



**Which is more correlated with hypertensive organ damage,
sleep blood pressure assessed by self-measured at home or
ambulatory blood pressure monitoring?:
Japan Morning Surge-Home Blood Pressure (J-HOP) Study**

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Background

- Nighttime BP, nocturnal hypertension (nighttime ambulatory SBP ≥ 120 mmHg): strongest prognostic value in terms of organ damage and CVD¹
- ABPM: standard method of nighttime BP measurement
- HBPM: developed in last decade, able to measure nighttime BP
- Nighttime home and ambulatory BP had similar values and gave comparable association with LVMI, IMT and PWV²

¹Kario K. Essential manual of 24 hour blood pressure management: From morning to nocturnal hypertension, 2015.

²Kollias A, et al. Hypertension. 2017;35:442-452.



Objective

- To assess the associations with organ damage of nighttime SBP assessed by ABPM and HBPM



HBPM



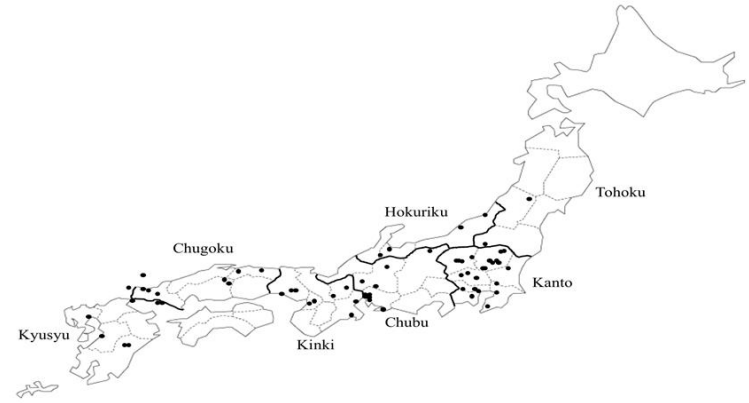
ABPM

- Left ventricular mass index (LVMI)
- Carotid intima media thickness (IMT)
- Brachial ankle pulse wave velocity (baPWV)

Pulse of Asia



J-HOP Study



- Japan Morning Surge-Home Blood Pressure Study
- Prospective observational study
- 75 doctors, 71 institutions (45 primary practices, 22 hospital-based OPD, 4 specialized university hospitals)
- Inclusion criteria:
 - HT, IGT/DM, dyslipidemia, smoker, CKD, AF, metabolic syndrome, OSA
- Exclusion criteria:
 - Recent (<6mo) cardiovascular or cerebrovascular events, current HD, chronic inflammatory disease, malignancy
- Total participants 4,310



Methods

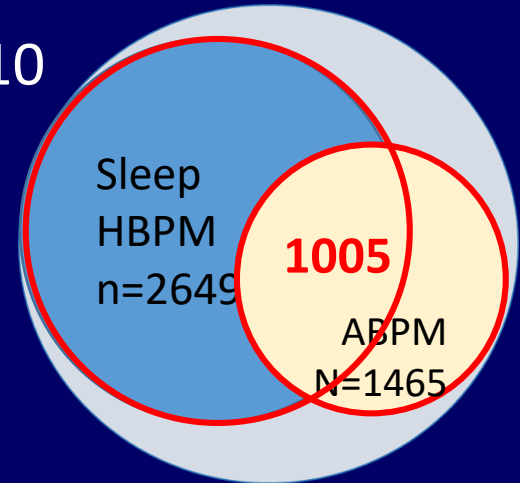
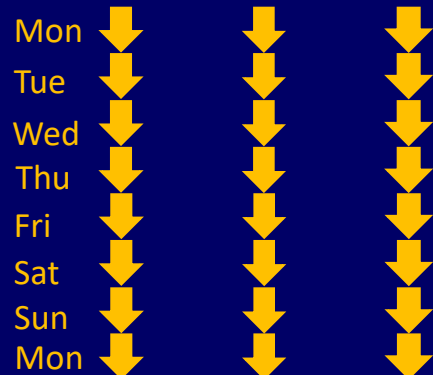
HBPM



