



Sollen wir den Blutdruck bei allen CKD Patienten, VOR der Dialyse, in den KDIGO Zielbereich (SBD <120 mmHg) absenken?

Heidelberg März 2023



Sollen wir den Blutdruck bei allen CKD Patienten, VOR der Dialyse, in den KDIGO Zielbereich (SBD > <120 mmHg) absenken?  
**JA UND DEN BLUTDRUCK KORREKT MESSEN!**

KDIGO Guideline Co-Chairs:

Alfred K. Cheung, MD  
University of Utah, USA

Johannes Mann, MD  
KfH Kidney Center and  
Univ. of Erlangen, Germany

I report the following potential duality/dualities of interest in the field covered by my lecture:

- Consultant:** UpToDate Inc., AstraZeneca, Bayer, Boehringer, Novo Nordisk,

- Employee:** KfH

- Research Support:** European Union, Canadian Institutes of Health Research, AstraZeneca, Bayer, Boehringer, Idorsia, Novo Nordisk, Sanofi

- Speaker's Bureau:** AstraZeneca, Bayer, Boehringer, Novartis, Novo Nordisk

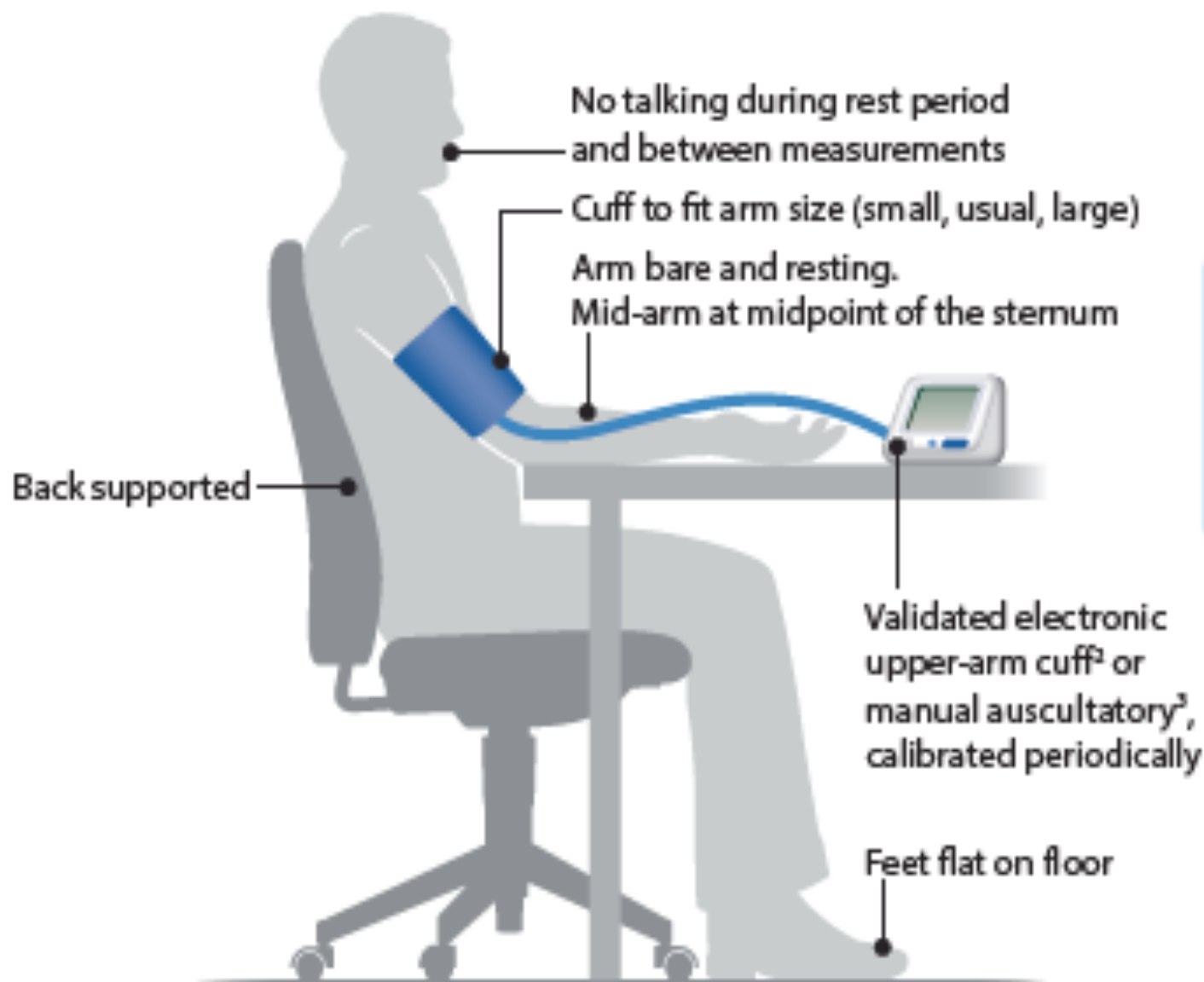
# GUIDELINE CHAPTERS

- Chapter 1. BP Measurement
- Chapter 2. Lifestyle Treatment for Lowering BP in CKD Patients
- Chapter 3. BP Management in CKD ND Patients with and without Diabetes: BP targets and treatments
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# BP MEASUREMENT

**Recommendation 1.1. We recommend **standardized** office BP (in preference to **routine** office) BP for the management of high BP in adults (1B).**



- Quiet room (no talking by patient or observer)
- No smoking, caffeine, or exercise for  $\geq 30$  min before measurement
- Empty bladder
- Relax for  $> 5$  min

