# ORAL PRESENTATIONS

## SCIENTIFIC SESSION 16: STROKE: SHEDDING LIGHT ON CIRCADIAN RYTHMS IN HYPERTENSION

### O56 NIGHTTIME BLOOD PRESSURE REFERENCE VALUES FOR AMBULATORY BLOOD PRESSURE MONITORING AND THEIR RELATIONSHIP WITH AGE

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**Background and Objective:** Nocturnal hypertension is characterized by elevated blood pressure (BP) levels during sleep (systolic blood pressure [SBP]>120 mmHg or diastolic blood pressure [DBP]>70 mmHg) as measured by 24-hour ambulatory blood pressure monitoring (24-h ABPM) (ESH 2023 guidelines). With aging, there is a gradual decline in renal function and vascular health, leading to changes in BP patterns. This study seeks to evaluate the necessity of age-specific cutoff points in defining hypertension, particularly during nocturnal hours.

**Methods:** A cross-sectional study was conducted, involving 3,220 patients without hypertension, defined by 24-hour BP values, who were not using any antihypertensive medications and were referred for 24-h ABPM. Patients with a body mass index (BMI) ≥30 kg/m$^2$ were excluded. The sleep period was defined as spanning from midnight to 6 am. Reference percentiles were established and juxtaposed with standard references. To determine the significance of age-specific cutoff points for defining nocturnal hypertension, the ESH 2023 reference was compared with the 95th percentile (P95) for age.

**Results:** Among the participants, 64.6% were female, with an average age of 51.0±15.0 years, BMI of 25.0±2.7 kg/m$^2$, nocturnal SBP of 106.4±9.0 mmHg (P95=121.8 mmHg), and nocturnal DBP of 66.0±5.0 mmHg (P95=74.3 mmHg). Normal distribution was observed for both SBP and DBP (Jarque Bera test). Nocturnal SBP exhibited a "J" shaped curve concerning age, whereas the average DBP remained relatively stable. Significant differences were noted for SBP across different age groups (P value <0.00001). Proposed cutoff points for mean nocturnal SBP were suggested as follows: i) P95 <60 years=120 mmHg; ii) P95 60-70 years=125 mmHg; and iii) P95 >70 years=130 mmHg (Figure). A reference of 75 mmHg was proposed as the cutoff point for mean nocturnal DBP.

**Conclusions:** The study highlights age-related variations in the P95 of mean nocturnal SBP, while DBP remains relatively stable across age groups. Consequently, we propose new cutoff points for defining these parameters.

**Keywords:** Hypertension; blood pressure; sleep; reference values; aging

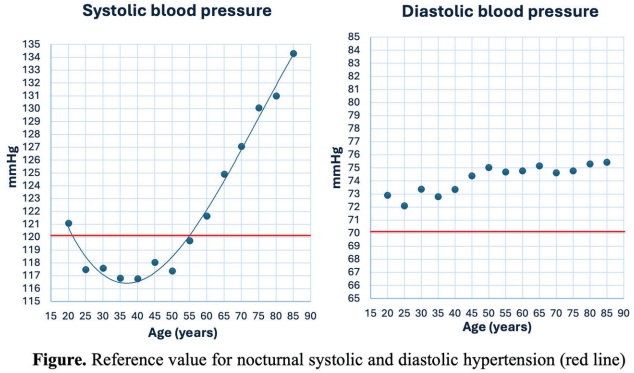


**Figure.** Reference value for nocturnal systolic and diastolic hypertension (red line) and 95th percentile of nocturnal mean systolic blood pressure and diastolic blood pressure according to age (blue dots).

### O57 NOCTURNAL BLOOD PRESSURE FLUCTUATION AND DIPPING PATTERNS IN PATIENTS WITH SEVERE OBSTRUCTIVE SLEEP APNOEA

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**Background and Objective:** Nighttime blood pressure (BP) is important for diagnosis of hypertension and for cardiovascular risk stratification. Remarkably, a reverse dipping pattern is a strong and independent predictor of overall mortality and major adverse cardiovascular events. Therefore, the further clarification of the underlying mechanisms of non- and reverse dipping is crucial to improve the treatment of patients with nighttime hypertension.

**Methods:** We investigated 97 patients with suspected obstructive sleep apnoea (OSA, AHI >30) using standard polysomnography and continuous BP measurement based on the pulse-transit-time method (SOMNOscreen Plus®, SOMNOmedics). Frequency and amplitude of fluctuations in systolic BP following sleep disturbances (OSA) were investigated.

**Results:** Apnoeic events went along with transient increases of BP. In some cases, systolic BP did not reach the value before the apnoea but increased over time. We defined elevations of the systolic BP baseline by >10 mmHg with a duration of >10 min as BP superpositions. The superposition periods were also characterized by increased BP amplitudes with peak values of BP up to 220 mmHg. Superposition occurred in 48 patients. Further, 65% of the OSA patients were identified as non-dippers. However, nearly all the patients with superposition (98%) were identified to have non-dipper or reverse dipper patterns.

**Conclusions:** Our study strongly suggests that non-dipping and reverse dipping in patients with severe OSA are causally linked to OSA related BP fluctuations. Further, continuous elevations in SBP baseline (superpositions) result in extreme BP values. This behaviour with high BP peaks may be contributing to the increased mortality in patients with reverse dipping. Therefore, identification and adequate treatment of patients with reverse dipping reduces the cardiovascular risk and may prolong their life.

### O58 CONTINUOUS MEASUREMENT OF BLOOD PRESSURE DURING NIGHT - INSIGHTS INTO THE GENESIS OF THE NOCTURNAL BLOOD PRESSURE FLUCTUATIONS

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**Background and Objective:** Nighttime blood pressure (BP) is a strongly predictive marker for overall cardiovascular risk. Traditional cuff-based BP measurements methods provide only discrete BP data. Short-term BP fluctuations are not detectable with such methods. Therefore, we applied two independent and continuously measuring methods with the aim to characterize systolic nocturnal blood pressure fluctuations (NBPF) related to sleep apnoea or periodic leg movements (PLM).

**Methods:** BP fluctuations were analysed in patients with suspected sleep disturbances. The Portapres™ device (Penaz method) and a system based on the measurement of the pulse transit time (SOMNOscreen®) were used to measure the BP in addition to a polysomnography performed under the conditions of a clinical sleep laboratory. The calculation of the BP by the SOMNOscreen® was performed using a BP-pulse wave velocity (PWV) transfer function.

**Results:** We saw BP fluctuations which occurred in connection with obstructive apnoeic events as well as in connection with PLM. Both methods recorded the same apnoea related NBPF. The amplitudes of these NBPF accounted for 24.7 mmHg and 22.8 mmHg (Portapres™ and SOMNOscreen®, respectively, 11 patients, number of events: n=695). PLM related PB fluctuations (in 5 of 11 patients, n=317) amounted to 18.4 mmHg (Portapres™ and 16.9 mmHg (SOMNOscreen®). Most of the patients did not show BP dipping when comparing awake with sleep time periods and they had a moderate to severe apnoea/hypopnoea index.

**Conclusions:** The study demonstrates a strong relation between apnoeic events/PLM and NPBF. The NBPF were similarly detected by two different BP measuring methods suggesting that the more indirect method of BP determination using the PWV provides a reliable measurement of NBPF. The results suggest that OSA