HEM-5001;
Omron Healthcare

2, 3, 4 a.m.
≥1 night/week
2 week
Nighttime SBP
= mean of
every value

J-HOP study: N=4310



22:25



TM-2421 or TM-2425; A&D Co Inc



06:15

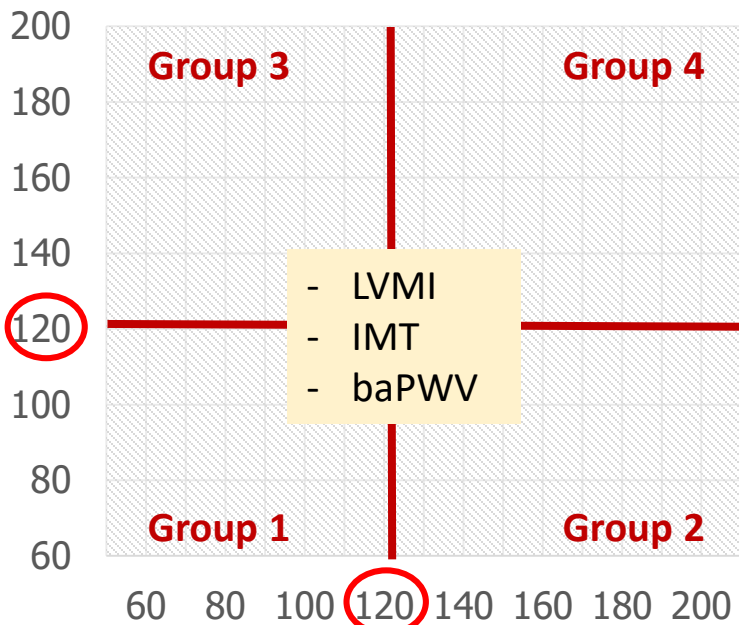
ABPM

Nighttime SBP: from going to bed to awakening, according to participants' diaries



Methods

Nighttime Home SBP
(mmHg)



Nighttime Ambulatory SBP
(mmHg)

Left ventricular mass index (LVMI)

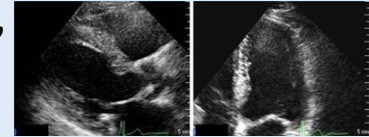
:2-dimensional, M or B mode, long axis

: $LVMI = LVM / BSA$

: $LVM = 0.8(1.04([LVIDD + PWTD + IVSTD]^3 - [LIDD]^3)) + 0.6 \text{ g}$

:Left ventricular hypertrophy (LVH)

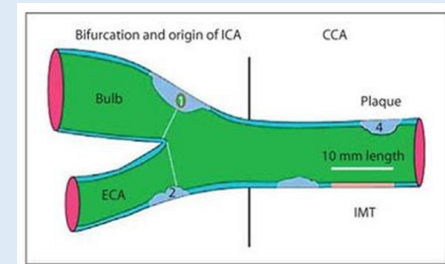
“Men >115, Women >95 g/m²”



Mean Rt and Lt carotid intima media thickness (IMT)

:3 points proximal to bilateral carotid bulbus at end-diastole

“>0.9 mm”



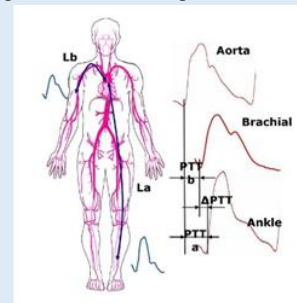
Brachial ankle pulse wave velocity (baPWV)

:measured by

volume plethysmographic method (Form PWV/ABI; Omron Healthcare)

:mean of Rt and Lt baPWV

“≥18 m/sec”

