Hypertension series: Isolated diastolic hypertension

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17th February 2024

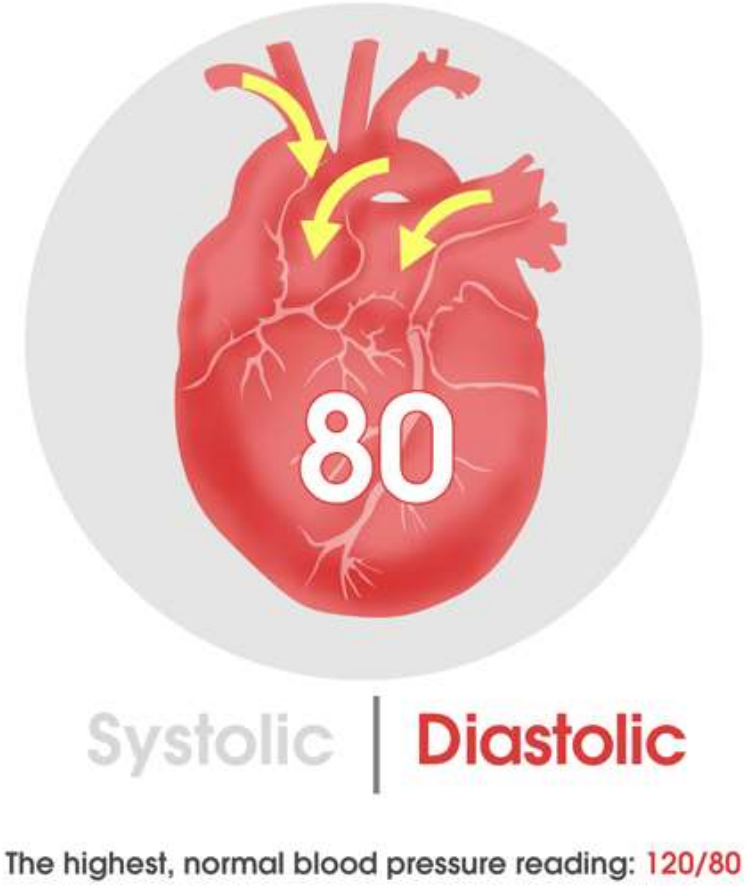
GLMS symposium

Greenlane Medical Specialists

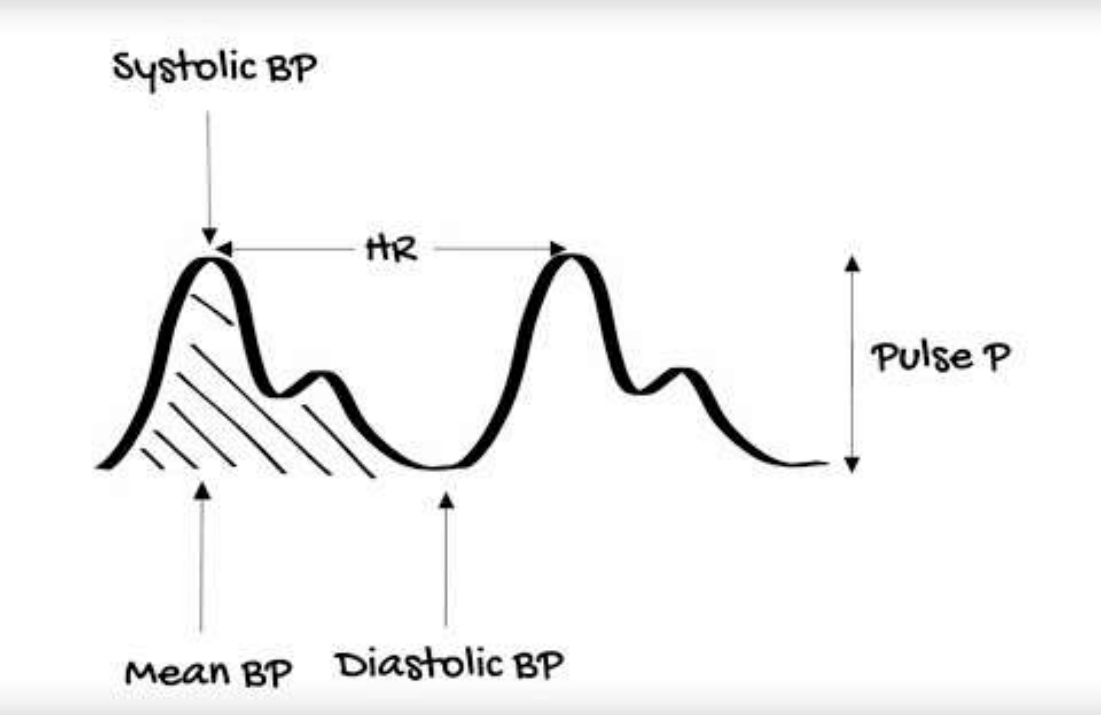
Who would you consider treating?

