

ACC.24

Mandibular Advancement versus CPAP for BP Reduction In OSA and high Cardiovascular Risk

Chi-Hang Ronald LEE, MBBS MD

Professor, NUS Yong Loo Lin School of Medicine
National University Heart Centre Singapore

American College of Cardiology

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None declared

CRESCENT is an investigator-initiated trial funded by the Singapore Ministry of Health. Manufacturers of the MAD and CPAP had no role in the trial design, data collection or analysis

- Hypertension is a major risk factor for cardiac and cerebrovascular diseases¹
- OSA is an under-diagnosed and modifiable cause of hypertension²
- Hypertension guidelines³ and scientific statements⁴ recommend screening and treatment of OSA in patients with hypertension
- CPAP is the first-line treatment – deliver PAP via a nasal or oronasal interface to maintain airway patency during sleep
- However, many patients either decline to use CPAP or find it challenging to stick to the treatment⁵

- MAD (oral appliance) reduces airway collapsibility by advancing the mandible during sleep
- MAD improves sleepiness and QoL, and better accepted and tolerated
- Unknown if treating OSA using MAD is effective in reducing BP due to limitations of early studies⁶⁻¹¹
- CRESCENT trial - compare the effectiveness of MAD vs CPAP in reducing BP in patients with moderate-to-severe OSA, hypertension, and high CV risk



- **Non-inferiority:** non-inferiority margin was set at +1.5 mmHg based on a RCT comparing CPAP vs sham CPAP¹²
- **Null hypothesis:** CPAP is more effective in reducing mean arterial BP by 1.5 mmHg
- **Sample size:** detect the non-inferiority of MAD with respect to CPAP based on a statistical power of 90%, a 2.5% type-1 error rate, and 20% attrition rate, a sample size of 220 participants was needed
- **Primary outcome:** change in 24-hour mean arterial BP from baseline to 6 m