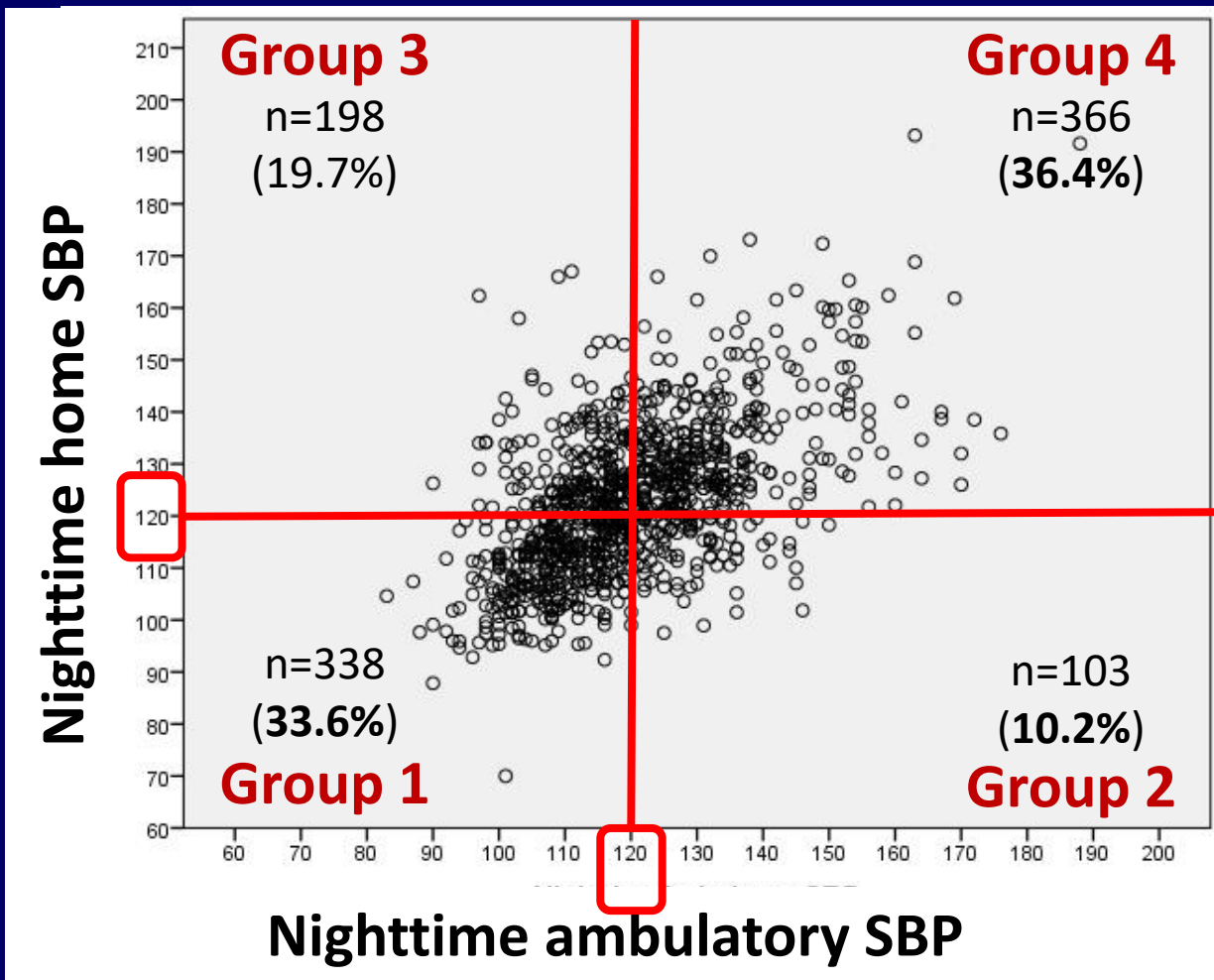




Results



8.9±4.3 nights



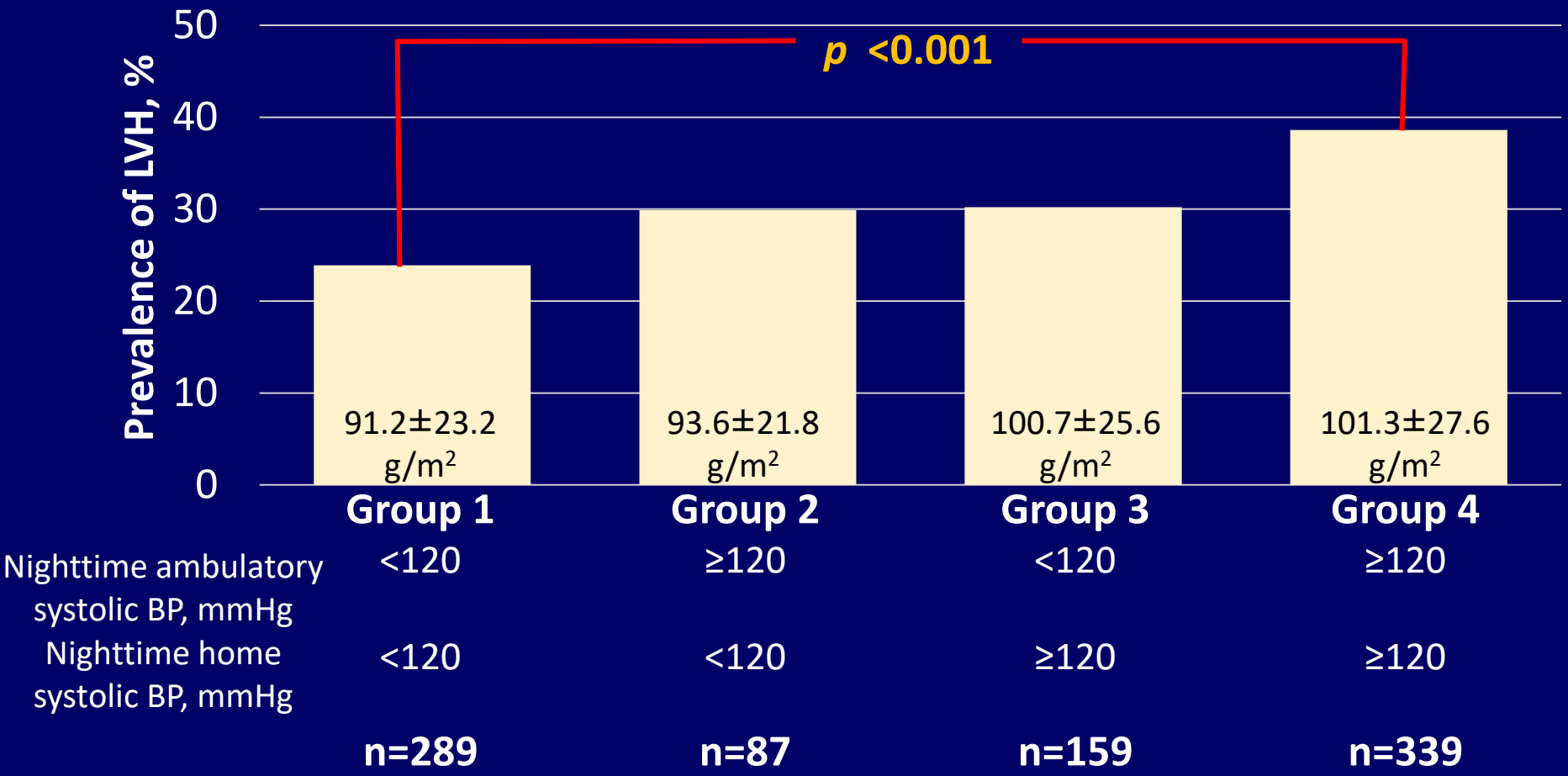


Baseline Characteristics

	Group 1	Group 2	Group 3	Group 4	p
Nighttime ambulatory SBP (mmHg)	<120	≥120	<120	≥120	
Nighttime home SBP (mmHg)	<120	<120	≥120	≥120	
N (%)	338 (34)	103 (10)	198 (20)	366 (36)	
Age (y)	62.0±10.8	60.6±9.5	65.4±9.9	63.9±11.2	<0.001*
Male (%)	160 (47.1)	42 (40.8)	115 (58.1)	186 (50.7)	0.018*
BMI (kg/m ²)	23.7±3.3	25.3±3.6	24.4±3.3	25.0±3.5	<0.001*
Smoking (%)	35 (10.3)	17 (16.5)	26 (13.1)	41 (11.2)	0.323
HT (%)	289 (85.0)	94 (91.3)	191 (96.5)	352 (95.9)	<0.001*
DM (%)	55 (16.2)	9 (8.7)	50 (25.3)	98 (26.7)	<0.001*
Hyperlipidemia (%)	134 (39.4)	35 (34.0)	74 (37.4)	115 (31.3)	0.131
eGFR	74.4±16.5	73.2±18.7	72.1±17.8	73.2±19.8	0.630
Past history of Angina, AMI, Stroke (%)	70 (21)	10 (10)	32 (16)	60 (16)	0.072