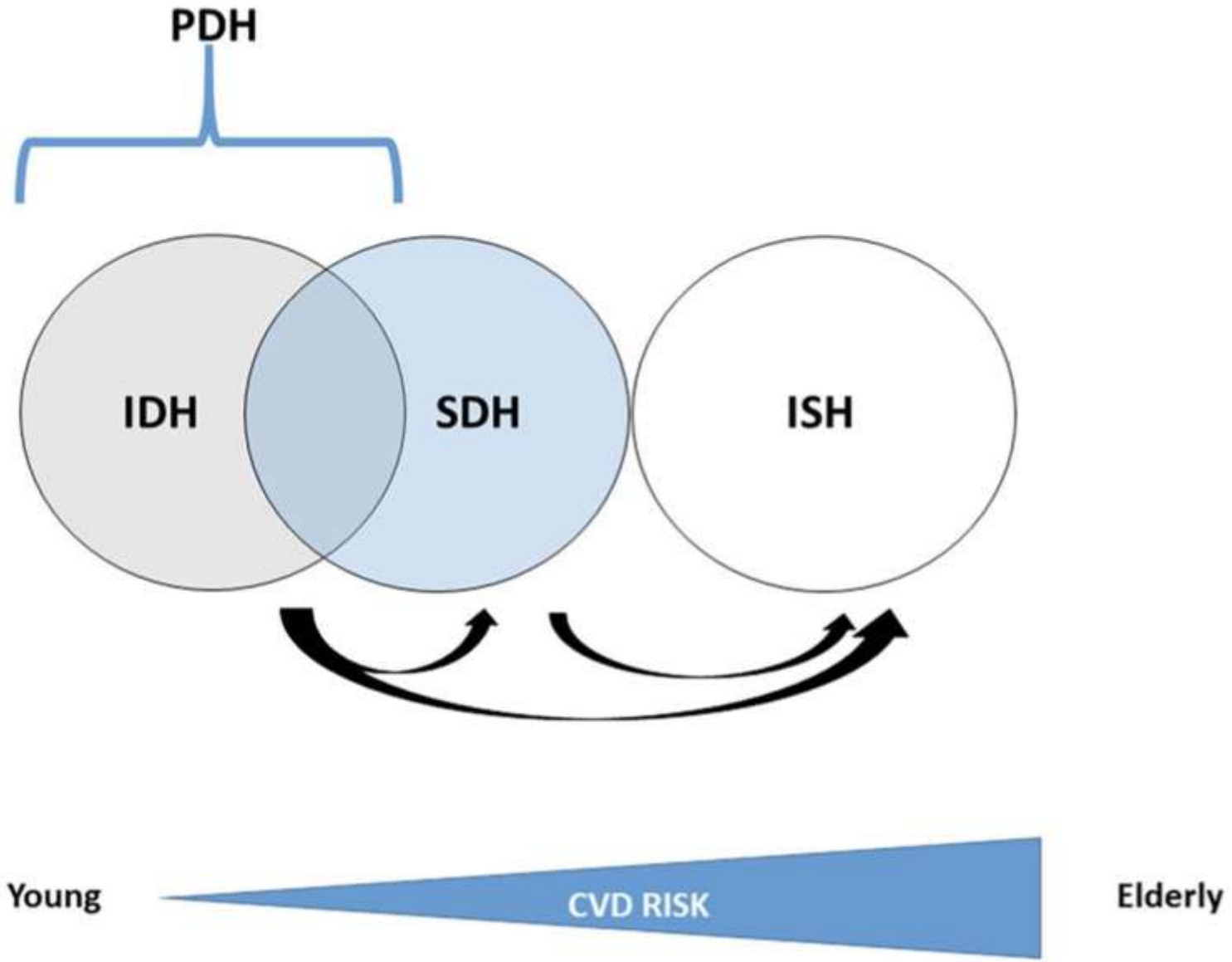
Mr A	**Mr B**	**Mr A**
35 M • HbA1 49 mmol/mol • CKD G2 A1 • Dyslipidemia • Strong family history of hypertension, no CV events • Increased BMI • Mean BP 128/94	62 M • Normal lipids • No diabetes, no CVD • Increased BMI • Normal kidney function • Non smoker • Hyperuricemia • Mean BP 130/94	40 M • No diabetes or • Normal kidney function • No secondary causes • Mean BP 150/90 mmHg