# Measurement of BP in **all** major trials: standardized !

| Study                    | Year  | Type of Study       | Method/Device                     | Wait/Rest, min | # Readings |
|--------------------------|-------|---------------------|-----------------------------------|----------------|------------|
| Framingham <sup>23</sup> | 1970s | Observational       | Manual                            | 5              | 2          |
| SHEP <sup>24</sup>       | 1991  | Clinical trial      | Manual                            | 5              | 2          |
| MDRD <sup>5</sup>        | 1994  | Clinical trial      | Manual                            | 5              | 3          |
| UKPDS <sup>7</sup>       | 1998  | Clinical trial      | Manual                            | 5              | 3          |
| ALLHAT <sup>8</sup>      | 2000  | Clinical trial      | Manual                            | 5              | 2          |
| HOPE <sup>9,10</sup>     | 2001  | Clinical trial      | Manual                            | 15             | 2          |
| HYVET <sup>25</sup>      | 2001  | Clinical trial      | Manual and automated              | 5              | 2          |
| AASK <sup>6</sup>        | 2002  | Clinical trial      | Manual                            | 5              | 3          |
| ADVANCE <sup>11</sup>    | 2007  | Clinical trial      | Automated/Omron                   | 5              | 2          |
| CRIC <sup>26</sup>       | 2009  | Observational study | Manual                            | 5              | 3          |
| ACCORD <sup>12</sup>     | 2010  | Clinical trial      | Automated/Omron                   | 5              | 3          |
| SPS3 <sup>27</sup>       | 2011  | Clinical trial      | Automated/Colin electronic device | 15             | 3          |
| ONTARGET <sup>13</sup>   | 2012  | Clinical trial      | Automated/Omron                   | 3              | 2          |
| CKD-JAC <sup>28</sup>    | 2013  | Observational study | Manual                            | 5              | 3          |
| SPRINT                   | 2015  | Clinical trial      | Automated/Omron                   | 5              | 3          |