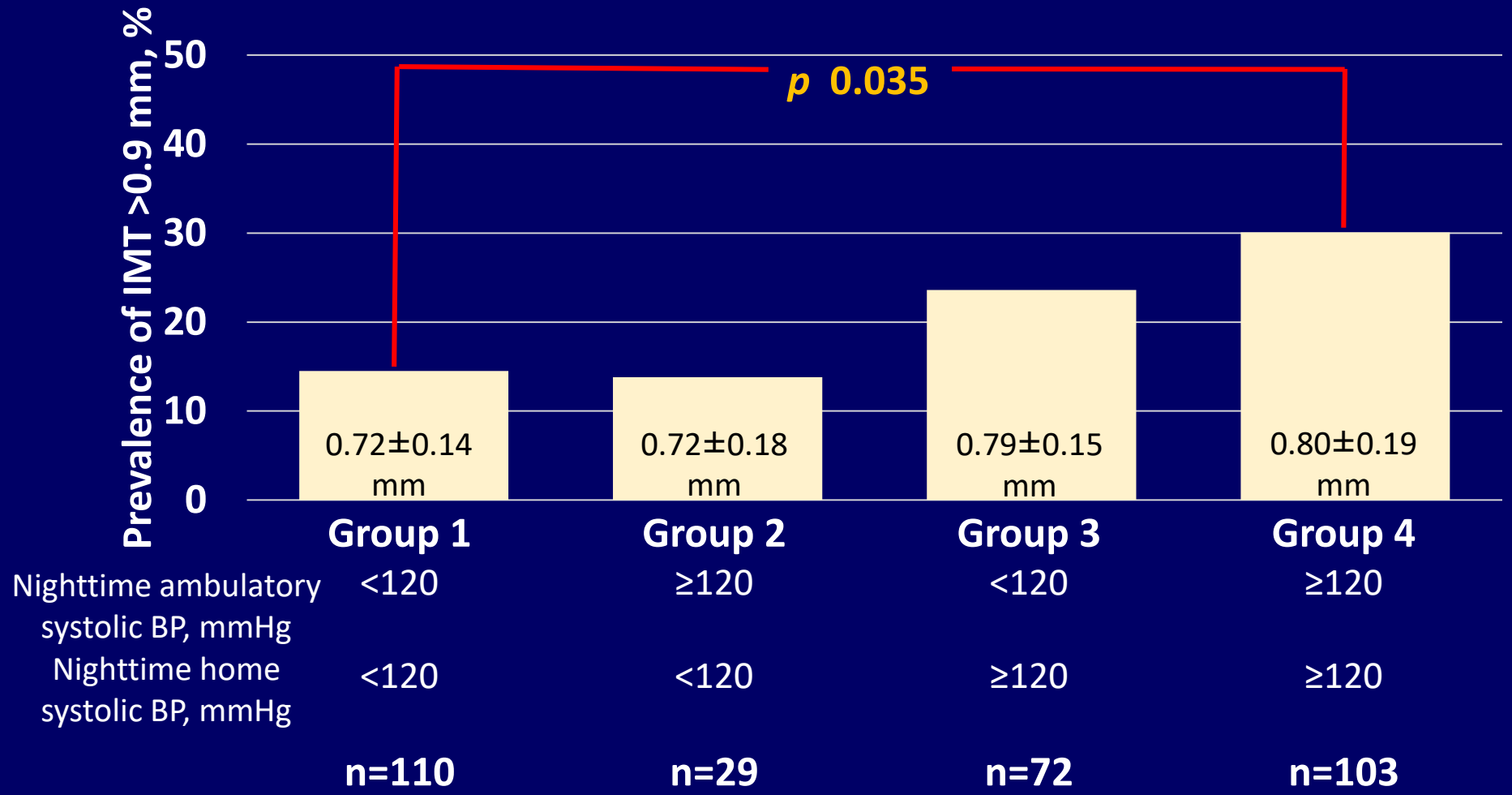
Left ventricular hypertrophy



Participant category based on nighttime ambulatory systolic blood pressure and nighttime home systolic blood pressure