Blood pressure: force against blood vessel wall

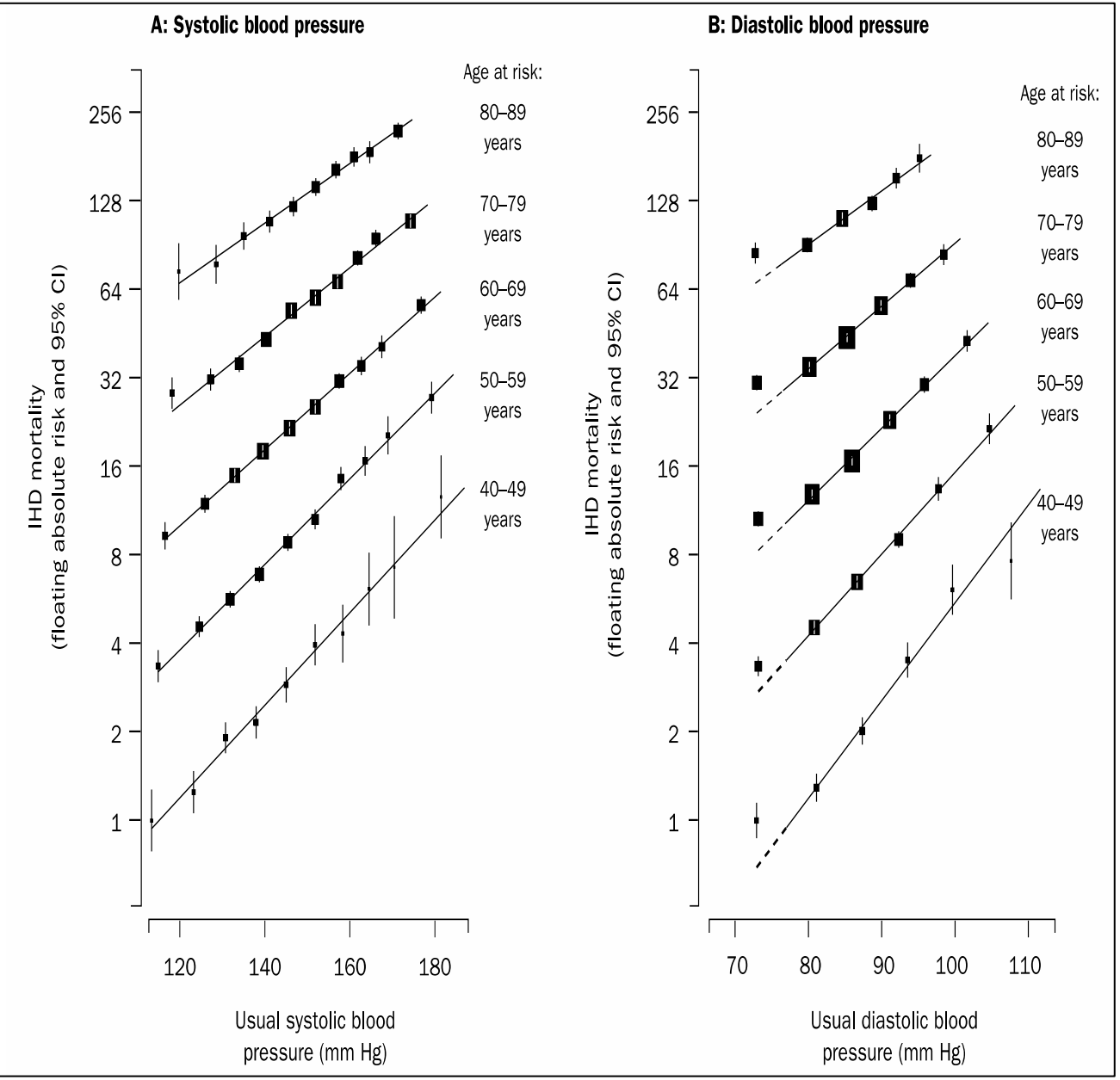


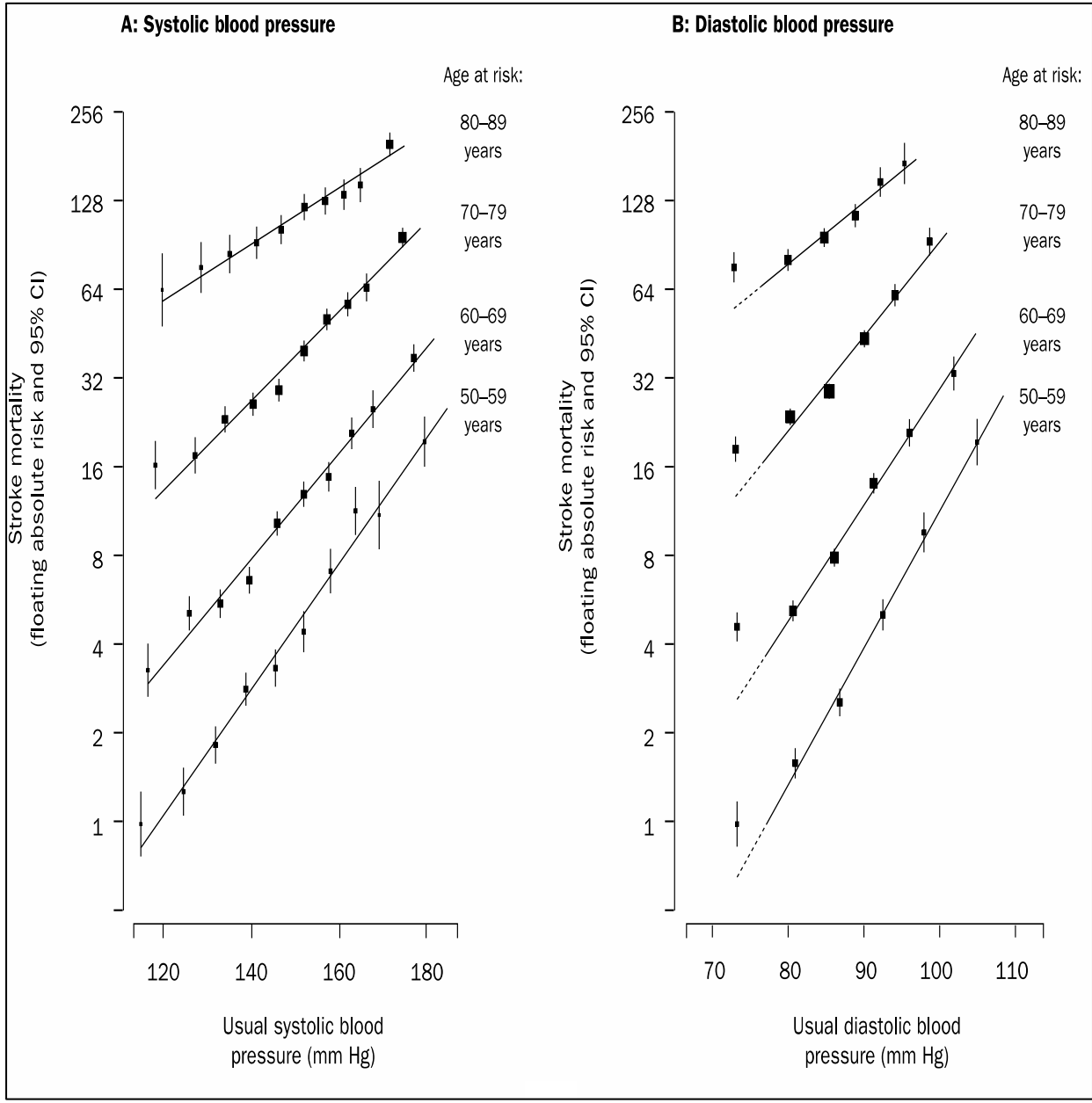
- Systolic BP – maximal BP peak (cardiac ejection phase)
- Diastolic BP – minimal pressure (relaxed cardiac phase)





Curr Cardiol Rep. ; 23(12): 177.





Prospective Studies Collaboration. Lancet 2002; 360: 1903-13.

- Hypertension contribute to CV disease burden
- Systolic BP most important association to CV events
  - Minimum participant age in major hypertension trials is 45.
  - Elevated DBP 80 – 90 mmHg, in the context of well controlled SBP, is not associated with excess risk of CVD risk.
  - IDH in elderly (>90 mmHg) demonstrated weak influence on CV risk.

- Subgroups of people with IDH and ISH were unknown

European Heart Journal (2021) 42, 2119–2129
JAMA. 2020;323(4):329-338.

Does Isolated diastolic hypertension (IDH) matter ?

