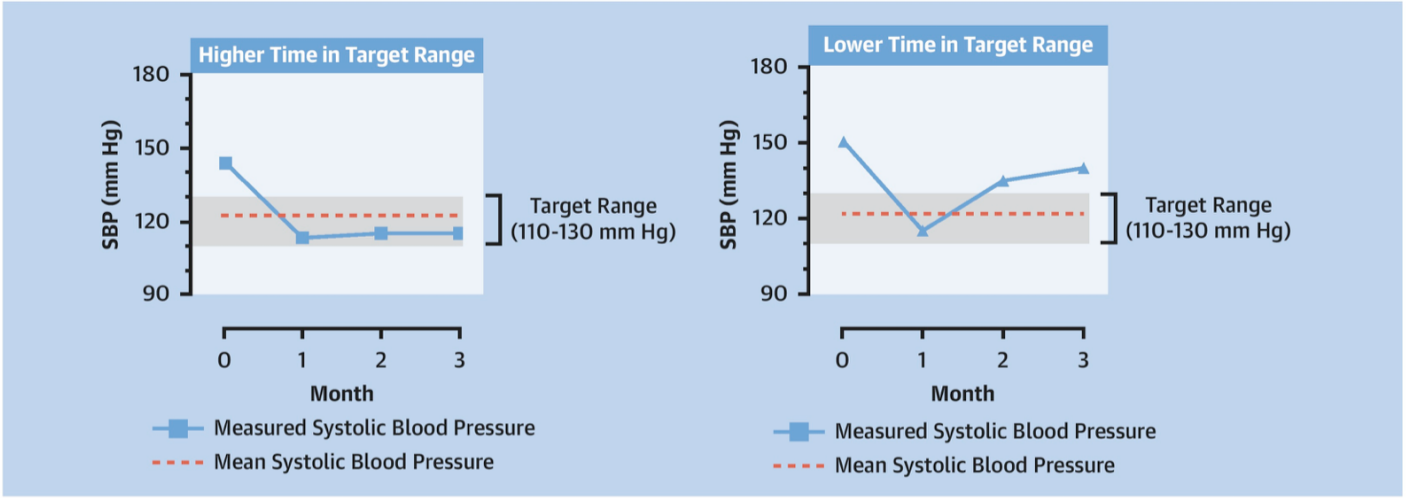
Michel Burnier, Brent M. Egan Circulation Research 2019;124:7,1124-1140

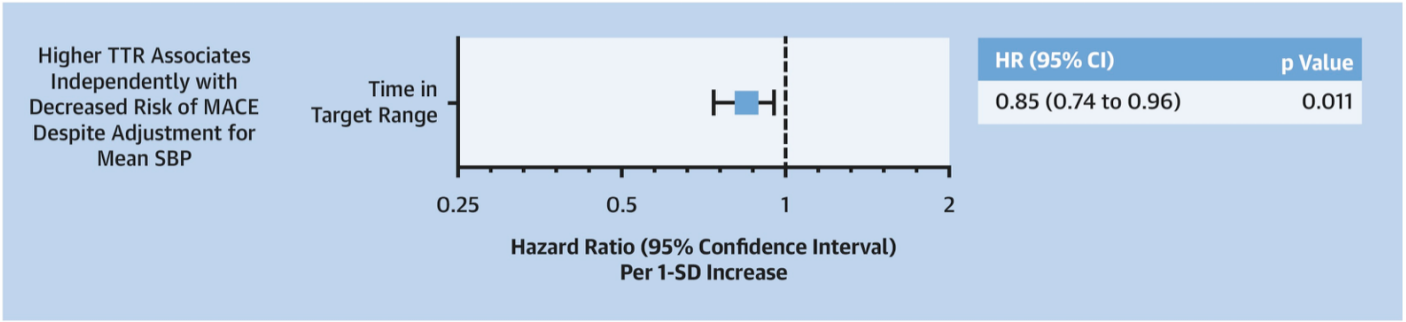
A new goal in HTN care?

BP “Time in Target Range”

Affected by adherence (and everything else that leads to uncontrolled HTN)

Using well-tolerated medications will likely increase TTR





Fatani, N. et al. J Am Coll Cardiol. 2021;77(10):1290-9.

HTN Treatment-my approach: BP goal <130/80 mmHg in most

First line:

Angiotensin receptor blockers (ARBs): telmisartan, irbesartan, azilsartan

Amlodipine

} Start together at low to medium dose, unless it is a patient with multiple intolerances

Second line: thiazide diuretic (or spironolactone/eplerenone)

Original Article

Head-to-Head Comparisons of Hydrochlorothiazide With Indapamide and Chlorthalidone
Antihypertensive and Metabolic Effects

George C. Roush, Michael E. Ernst, John B. Kostis, Suraj Tandon, Domenic A. Sica

(*Hypertension*. 2015;65:00-00.