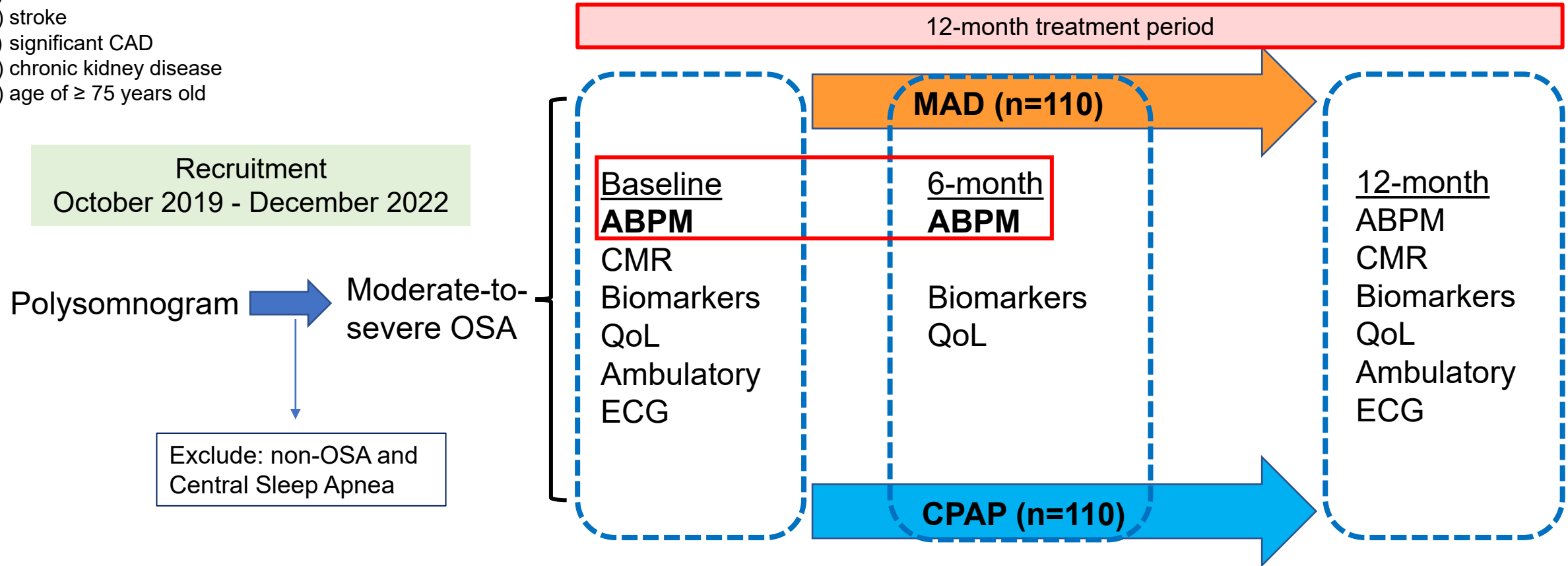
CRESCENT – protocol summary

INCLUSION CRITERIA¹³

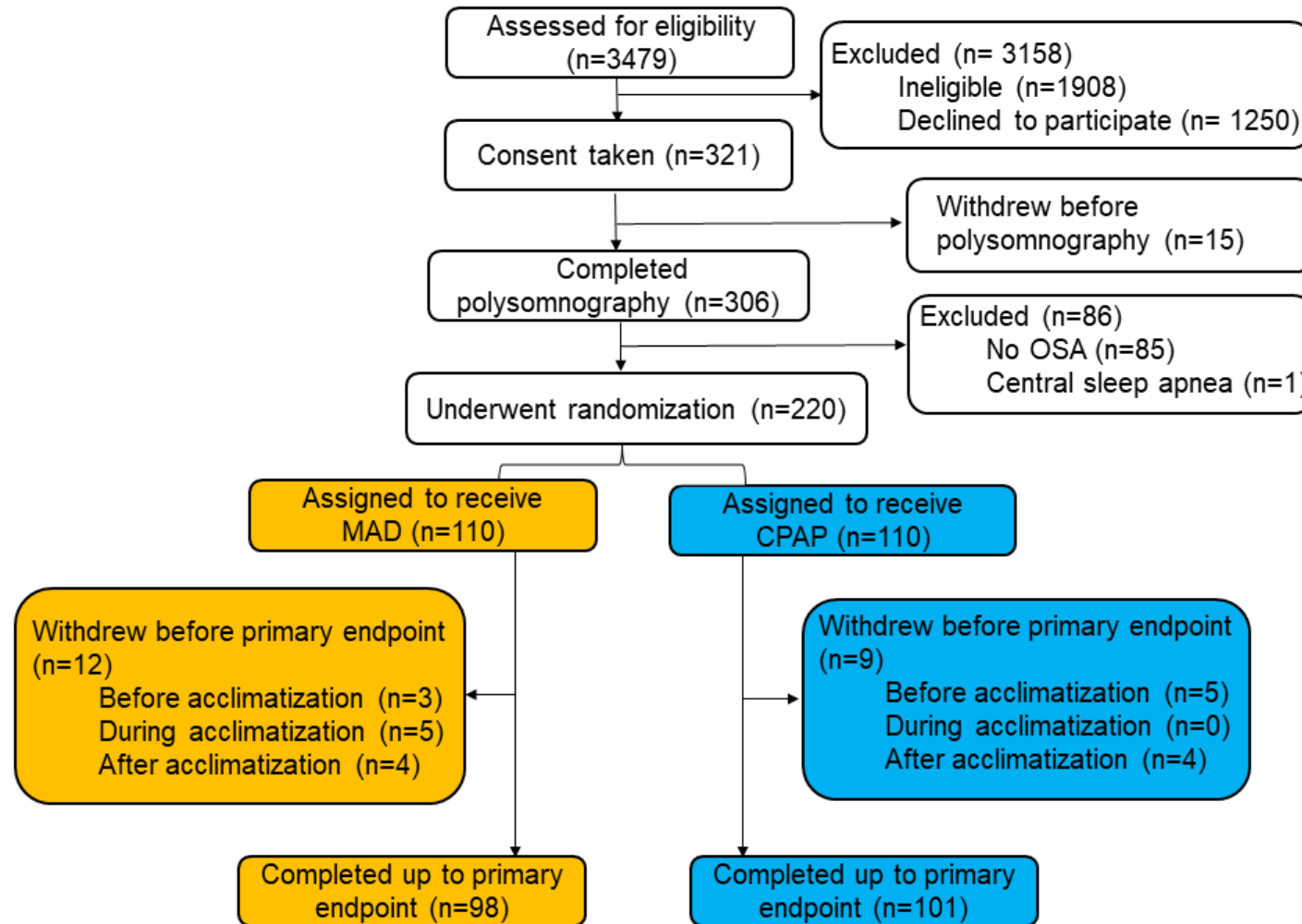
1. Age \geq 40 years
2. Chinese
3. Essential hypertension, on \geq 1 medication for BP control
4. *High cardiovascular risk, as defined by \geq one of the following:
 - (a) DM
 - (b) stroke
 - (c) significant CAD
 - (d) chronic kidney disease
 - (e) age of \geq 75 years old