	ISH	IDH	SDH
Overall prevalence	1.57	2.66	0.93
Male	2.23	4.09	1.42
Female	0.92	1.25	0.46
ACC/AHA 2017 increment (%)	−10	4.3	30.5

Isolated diastolic hypertension (IDH)

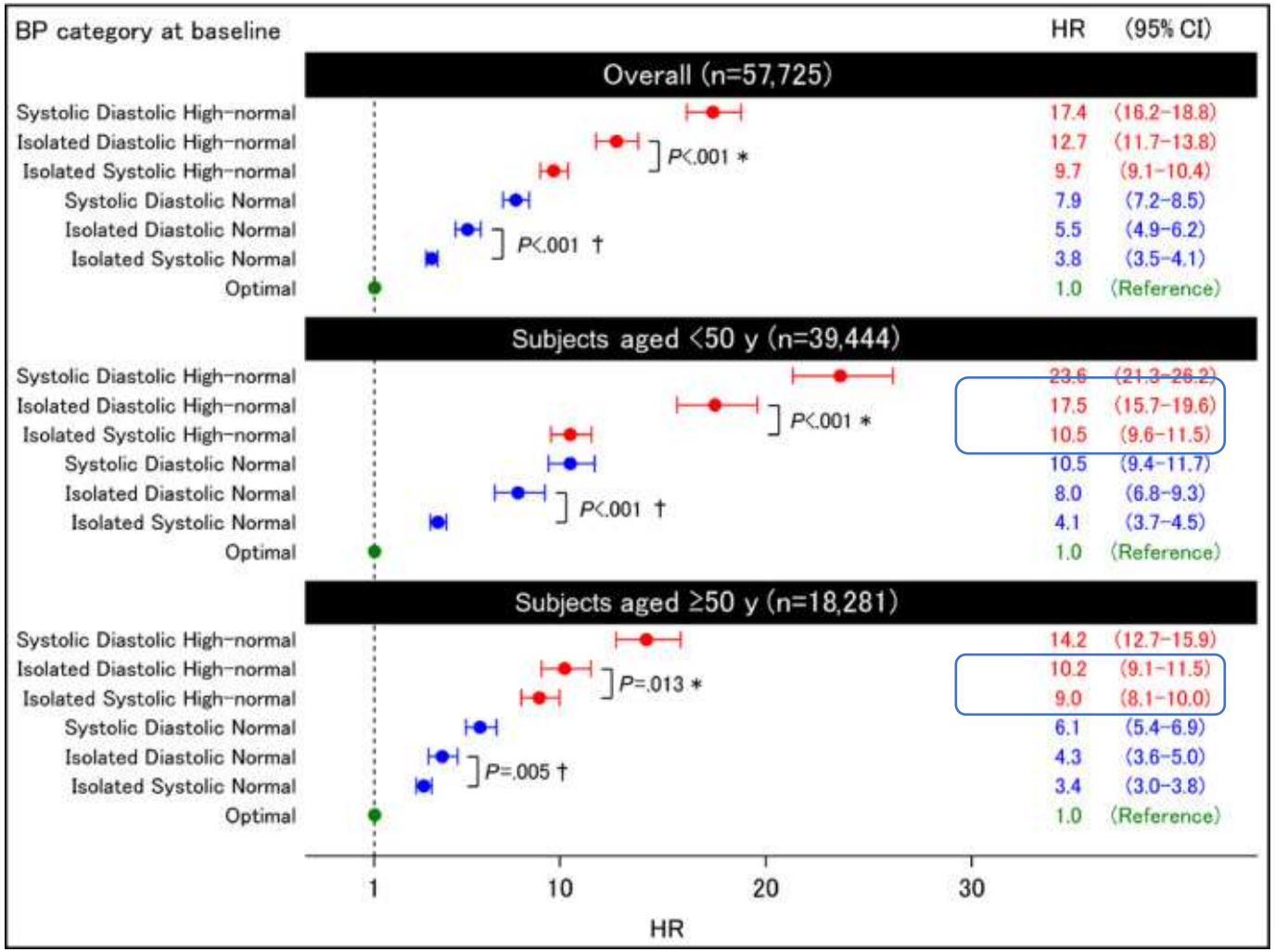
- Prevalence is 1.3 – 6.5% (DBP >90 mmHg and >80 mmHg respectively) in the US population; 7.8 – 24.7% in the Chinese population.
- More frequent hypertensive phenotype in people <50 years
  - Peak prevalence in 30 – 49 years age group
  - Prevalence in individuals <40 years 2.6%
  - Prevalence in individuals < 18 years 1.9%
- IDH increases the risk for the development of incident systolic hypertension
  - HR 23 over 10 years compared to normotensive patients

Curr Cardiol Rep. 2022; 23(12): 177.
European Heart Journal (2021) 42, 2119–2129
JAMA. 2020;323(4):329-338.

IDH – what is the risk?

IDH – risk of developing new hypertension

Ref <120/80 mmHg



Mean age 41 years
4.9 year follow up

ISN: SBP 120–129 & DBP <80 mmHg
IDN: SBP <120 & DBP 80–84 mmHg
SDN: SBP 120–129 & DBP 80–84 mmHg
ISHN: SBP 130–139 & DBP <85 mmHg
IDHN: SBP <130 & DBP 85–89 mmHg
SDHN: SBP 130–139 & DBP 85–89 mmHg

J Clin Hypertens (Greenwich). 2017 Jun; 19(6): 603–610.

Cardiovascular Risk of Isolated Diastolic Hypertension Defined by the 2017 American College of Cardiology/ American Heart Association Blood Pressure Guideline

A Nationwide Age-Stratified Cohort Study

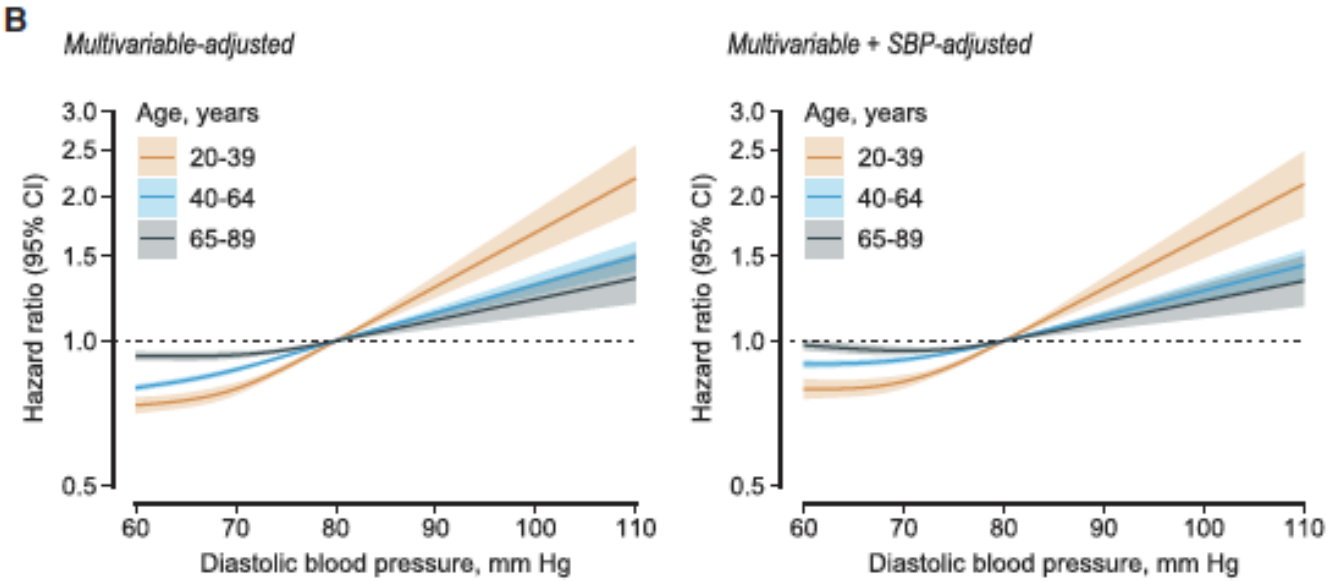
Hokyou Lee, Yuichiro Yano, So Mi Jemma Cho, Sungha Park, Donald M. Lloyd-Jones, Hyeon Chang Kim