BP reduction

1.25 mg indapamide
=25 mg chlorthalidone
= 60 mg HCTZ

} **Similar metabolic side-effects**

Watch for

- Hyponatremia
- Orthostatic hypotension
- Renal failure
- Erectile dysfunction
- Gout

HTN Treatment-my approach: BP goal <130/80 mmHg in most

Third line: aldosterone blocker

-Spironolactone

-Eplerenone

Careful in CKD
Some need dietary modifications (low K diet)
Close monitoring of K and Cr (day 3-7, 1 month, 3 months, every 6 months)

Fourth line:

-Vasodilating BB: carvedilol, nebivolol: better tolerance and less metabolic SE than selective BB

-Nitrates: lowers systolic BP and pulse pressure in isolated systolic hypertension

-Alpha blockers: side effects

Franklin SS. Curr Hypertens Rep. 2000 Jun;2(3):253-9

Resistant HTN-my approach

Multi-drug regimens by definition → Compliance difficult

Avoid short-acting medications like

-Hydralazine

-Clonidine……THE WORST

-Labetalol

-(Lisinopril)

Consider combination pills to improve compliance!

-Amlodipine, valsartan, HCTZ

-Amlodipine, olmesartan, HCTZ

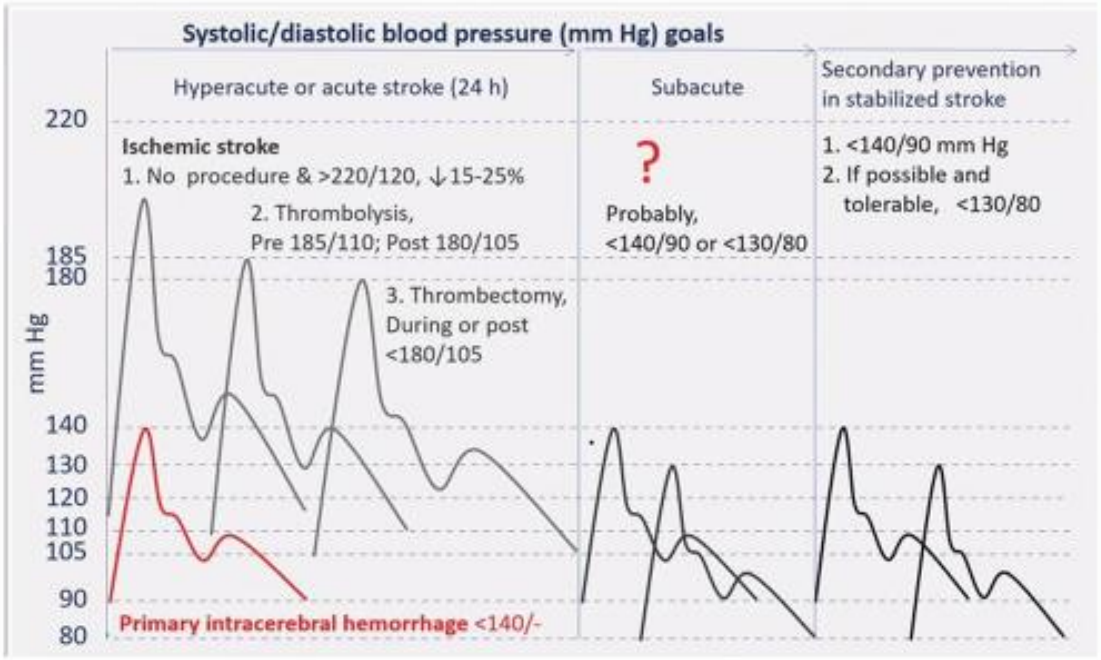
-Azilsartan, chlorthalidone

-Telmisartan, amlodipine

-Telmisartan-HCTZ

-Spironolactone-HCTZ

Acute BP reduction in cerebrovascular accident (CVA)



AJH AMERICAN JOURNAL OF HYPERTENSION
OXFORD
Am J Hypertens. 2022 Jun; 35(6): 483–499.
Published online 2022 Mar 22. doi: 10.1093/ajh/hpac039

Blood Pressure Goals in Acute Stroke

Qian-Hui Guo, Chu-Hao Liu, and Ji-Guang Wang*

PMCID: PMC9203067
PMID: 35323883

Cedars Sinai

I typically leave BP control up to the stroke neuro-intensivists who closely follow hemodynamics, imaging and plan therapies

Conclusions

- Lowering of BP unequivocally lowers stroke risk (and cardiovascular risk).

- How low is debatable, but if tolerated without metabolic adverse effects, goal of <130 is desirable, especially in high risk (and older) patients: but it is hard work requiring frequent follow up and lab testing.

- Do not use age as an excuse to accept elevated BP, especially (systolic blood pressure) SBP>140 mmHg.

- The use of long acting angiotensin receptor blockers (ARBs), calcium channel blockers (CCBs) and diuretics will improve tolerability of treatment and stabilize otherwise “labile BP”.

- Don’t rely on clinic BP alone, home BP monitoring and ambulatory BP monitoring adds significantly to effectiveness and safety of hypertension (HTN) management.