# ARTICLE IN PRESS

## ADVANCING HIGH VALUE HEALTH CARE

THE AMERICAN  
JOURNAL of  
MEDICINE®

# International Consensus on Standardized Clinic Blood Pressure Measurement – A Call to Action

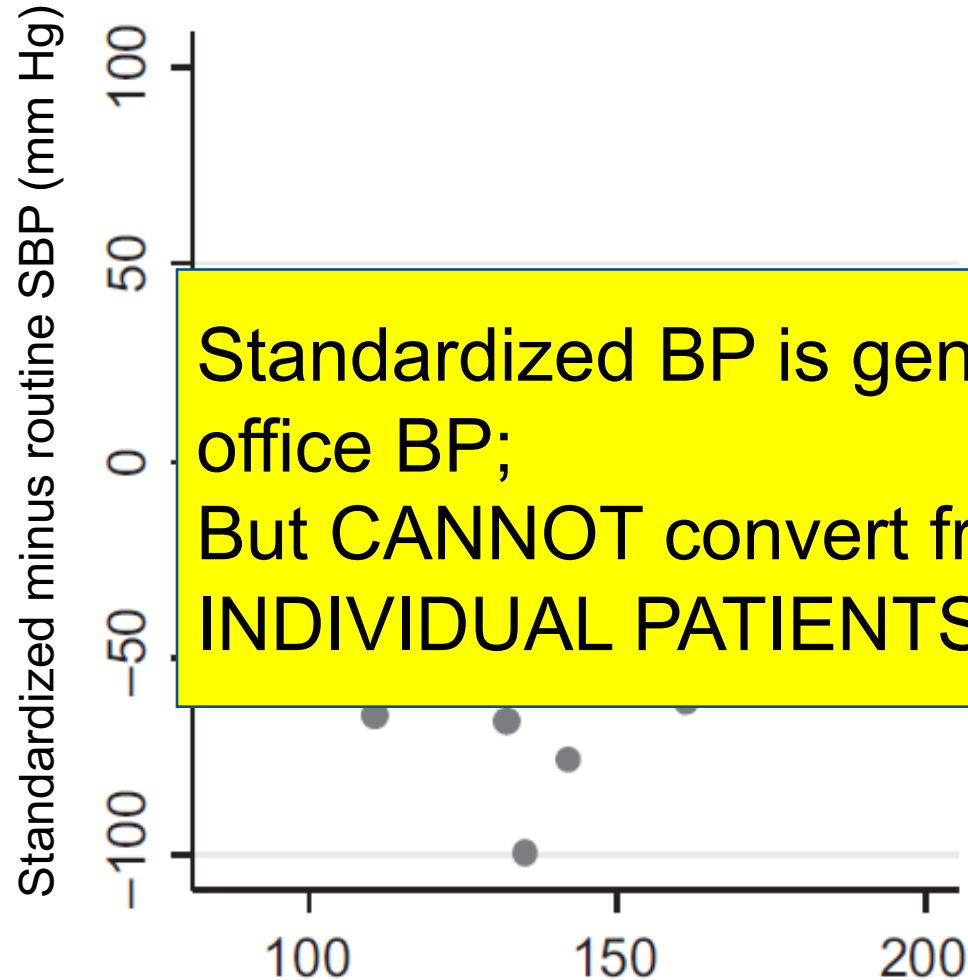
Q1

Q2 Alfred K. Cheung,<sup>a</sup> Paul K. Whelton,<sup>b</sup> Paul Muntner,<sup>c</sup> Aletta E. Schutte,<sup>d,e</sup> Andrew E. Moran,<sup>f</sup> Bryan Williams,<sup>g</sup>  
Pantelis Sarafidis,<sup>h</sup> Tara I. Chang,<sup>i</sup> Stella S. Daskalopoulou,<sup>j,k</sup> John M. Flack,<sup>l</sup> Garry Jennings,<sup>m</sup> Stephen P. Juraschek,<sup>n</sup>  
Reinhold Kreutz,<sup>o</sup> Giuseppe Mancia,<sup>p</sup> Shawna Nesbitt,<sup>q</sup> Pedro Ordunez,<sup>r</sup> Raj Padwal,<sup>s</sup> Alexandre Persu,<sup>t</sup>  
Doreen Rabi,<sup>u,v</sup> Markus P. Schlaich,<sup>w</sup> George S. Stergiou,<sup>x</sup> Sheldon W. Tobe,<sup>y,z</sup> Maciej Tomaszewski,<sup>aa,bb</sup>  
Kim A. Williams Sr.,<sup>cc</sup> Johannes F.E. Mann<sup>dd,ee</sup>

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# Poor Correlation Between Routine and Standardized Office BP in CKD



- N = 275 CKD
- eGFR  $29 \pm 10$  ml/min/1.73m<sup>2</sup>
- Bland-Altman plot with limits of agreement

Standardized BP is generally lower than routine office BP;  
But CANNOT convert from one to the other IN INDIVIDUAL PATIENTS

Average of standardized and routine SBP (mm Hg)

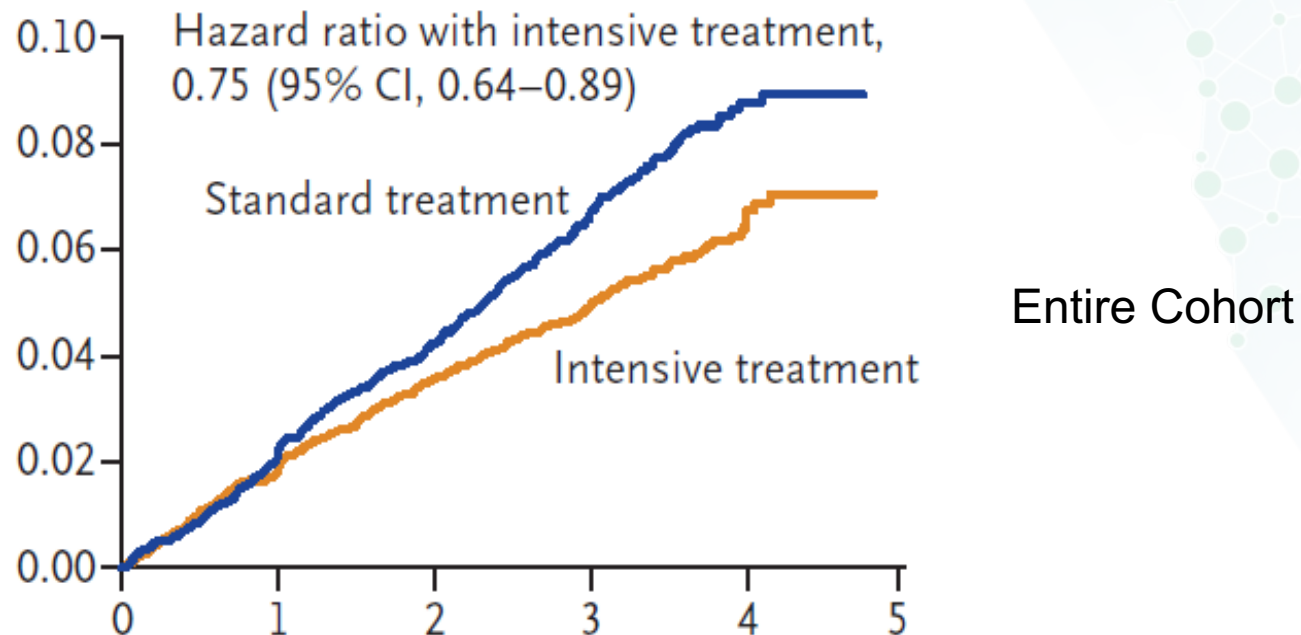
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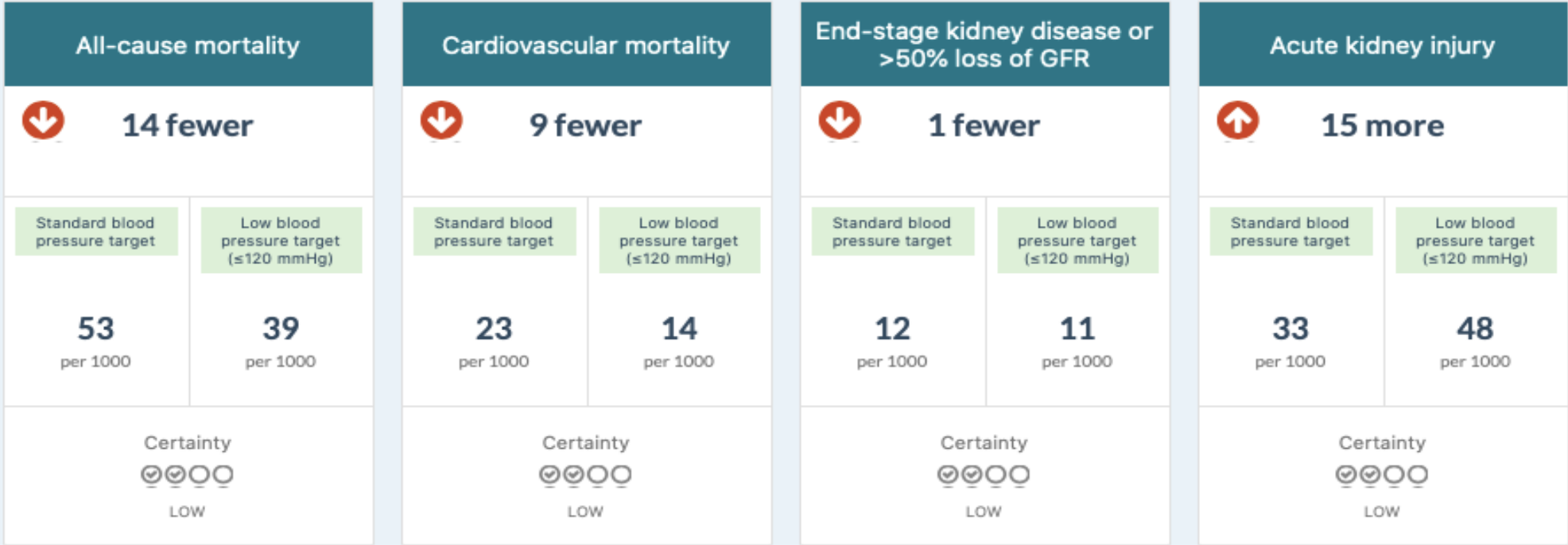
# BP MANAGEMENT IN CKD ND PATIENTS WITH AND WITHOUT DIABETES – BP TARGETS