8, 109, 484 participants
Median age 40 years; 49.5% men
Follow up 15.3 years
Composite CV events and mortality

A

Age, y	<130/<80 mm Hg Events	<130/<80 mm Hg Person-yrs	<130/≥80 mm Hg Events	<130/≥80 mm Hg Person-yrs	HR (95% CI)	P interaction
Multivariable-adjusted						
20-39	13,417	39,497,472	9,855	16,777,233	1.30 (1.26-1.33)	<0.001
40-64	78,458	40,460,839	47,698	17,886,178	1.19 (1.17-1.20)	<0.001
65-89	39,626	3,120,911	18,223	1,319,282	1.09 (1.07-1.11)	
Multivariable + SBP-adjusted						
20-39	13,417	39,497,472	9,855	16,777,233	1.23 (1.19-1.26)	<0.001
40-64	78,458	40,460,839	47,698	17,886,178	1.11 (1.10-1.13)	<0.001
65-89	39,626	3,120,911	18,223	1,319,282	1.07 (1.05-1.09)	

B



Hypertension 2020; 76: e:44 – 46.

Circulation

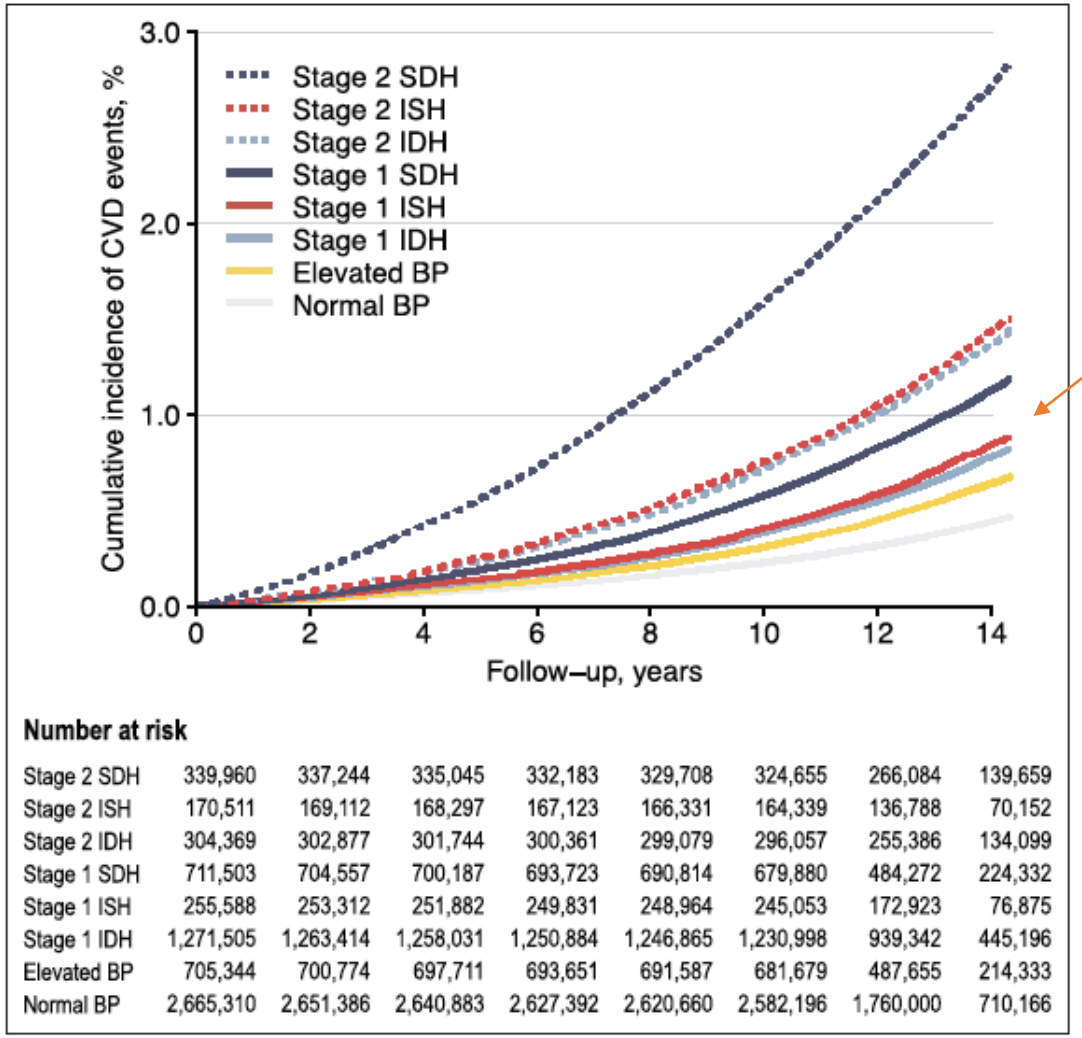
ORIGINAL RESEARCH ARTICLE

Cardiovascular Risk of Isolated Systolic or Diastolic Hypertension in Young Adults

Lee et al.