EDITOR'S PAGE

JACC VOL. 67, NO. 25, 2016

JUNE 28, 2016:3014–5

No Such Thing as Ideal Blood Pressure

A Case for Personalized Medicine

Valentin Fuster, MD, PhD

Cedars Sinai

Frequently Asked Questions (FAQs):

1. What are the optimal BP goals for elderly patients? BP goals must be individualized and although a BP goal of <130/80 is desirable, such goals are sometimes not tolerated, especially in the setting of orthostatic hypotension.

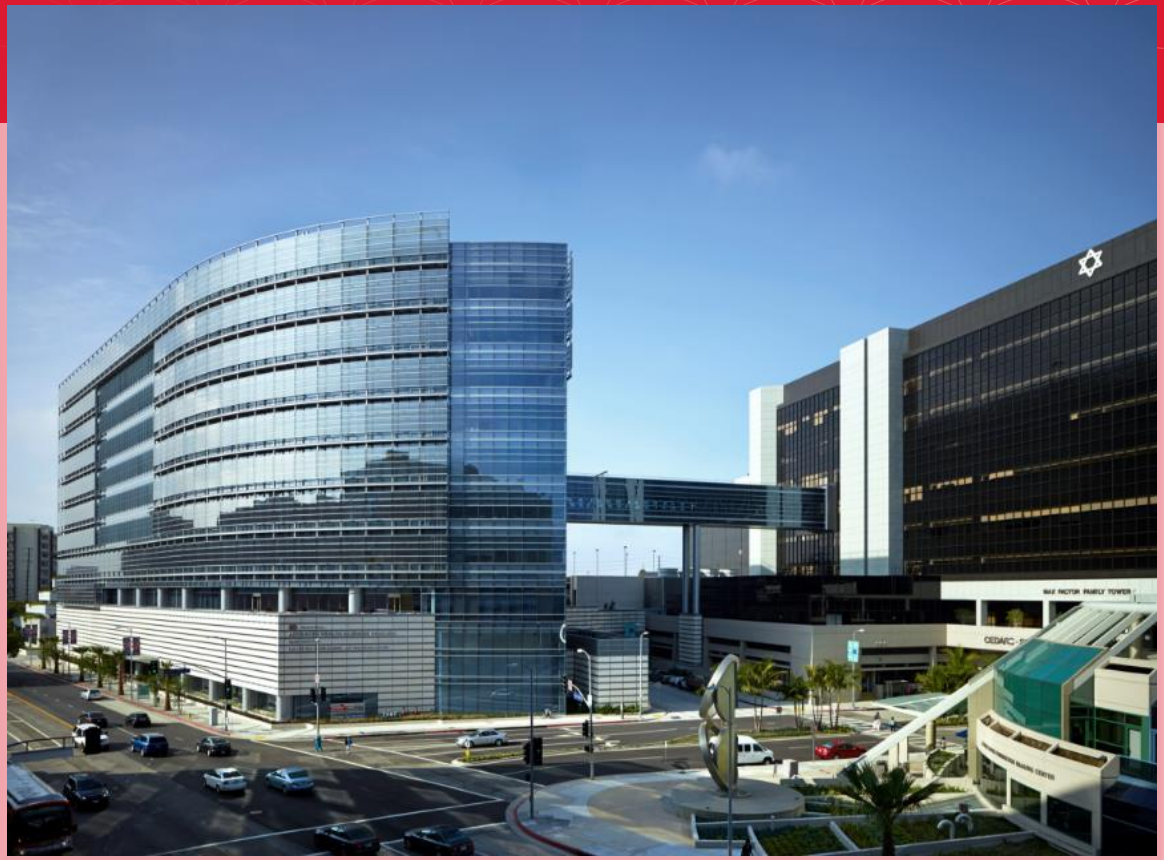
2. Is assessment of clinic or office BP enough? No, home BP and ambulatory BP monitoring are essential to optimize patients' hypertension treatment.

3. What are the best tolerated BP medications? Long-acting angiotensin receptor blockers and non-dihydropyridine calcium channel blockers have the highest continuation rates.

4. Does everyone with a BP of 130-139/80-89 have to be treated with medications. according the 2017 ACC/AHA hypertension guidelines? No. Lifestyle modifications first and only patients who have a calculated cardiovascular risk >10% should be started on antihypertensive medications.
   A conversation between the practitioner and the patient is crucial for these treatment decisions.

Thank you!

florian.rader@cshs.org



Q & A Session

L.A. Care PCE Program Friendly Reminders

Friendly Reminder, a survey will pop up on your web browser after the webinar ends. Please do not close your web browser and wait a few seconds, and please complete the online survey.

Please note: ***the online survey may appear in another window or tab after the webinar ends.***

Upon completion of the online survey, you will receive the PDF CME or CE certificate based on your credential, verification of name and attendance duration time of at least 75 minutes, ***within two (2) weeks after today's webinar.***

Webinar participants will only have up to two weeks after webinar date to email Leilanie Mercurio at lmercurio@lacare.org to request the evaluation form if the online survey is not completed yet. No name, no survey or completed evaluation and less than 75 minutes attendance duration time via log in means No CME or CE credit, No CME or CE certificate.

Thank you!