EXCLUSION CRITERIA

- Known OSA on treatment
- Secondary hypertension
- Contraindications to MAD
- Hypertensive crisis, ACS, or acute HF in the past 30 days



CONSORT diagram



***Overall withdrawal: 9.5% - less than the 20% anticipated**

Key baseline characteristics balanced

	MAD (n=110)	CPAP (n=110)
Age (years), median (IQR)	61.5 (56.0-66.0)	61.0 (55.0-65.0)
Male sex, n (%)	96 (87.3)	92 (83.6)
BMI (kg/m ²), median (IQR)	27.6 (25.4-30.5)	27.4 (25.2-30.6)
Number of BP medications, n (%)		
1	27 (24.6)	42 (38.2)
2	53 (48.2)	41 (32.3)
3	22 (20.0)	22 (20.0)
≥4	8 (7.3)	5 (4.0)
24-h SBP (mmHg), median (IQR)	125 (118-132)	125 (118-132)
DM	65 (59.1)	65 (59.1)
Previous CVA/TIA	8 (7.3)	8 (7.3)
Chronic kidney disease	9 (8.2)	8 (7.3)
Previous MI	32 (29.1)	33 (30.0)
Previous PCI	51 (46.4)	57 (51.8)
Previous CABG	11 (10.0)	12 (10.9)