6, 424, 090 participants
Median age 30 years; 61% men
Follow up 13.2 years
composite CV events and mortality

Normal BP	<120/80 mmHg	REF
Stage 1 ISH	130–139/ <80 mmHg	HR 1.32 (1.28–1.36)
stage 1 IDH	<130/ 80–89 mmHg	HR 1.36 (1.61–1.72)
Stage 1 SDH	130-139/ 80-89 mmHg	HR 1.67 (1.61–1.72)



Number at risk

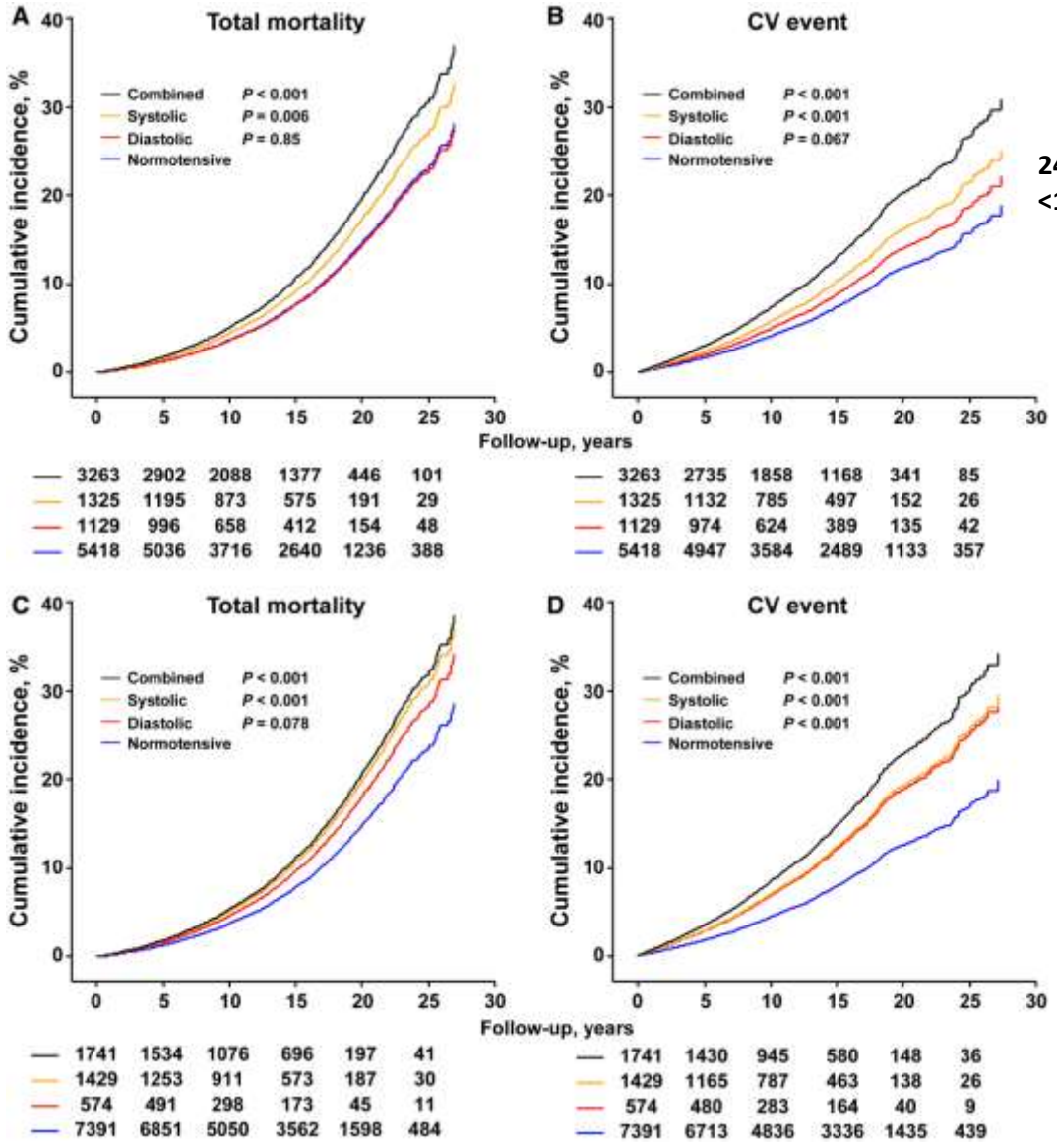
Stage 2 SDH	339,960	337,244	335,045	332,183	329,708	324,655	266,084	139,659
Stage 2 ISH	170,511	169,112	168,297	167,123	166,331	164,339	136,788	70,152
Stage 2 IDH	304,369	302,877	301,744	300,361	299,079	296,057	255,386	134,099
Stage 1 SDH	711,503	704,557	700,187	693,723	690,814	679,880	484,272	224,332
Stage 1 ISH	255,588	253,312	251,882	249,831	248,964	245,053	172,923	76,875
Stage 1 IDH	1,271,505	1,263,414	1,258,031	1,250,884	1,246,865	1,230,998	939,342	445,196
Elevated BP	705,344	700,774	697,711	693,651	691,587	681,679	487,655	214,333
Normal BP	2,665,310	2,651,386	2,640,883	2,627,392	2,620,660	2,582,196	1,760,000	710,166

Circulation. 2020;141:1778–1786.

Isolated Diastolic Hypertension in the IDACO Study: An Age-Stratified Analysis Using 24-Hour Ambulatory Blood Pressure Measurements

John W. McEvoy, Wen-Yi Yang, Lutgarde Thijs, Zhen-Yu Zhang, Jesus D. Melgarejo, José Boggia, Tine W. Hansen, Kei Asayama, Takayoshi Ohkubo, Eamon Dolan, Katarzyna Stolarz-Skrzypek, Sofia Malyutina, Edoardo Casiglia, Lars Lind, Jan Filipovský, Gladys E. Maestre, Yan Li, Ji-Guang Wang, Yutaka Imai, Kalina Kawecka-Jaszcz, Edgardo Sandoya, Krzysztof Narkiewicz, Eoin O'Brien, Thomas Vanassche, Jan A. Staessen; on behalf of the International Database on Ambulatory Blood Pressure in Relation to Cardiovascular Outcomes (IDACO) Investigators

11,135 participants
<50 vs >50 years old (median age 54.7, 51% men)
FU 13.8 years
2017 ACC/AHA and 2018 ESC guidelines



24h ABPM <125/75 mmHg

24h ABPM <130/80 mmHg

Hypertension. 2021; 78:1222 – 31.