**Recommendation 3.1.1.** We suggest that adults with high BP and CKD be treated with a target systolic blood pressure (**SBP**) of **less than 120 mm Hg, when tolerated**, using *standardized* office BP measurement (2B).

Based mainly on SPRINT study (SBP <120 vs <140mmHg, N=9361, CKD=2646)



Among a 1000 patients like you, on average with Low blood pressure target ( $\leq 120$  mmHg)



- Hypokalemia
- >30% loss in eGFR
- >40% loss in eGFR
- Mild cognitive impairment
- Cardiovascular events
- Myocardial infarction
- Stroke
- Heart failure
- Probable dementia
- Falls
- Fatigue
- Serious adverse events
- Hyperkalemia
- Practical issues



# Concerns about the applicability of SPRINT findings

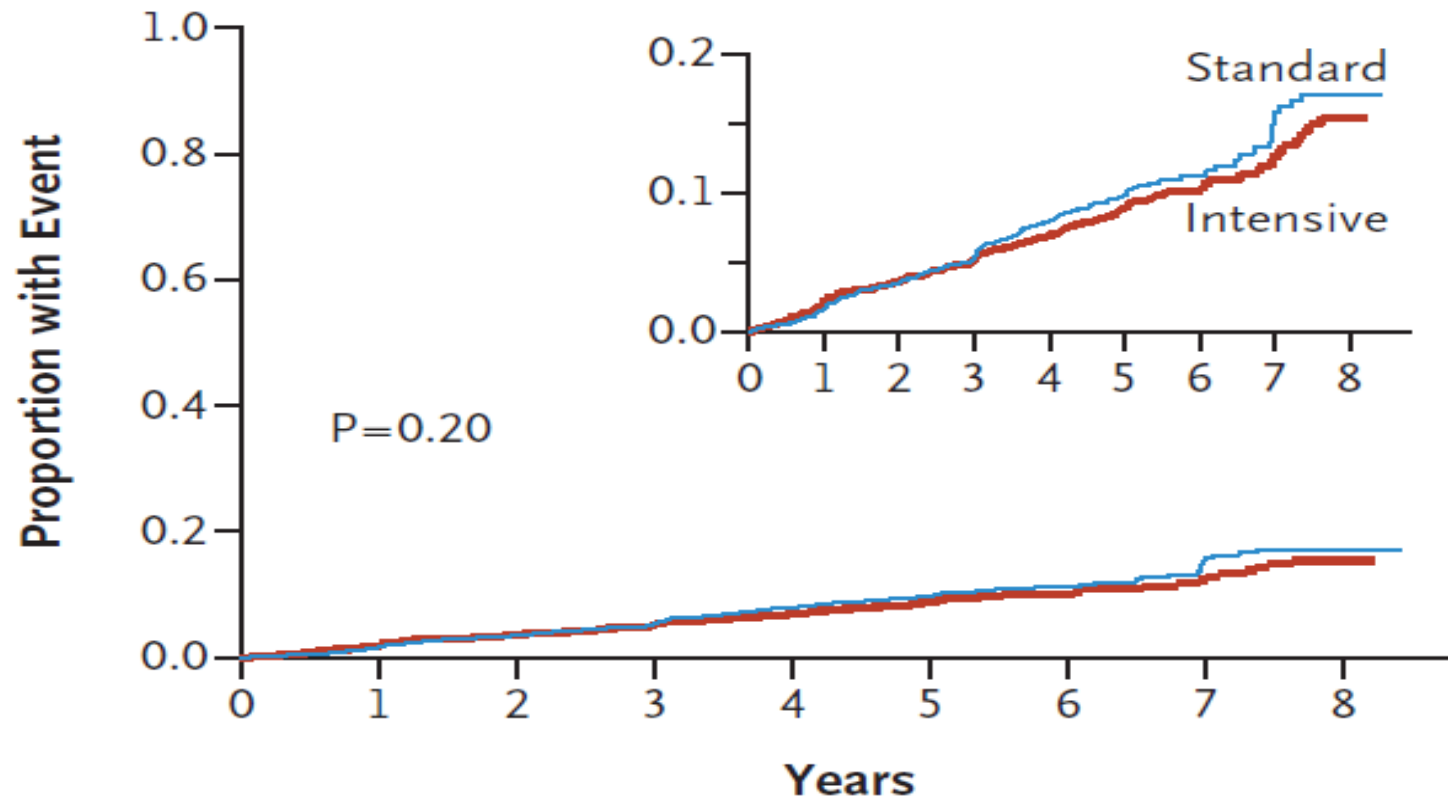
- Discordant results of ACCORD-BP (type 2 diabetes)
- Cognitive function in elderly
- Kidney effects