Carotid intima media thickness



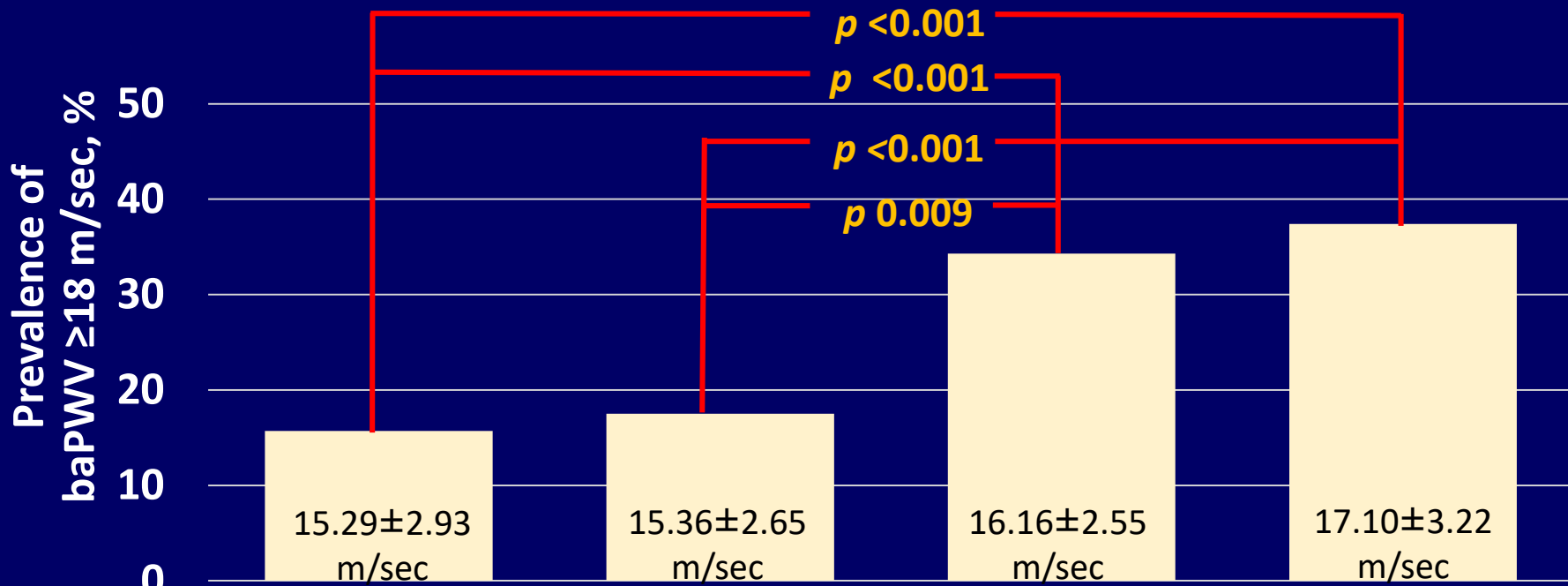
Nighttime ambulatory
systolic BP, mmHg
Nighttime home
systolic BP, mmHg