Isolated Diastolic Hypertension in the IDACO Study: An Age-Stratified Analysis Using 24-Hour Ambulatory Blood Pressure Measurements

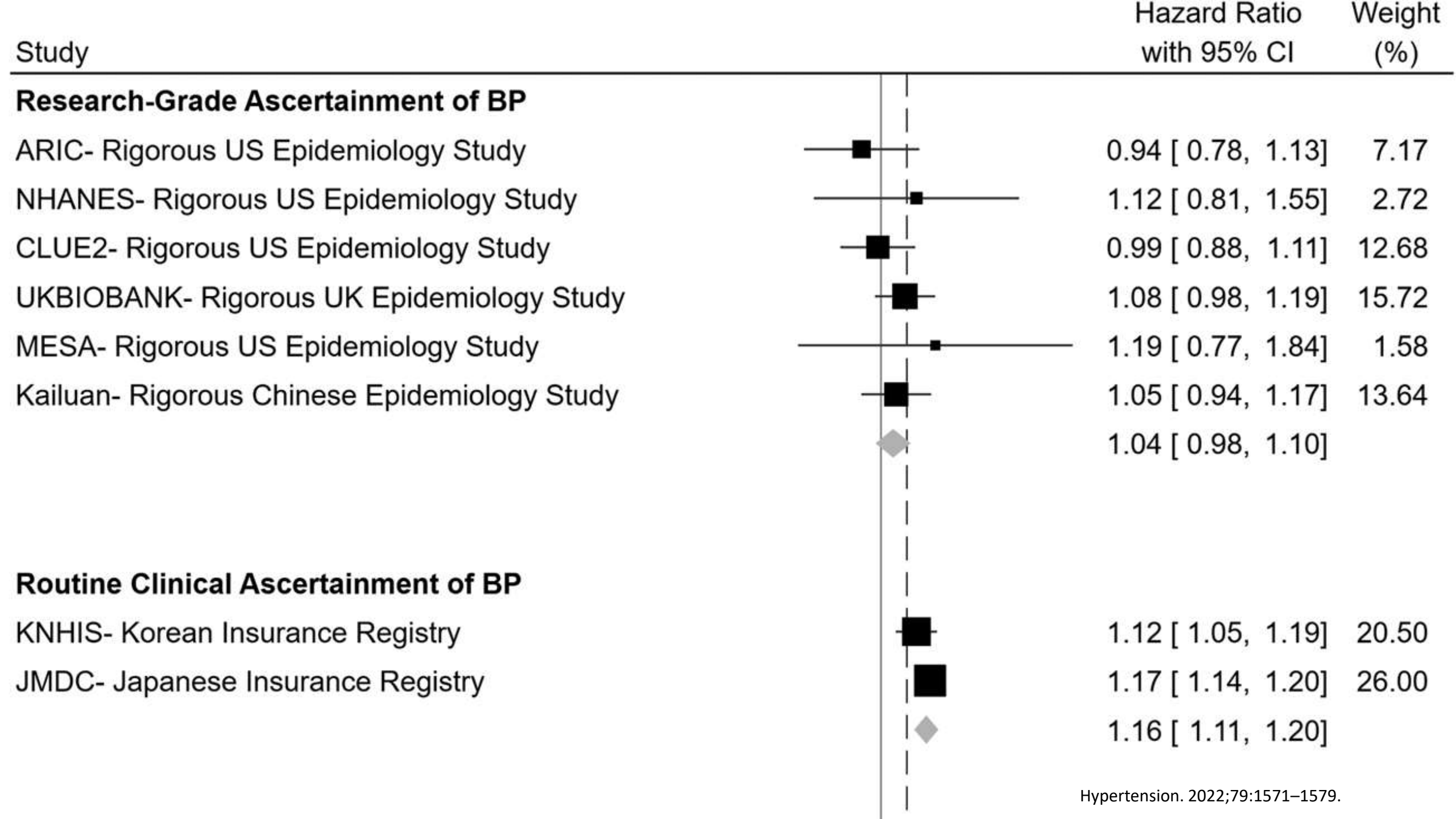
John W. McEvoy, Wen-Yi Yang, Lutgarde Thijs, Zhen-Yu Zhang, Jesus D. Melgarejo, José Boggia, Tine W. Hansen, Kei Asayama, Takayoshi Ohkubo, Eamon Dolan, Katarzyna Stolarz-Skrzypek, Sofia Malyutina, Edoardo Casiglia, Lars Lind, Jan Filipovský, Gladys E. Maestre, Yan Li, Ji-Guang Wang, Yutaka Imai, Kalina Kawecka-Jaszcz, Edgardo Sandoya, Krzysztof Narkiewicz, Eoin O'Brien, Thomas Vanassche, Jan A. Staessen; on behalf of the International Database on Ambulatory Blood Pressure in Relation to Cardiovascular Outcomes (IDACO) Investigators

11,135 participants
<50 vs >50 years old (median age 54.7, 49% F)
FU 13.8 years
2017 ACC/AHA and 2018 ESC guidelines

Table 4. Multivariable-Adjusted HR in Relation to Hypertension Categories After Stratification by Age

	Total mortality				P_{int}	CV events				P_{int}
	Age<50		Age≥50			Age<50		Age≥50		
Characteristic	HR (95% CI)	*P* value	HR (95% CI)	*P* value		HR (95% CI)	*P* value	HR (95% CI)	*P* value	
2017 AHA/ACC criteria										
Normotensive	Reference		Reference			Reference		Reference		
Isolated diastolic	1.66 (0.96–2.86)	0.068	0.91 (0.75–1.10)	0.31	0.076	2.87 (1.72–4.80)	<0.001	0.98 (0.78–1.23)	0.87	<0.001
Isolated systolic	0.68 (0.21–2.20)	0.52	1.14 (1.03–1.28)	0.015	0.28	0.74 (0.22–2.43)	0.62	1.33 (1.17–1.52)	<0.001	0.45
Combined	2.08 (1.33–3.25)	0.0013	1.33 (1.21–1.46)	<0.001	0.15	2.39 (1.47–3.89)	<0.001	1.68 (1.50–1.88)	<0.001	0.092

Hypertension. 2021; 78:1222 – 31.