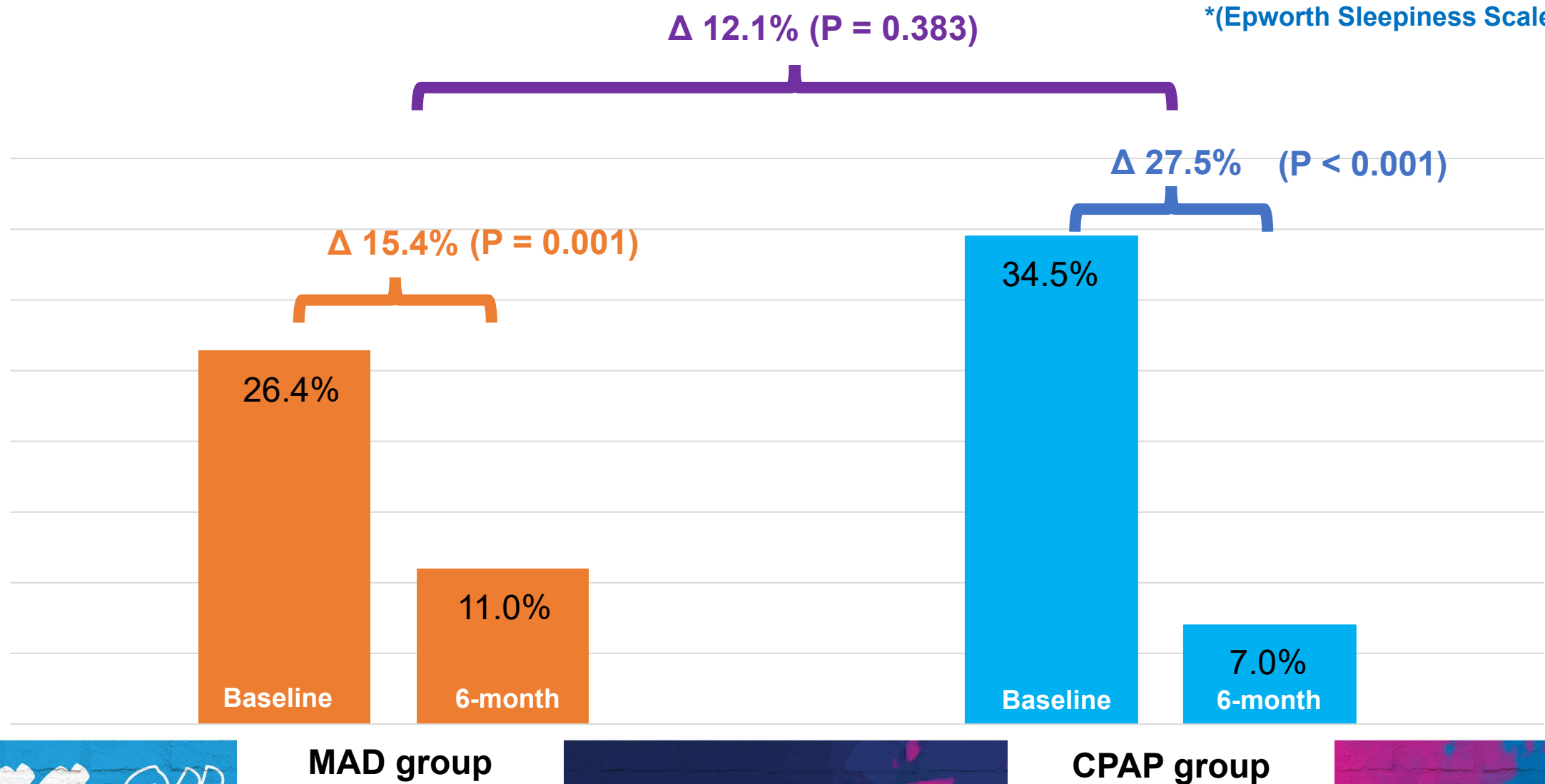
Device adherence (over 6 months)

	MAD (n=85)	CPAP (n=98)
Device adherence		
* ≥ 4 hours per night in $\geq 70\%$ of the night, n (%)	59 (69.4)	63 (64.3)
Average usage ≥ 4 hours per night, n (%)	64 (75.3)	68 (68.7)
Average usage ≥ 6 hours per night, n (%)	48 (56.5)	23 (23.2)

* American Academy of Sleep Medicine (AASM) recommendation for improvement in clinical symptoms