	Group 1	Group 2	Group 3	Group 4
Nighttime ambulatory systolic BP, mmHg	<120	≥120	<120	≥120
Nighttime home systolic BP, mmHg	<120	<120	≥120	≥120
n	110	29	72	103

Participant category based on nighttime ambulatory systolic blood pressure and nighttime home systolic blood pressure



Brachial ankle pulse wave velocity



Nighttime ambulatory systolic BP, mmHg

Group 1	Group 2	Group 3	Group 4
<120	≥120	<120	≥120

Nighttime home systolic BP, mmHg

Group 1	Group 2	Group 3	Group 4
<120	<120	≥120	≥120
n=338	n=103	n=198	n=366

Participant category based on nighttime ambulatory systolic blood pressure and nighttime home systolic blood pressure



Blood pressure and organ damage

	LVH		IMT >0.9 mm		baPWV ≥18 m/sec	
	Odds ratio (95% CI)		Odds ratio (95% CI)		Odds ratio (95% CI)	
	Model I	Model II	Model I	Model II	Model I	Model II
Nighttime ambulatory SBP ≥120 vs <120 mmHg	1.65[†] (1.24-2.20)	1.54[†] (1.13-2.11)	1.63 (0.95-2.80)	1.77 (0.97-3.23)	1.69[‡] (1.28-2.24)	1.70[†] (1.24-2.34)
Nighttime home SBP ≥120 vs <120 mmHg	1.74[‡] (1.29-2.34)	1.48[*] (1.06-2.06)	2.56[†] (1.41-4.64)	2.31[*] (1.16-4.60)	2.95[‡] (2.17-4.02)	2.21[‡] (1.57-3.12)

Model I: unadjusted

Model II: adjusted for age, gender, BMI, clinic SBP ≥140 mmHg

* $p < 0.05$, [†] $p < 0.01$, [‡] $p < 0.001$



Result Summary

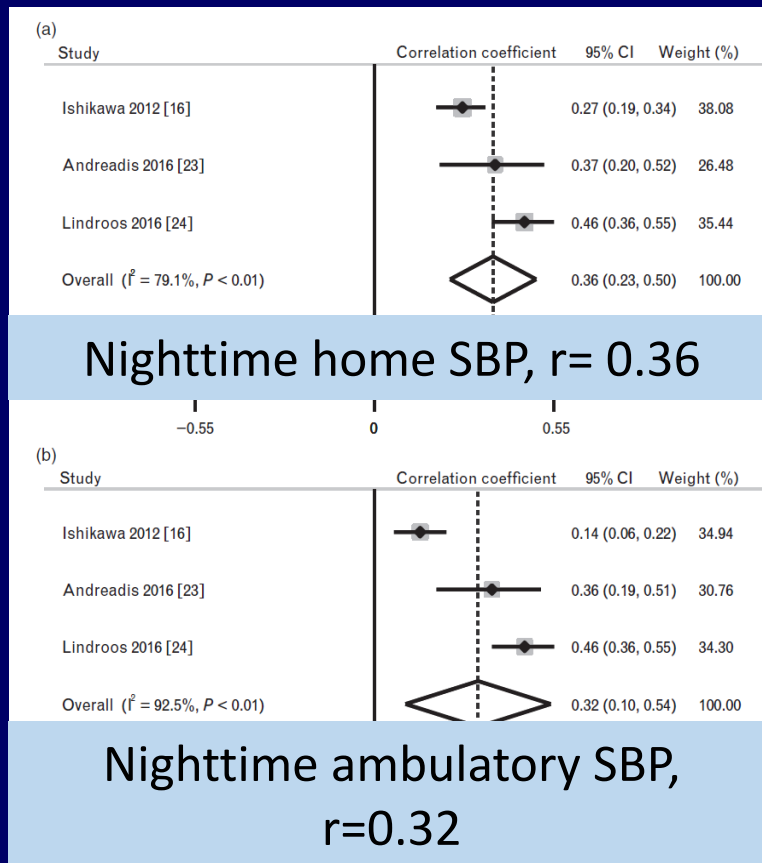
- Participants with nocturnal hypertension (NH; nighttime home/ambulatory SBP ≥ 120 mmHg) had significant higher prevalence of LVH, IMT > 0.9 mm and baPWV > 18 m/sec
- After adjusted for covariates,
 - NH defined by home SBP had significant association LVH, IMT > 0.9 mm and baPWV > 18 m/sec
 - NH defined by ABPM had significant association LVH and baPWV > 18 m/sec