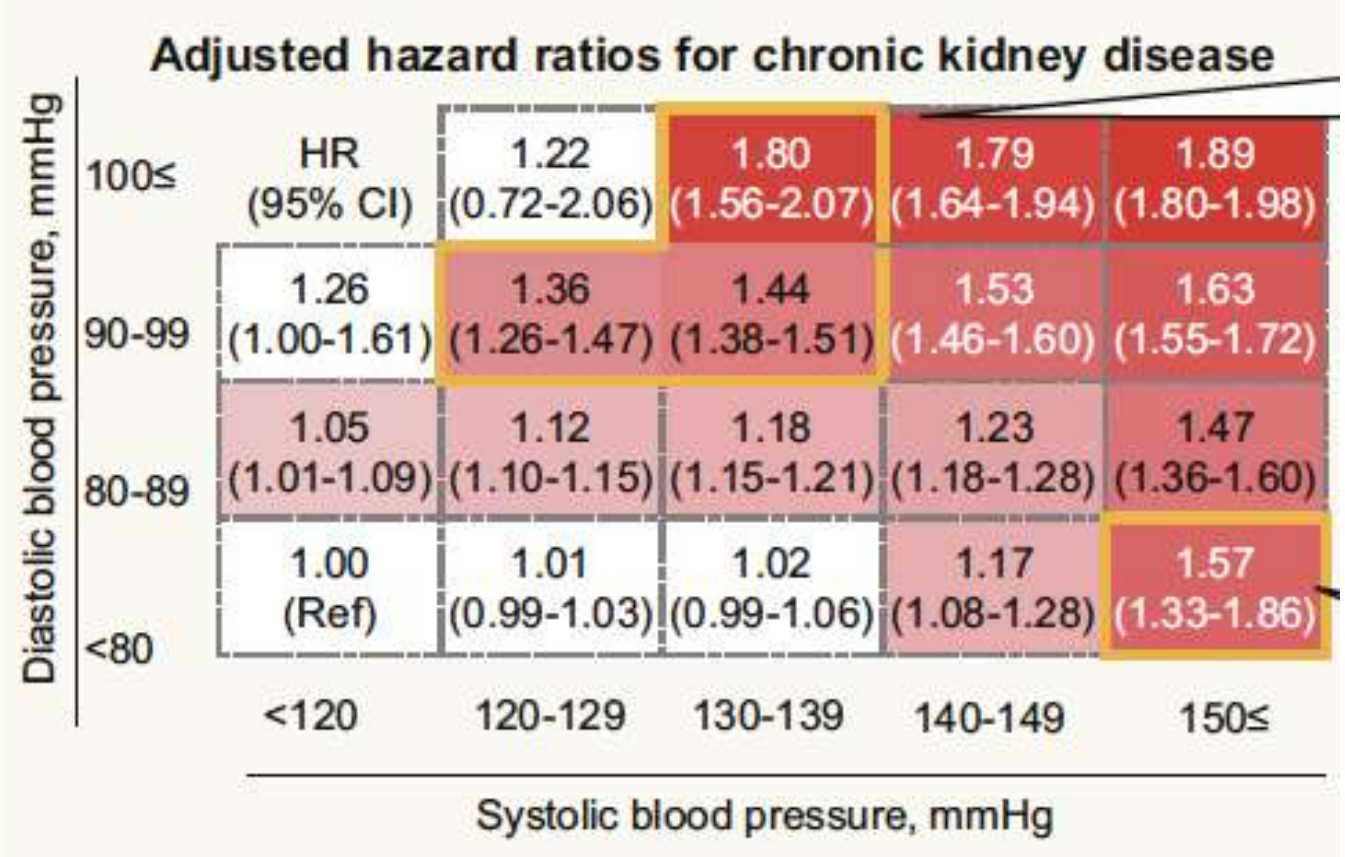


Hypertension. 2022;79:1571–1579.

Cross-classification by systolic and diastolic blood pressure levels and chronic kidney disease, proteinuria, or kidney function decline

Tsukasa Suenaga[1] · Michihiro Satoh[1,2] · Takahisa Murakami[1,2,3] · Takuo Hirose[4,5,6] · Taku Obara[2,7] · Shingo Nakayama[1,5] · Hideaki Hashimoto[1,2,5] · Maya Toyama[1,2,8] · Tomoko Muroya[1,2,9] · Atsuhiro Kanno[10] · Takefumi Mori[5] · Takayoshi Ohkubo[11,12] · Yutaka Imai[12] · Hirohito Metoki[1,2,12]

1,492,291 participants
No CKD and no antihypertensive agents at baseline
Median age 41 years; 61% men
FU 3.2 years
2017 ACC/AHA ref (<120/<80 mmHg)
Incident CKD (eGFR <60 ml/min +/- proteinuria)



Hypertension Research (2023) 46:1860–1869

IDH – what is the risk?

- Age-specific risk with IDH
- IDH and ISH associated with 13 and 10 times risk of hypertension, respectively
- DBP threshold of <75 mmHg appear to be an adverse prognostic factor in people <50 years for CV events
- IDH (and ISH) associated with CKD risk
- Threshold for DBP target <75 – 80 mmHg

Who would you consider treating?

Mr A	**Mr B**	**Mr C**
35 M • CKD G2 A2 • HbA1 54 mmol/mol • Dyslipidemia • Strong family history of hypertension and CV events • Increased BMI • Mean BP 130/94	62 M • Normal kidney function • No diabetes, no CVD • Normal lipids • Increased BMI • Mean BP 130/94	40 M • No diabetes • Normal kidney function • Normal lipids • No secondary causes • Mean BP 150/90 mmHg

Therapeutic considerations

- Observational studies
- Guidelines do not address management of IDH as a distinct phenotype
- Approach patient
  - Age-specific (Low absolute risk vs cumulative risk in <50 yo)
  - Co-existing metabolic risks, CV risk scores
- What is too low?
  - No specific study addressing lower level of DBP alone on increased CV risk
  - HOT trial showed no J-shaped associated with CV events at DBP 70 mmHg
- Low risk: periodic testing, aggressive lifestyle intervention
- High risk: Pharmacotherapy may be considered. Theoretical benefit of the use vasodilators

Questions?

- Thanks for your attention

Greenlane
Medical Specialists