Excessive Daytime Sleepiness*

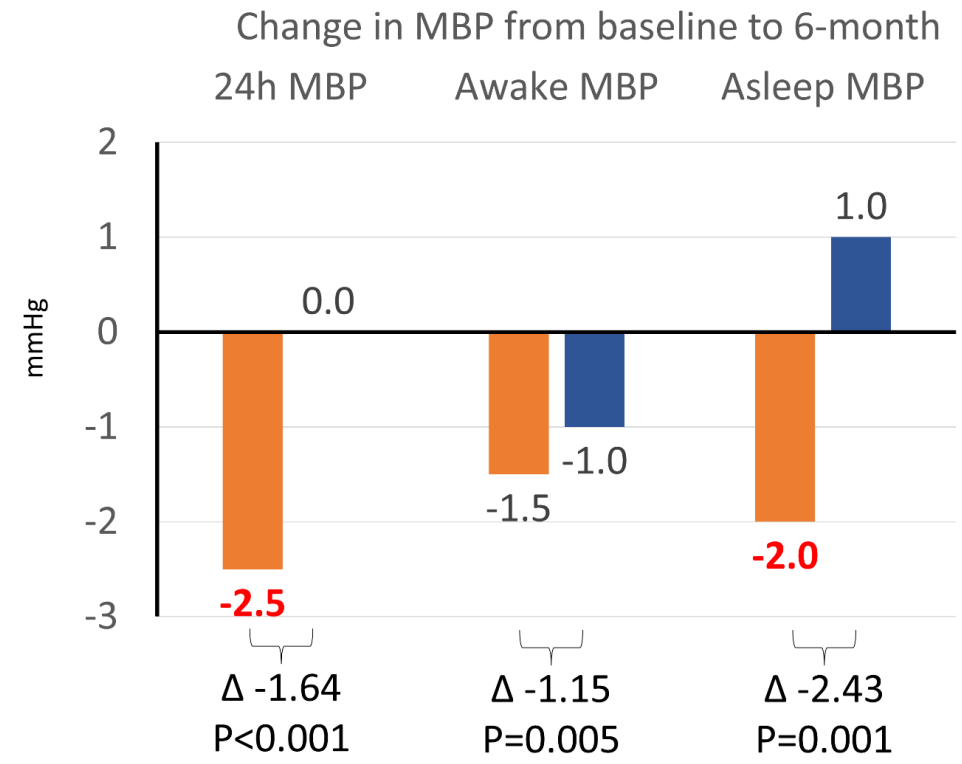
*(Epworth Sleepiness Scale >10/24)