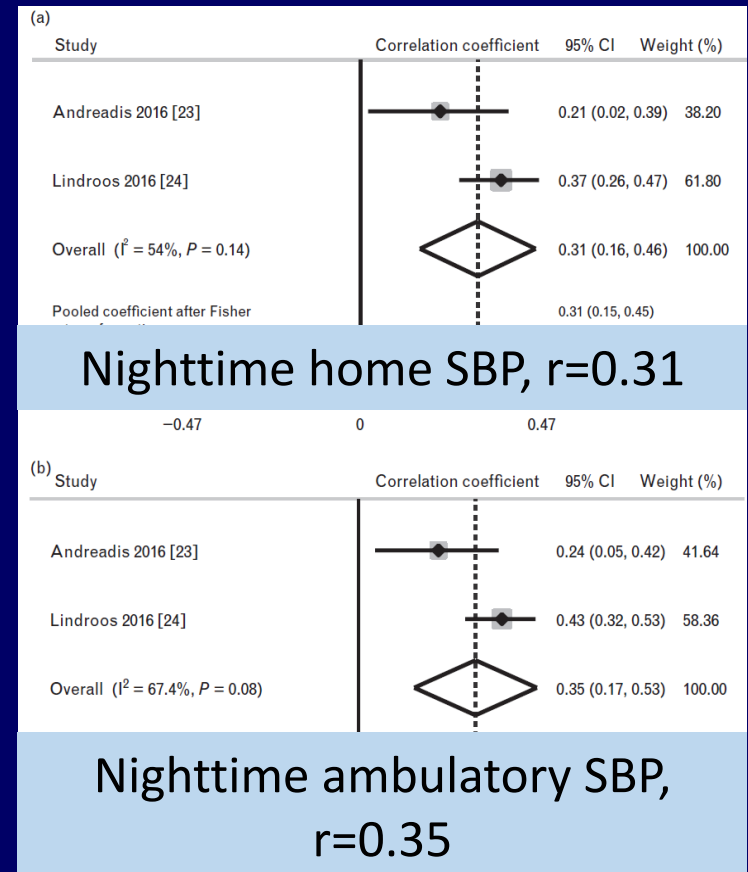
Discussion

Nighttime home SBP and ambulatory SBP: comparable relationship with organ damage

LVMI



IMT





Discussion

- This study:
 - Applied nighttime home SBP of 120 mmHg as a threshold to diagnose nocturnal hypertension (NH)
 - Nighttime home SBP had better associations with organ damage than nighttime ambulatory SBP
 - HBPM readings for longer days may reflect more accurate nighttime BP values than one day ABPM reading



Discussion

	Nighttime HBPM schedule	No. of nighttime home BP readings	Nighttime ABPM schedule	No. of nighttime ABPM readings
J-HOP	2, 3, 4 a.m. ≥1 day/wk, 2 wk	25.5±12.7 (8.9±4.3 nights)	every 30 min	14.9±2.9
Andreadis, 2016	2 nd , 3 rd , 4 th h after going to bed, 3 nights	8.5±0.9	every 20 min	19±4.7
Lindroos, 2016	2 nd , 3 rd , 4 th h after going to bed, 2 nights	5.6±1.3	every 20 min	16.6±3.5

- In participants with CV risk factors, compared to nighttime ambulatory SBP,

Nighttime home SBP was

-independently associated with LVMI, IMT and baPWV

- Nighttime home BP monitoring
 - ✓ Better association with organ damage
 - ✓ Lower cost
 - ✓ More easily enable to repeat measurement during long-term follow-up
 - ✓ More comfortable to patients
 - ✓ Could be used in clinical practice in near future



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Thank you