# ACCORD BP

- 4733 participants with type 2 diabetes
- Randomly assigned a 2 × 2 factorial design to
  - intensive glycemic control (HbA1c target <6 % or standard control (HbA1c target 7.0 to 7.9%))
  - intensive SBP (goal <120 mm Hg) or standard SBP (goal < 140 mm Hg)

# ACCORD BP Primary results (MI, stroke, CV death)

## A Primary Outcome

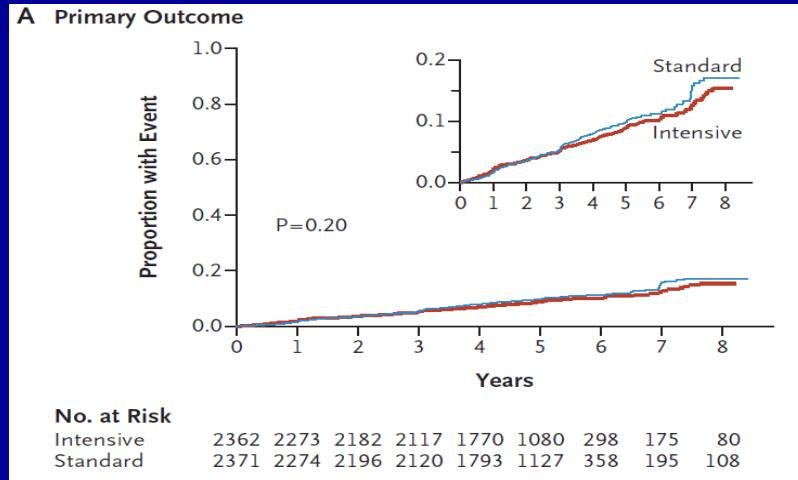


N Engl J Med 2010;362:1575-85.

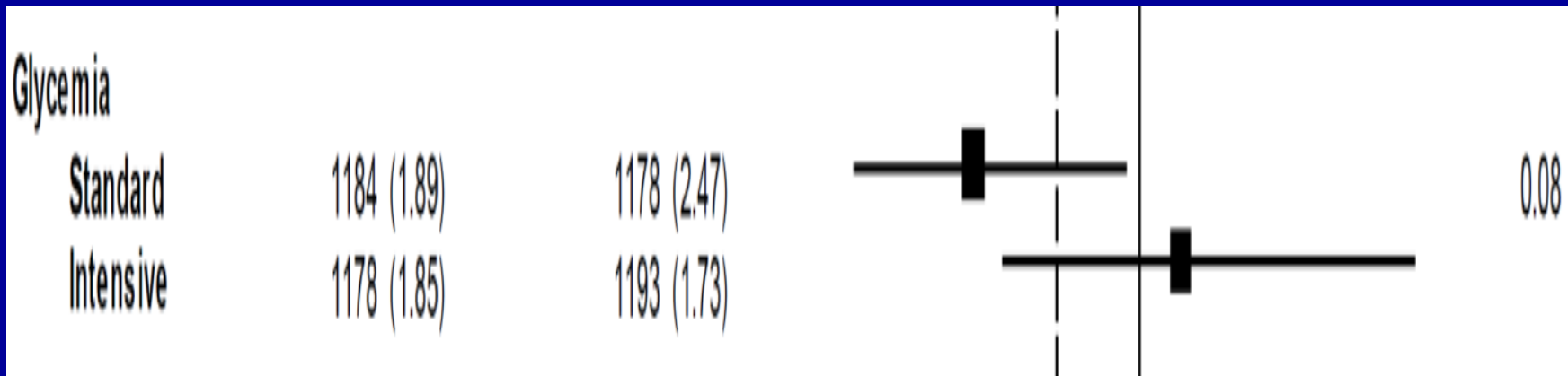
### No. at Risk

|           |      |      |      |      |      |      |     |     |     |
|-----------|------|------|------|------|------|------|-----|-----|-----|
| Intensive | 2362 | 2273 | 2182 | 2117 | 1770 | 1080 | 298 | 175 | 80  |
| Standard  | 2371 | 2274 | 2196 | 2120 | 1793 | 1127 | 358 | 195 | 108 |

# ACCORD BP Primary results (MACE)



N Engl J Med 2010;362:1575-85.



## Supplementary Appendix 1

This appendix has been provided by the authors to give readers additional information about their work.