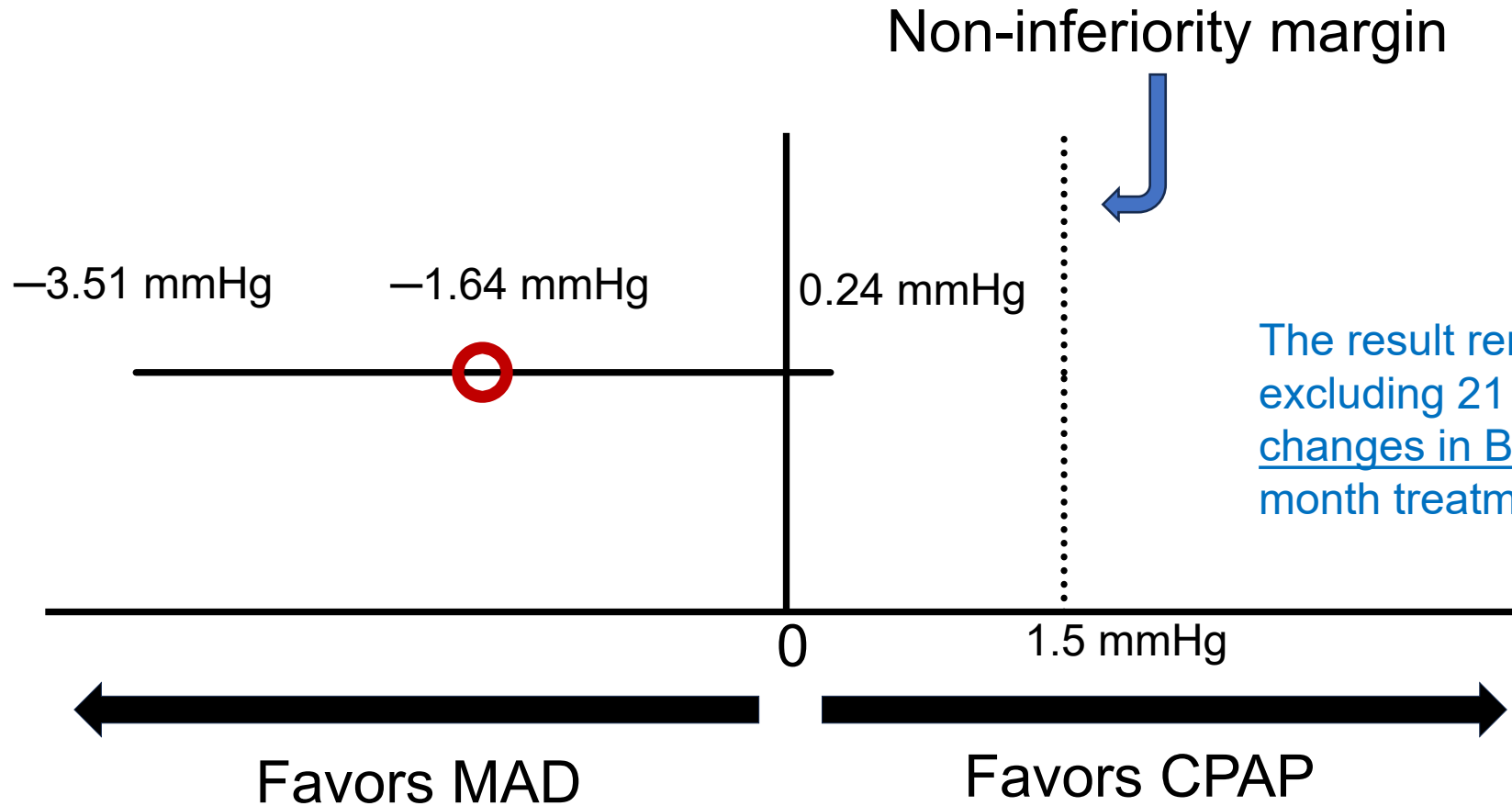
Change in BP from baseline to 6-month

In this cohort of OSA participants with relatively well-controlled BP at baseline...

MAD vs. CPAP
Mean arterial BP



Effect size in relation to margin



The non-inferiority of MAD against CPAP is demonstrated because the confidence interval does not exceed the predefined margin of 1.5 mmHg (dotted line).

Awake vs Asleep BP

	MAD		CPAP		Difference (95% CI) in BP changes (mmHg)	p value ANOVA
	Baseline	6-month	Baseline	6-month		
Awake BP – not wearing the device						
SBP	126 (121-135)	124 (117-134)	129 (119-136)	127 (119-136)	-1.83 (-4.56 to 0.90)	0.009
DBP	82 (77-88)	81 (75-85)	81 (75-88)	81 (74-88)	-0.83 (-2.66 to 1.00)	0.007
Asleep BP – wearing the assigned device						
SBP	122 (113-131)	118 (110-129)	121 (113-129)	120 (111-131)	-2.85 (-6.14 to 0.44)	0.005
DBP	77 (71-84)	75 (69-81)	75 (70-82)	76 (70-83)	-2.26 (-4.59 to 0.06)	0.001

- The CRESCENT compared the effectiveness of MAD versus CPAP for BP reduction. All participants had hypertension and high CV risk
- MAD was non-inferior to CPAP for reducing 24-h mean arterial BP at 6-m follow-up
- The between-group difference in BP reduction favored MAD and was most pronounced for asleep BPs
- Both the MAD and CPAP were effective in improving daytime sleepiness



Yi-Hui **Ou**, BSc (Pharm), Juliana Tereza **Colpani**, DDS, MS,
Crystal S. **Cheong**, MBBS, Weiqiang **Loke**, BDS, As tar **Thant**, RPSGT,
E Ching **Shih**, MBBS, Frank **Lee**, BDS, Siew-Pang **Chan**, PhD
Ching-Hui **Sia**, MBBS, Chieh-Yang **Koo**, MBBS, Serene **Wong**, MBBS,
Aiping **Chua**, MBBS, Chin-Meng **Khoo**, MBBS, William **Kong**, MBBS, PhD,
Calvin W. **Chin**, MD, PhD, Pipin **Kojodjojo**, MBBS; PhD, Philip E. **Wong**, MBBS,
Mark Y. **Chan**, MBBS; PhD, A. Mark **Richards**, MD, PhD,
Peter A. **Cistulli**, MBBS; PhD, Chi-Hang **Lee**, MBBS, MD

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