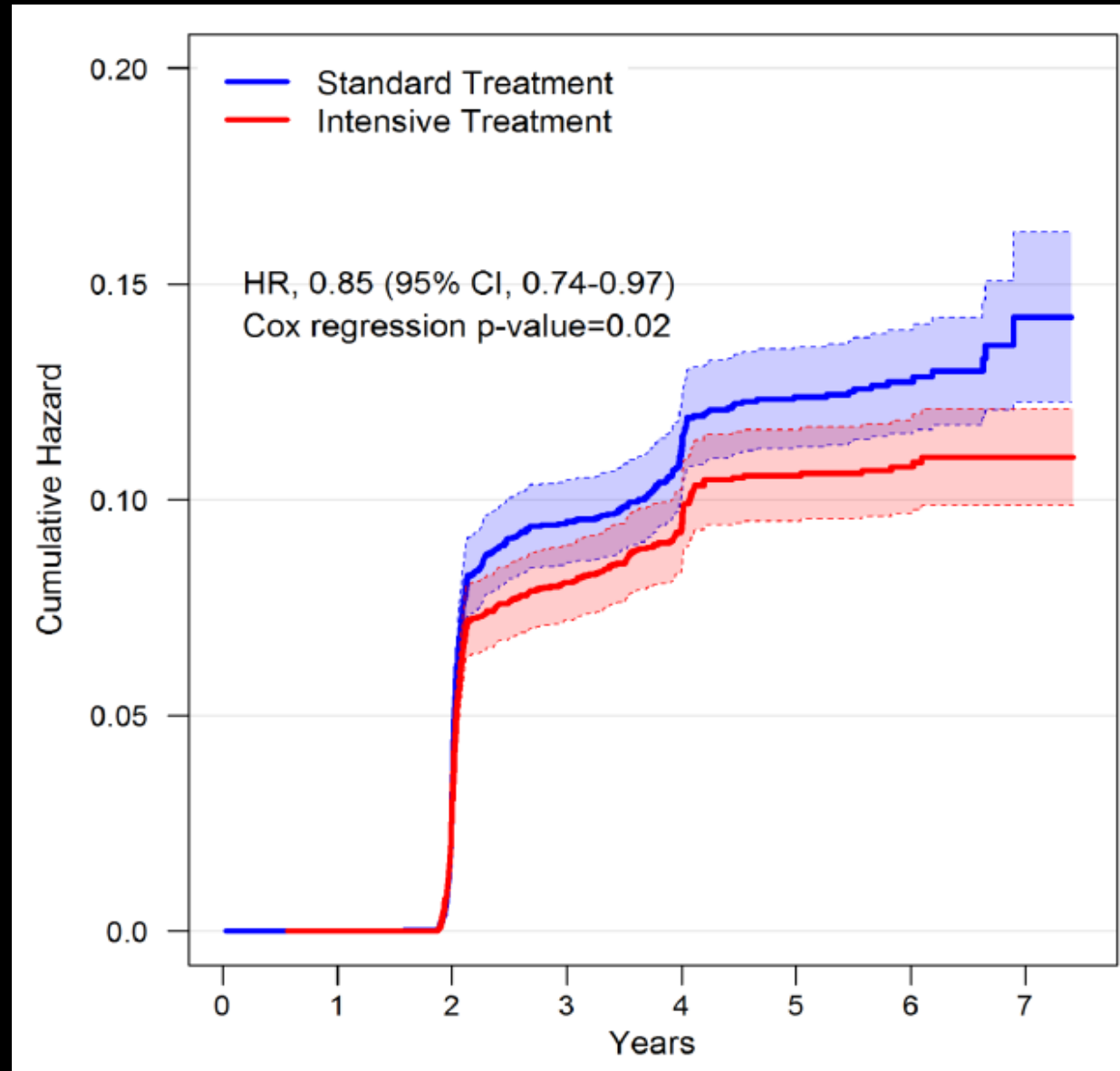
Supplement to: The ACCORD Study Group. Effects of intensive blood-pressure control in type 2 diabetes mellitus. N Engl J Med 2010;362:1575-85. DOI: 10.1056/NEJMoa1001286.



# Concerns about the applicability of SPRINT findings

- Discordant results of ACCORD-BP (type 2 diabetes)
- Cognitive function in elderly
- Kidney effects

# SPRINT: Probable dementia or mild cognitive impairment



# Adverse Events in CKD Subgroup in SPRINT

(Cheung et al. JASN 2017)

|                  | No. (%)<br>of Participants with AE |                   |             |             |
|------------------|------------------------------------|-------------------|-------------|-------------|
|                  | Intensive BP                       | Standard BP       | HR          | P           |
| Hypotension      | 51 (3.8)                           | 38 (2.9)          | 1.34        | 0.17        |
| Syncope          | 54 (4.1)                           | 42 (3.2)          | 1.28        | 0.22        |
| Injurious fall   | 125 (9.4)                          | 138 (10.5)        | 0.90        | 0.40        |
| <b>AKI/ARF</b>   | <b>114 (8.6)</b>                   | <b>78 (5.9)</b>   | <b>1.46</b> | <b>0.01</b> |
| K <3.0 mmol/l    | 30 (2.2)                           | 16 (1.2)          | 1.87        | 0.04        |
| K >5.5 mmol/l    | 106 (8.0)                          | 78 (5.9)          | 1.36        | 0.04        |
| <b>TOTAL SAE</b> | <b>627 (47.1)</b>                  | <b>640 (48.1)</b> | <b>0.98</b> | <b>0.67</b> |

# Individualization is Key

But reasonable to have  
general BP target



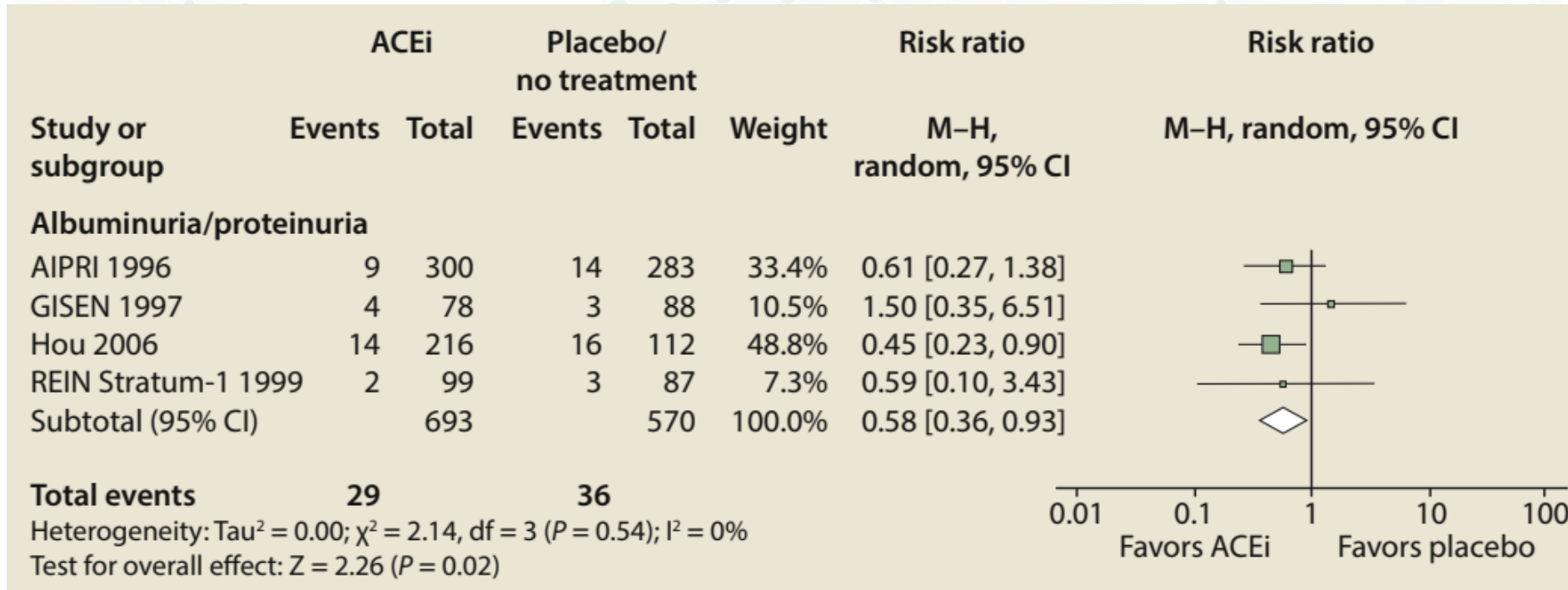
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# BLOOD PRESSURE MANAGEMENT IN PATIENTS WITH CKD, WITH OR WITHOUT DIABETES, NOT RECEIVING DIALYSIS

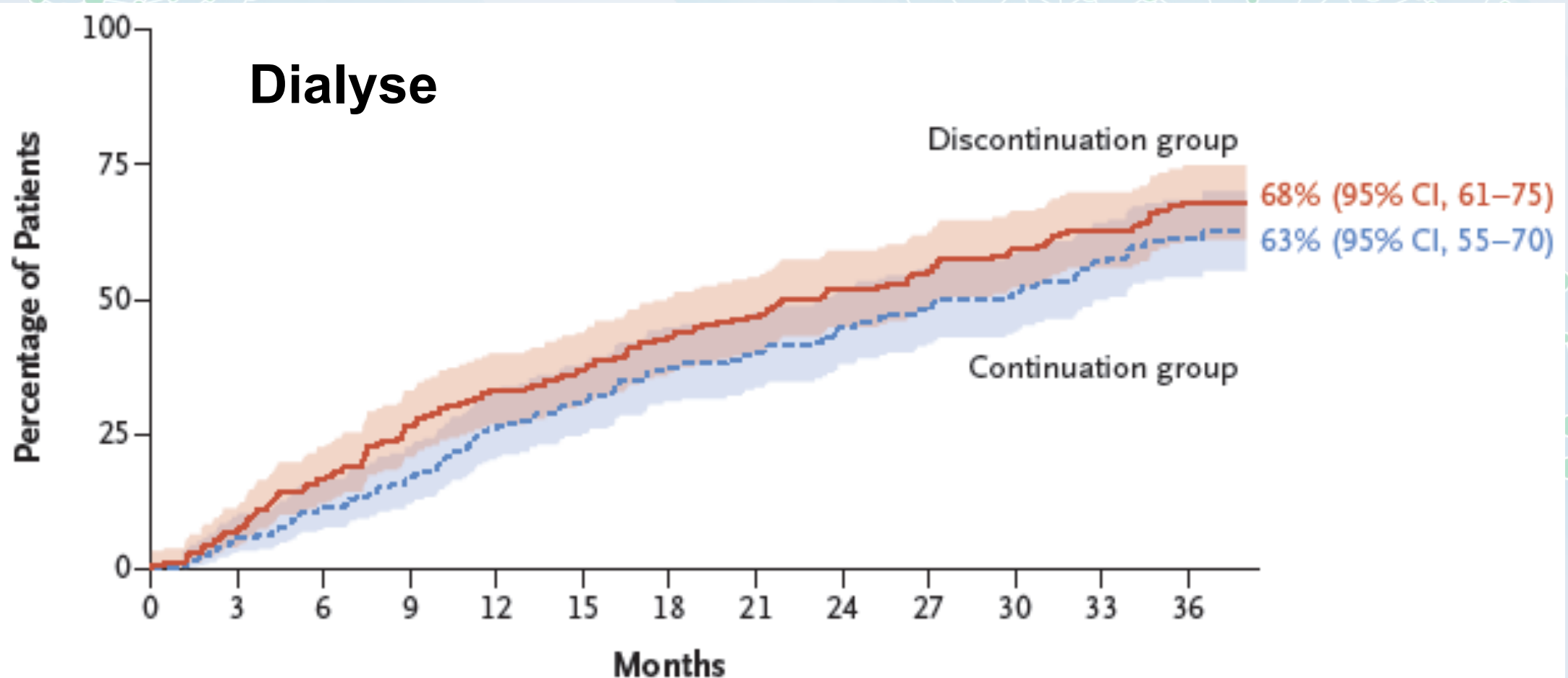
**Recommendation 3.2.1:** We recommend starting renin-angiotensin-system inhibitors (RASi) (angiotensin-converting enzyme inhibitor [ACEi] or angiotensin II receptor blocker [ARB]) for people with high BP, CKD, and severely increased albuminuria (G1-G4, A3) without diabetes (1B).

Cardiovascular events in patients with CKD G3-G4, A3 without diabetes



# RASi weglassen, wenn GFR sinkt?

STOP ACEi trial: N= 411, 3 Jahre, eGFR 18 ml/min



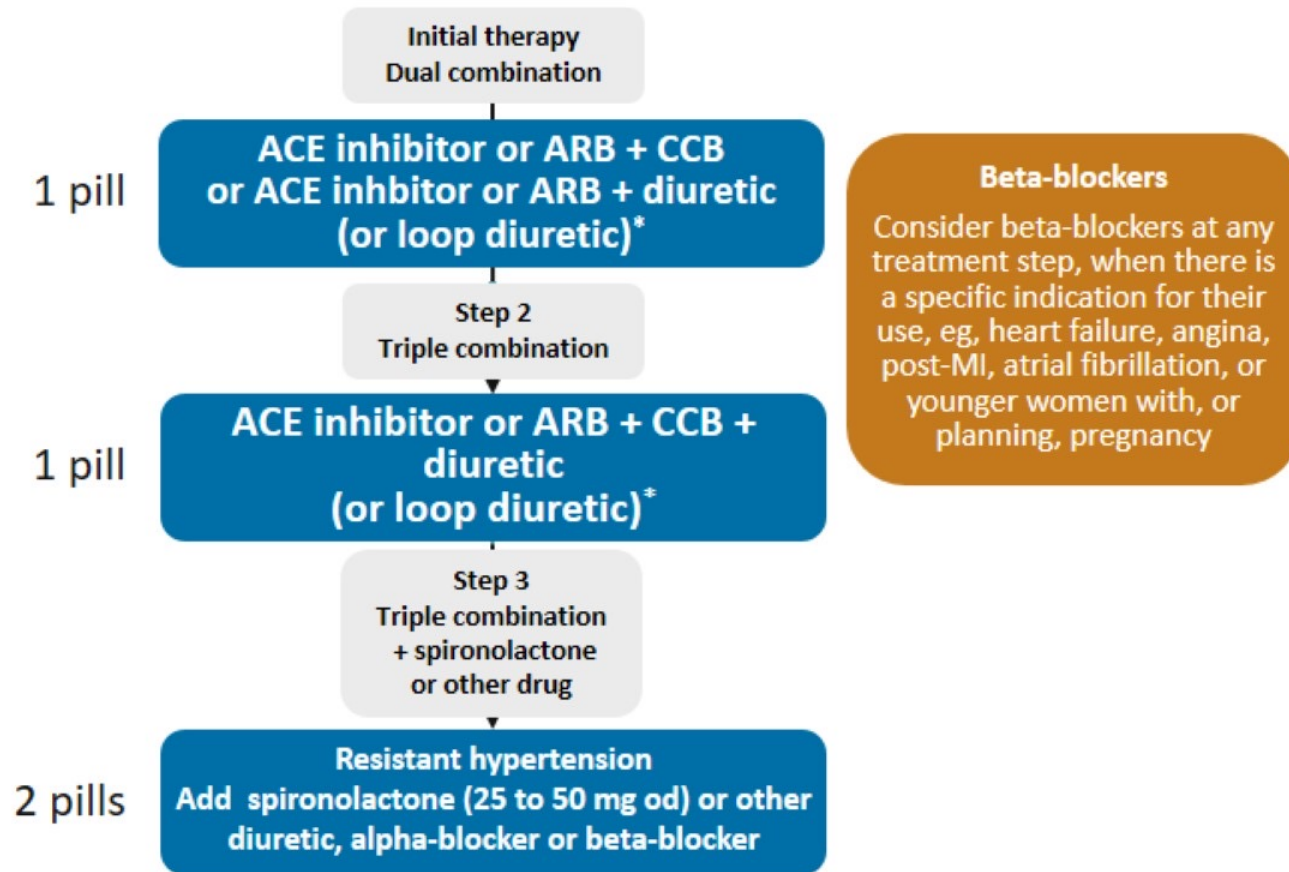


# The talk in one slide

- SPRINT showed that ‘targeting’ a standardized office (=clinic) SBP < 120 mm Hg resulted in lower overall mortality, including in CKD.
- Very similar reduction in harm with SBP <120 was demonstrated in the standard glycaemic arm of ACCORD.
- Basing ANY clinical decisions on non-standardized clinic BP is indefensible.
- The KDIGO guideline explicitly requires a shared decision-making process. It is unreasonable not to offer CKD patients the choice.



# Drug-Treatment Strategy for Hypertension and CKD



A reduction in eGFR and the rise in serum creatinine is expected in patients with CKD who receive BP-lowering therapy, especially in those treated with an ACE inhibitor or ARB but a rise in serum creatinine of > 30% should prompt evaluation of the patient for possible renovascular disease.

\*Use loop diuretics when eGFR is < 30 mL/min/1.72 m<sup>2</sup>, because thiazide/thiazide-like diuretics are much less effective/ineffective when eGFR is reduced to this level.