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## Introduction

- Abnormal nocturnal blood pressure (BP) such as non-dipping or nocturnal hypertension (reverse-dipping) represents a potent marker for current and future cardiovascular risks.
- Accurate BP measurement reflecting “sleep” BP is important.
- Standard cuff-based ambulatory nocturnal BP measurement yields limited data points potentially resulting in imprecise results.

## Hypothesis

- Spot check nocturnal BP does not capture true average nocturnal BP as measured by continuous beat to beat BP recording.

## Methods

- Design: Prospective observational
- Subjects: Patients undergoing clinically indicated in-lab polysomnography (PSG)
- BP measurement: Beat-to-beat fashion by noninvasive Caretaker® device that uses a pulse decomposition analysis algorithm
- Sleep wakefulness status was ascertained by PSG
- Analysis:
  - Comparison between “every 30 min periodic systolic BP data starting at the onset of BP recording” and “average BP data from entire 30 min continuous beat-to-beat BP measurement” both by Caretaker® for entire recording time and by sleep state (sleep vs. awake)
  - BP variability defined as SD of the rolling difference between the 100 point mean of systole on continuous BP measurement by the patient’s sleep state

## Results

### Characteristics of study participants ( n = 13)

- Age: 52 (12) yo, Male (8/13), BMI 34, HTN (11/13)
- Diagnostic PSG: 9/13, Split night PSG: 4/13

### Sleep characteristics of study participants ( n = 13)

- Any OSA (AHI>5) present: 10/13
- Significant OSA (AHI>15) present: 6/13
- Average total sleep time: 385 min

## Main results ( n = 13)

- Mean SBP of Sleep and Awake were similar [135.3 (19.8) vs. 134.5 (18.7) mmHg, P=0.45] (Figure 1- Box Plot)
- Mean nocturnal SBP by **periodic BP measurement** was higher compared with **beat-to-beat-derived average BP** (139.1 mmHg [20.3] vs. 134.7 [19.5], p< 0.0001) (Figure 2)
- The difference between the two methods remained similar when continuous BP was derived from sleep vs. awake period (4.5 mmHg [5.9] vs. 5.0 [5.6], p= 0.75)
- BP variability was more pronounced during awake compared with sleep period (4.6 mmHg [1.3] versus 3.3 [1.3], p<0.0001)

Figure 1

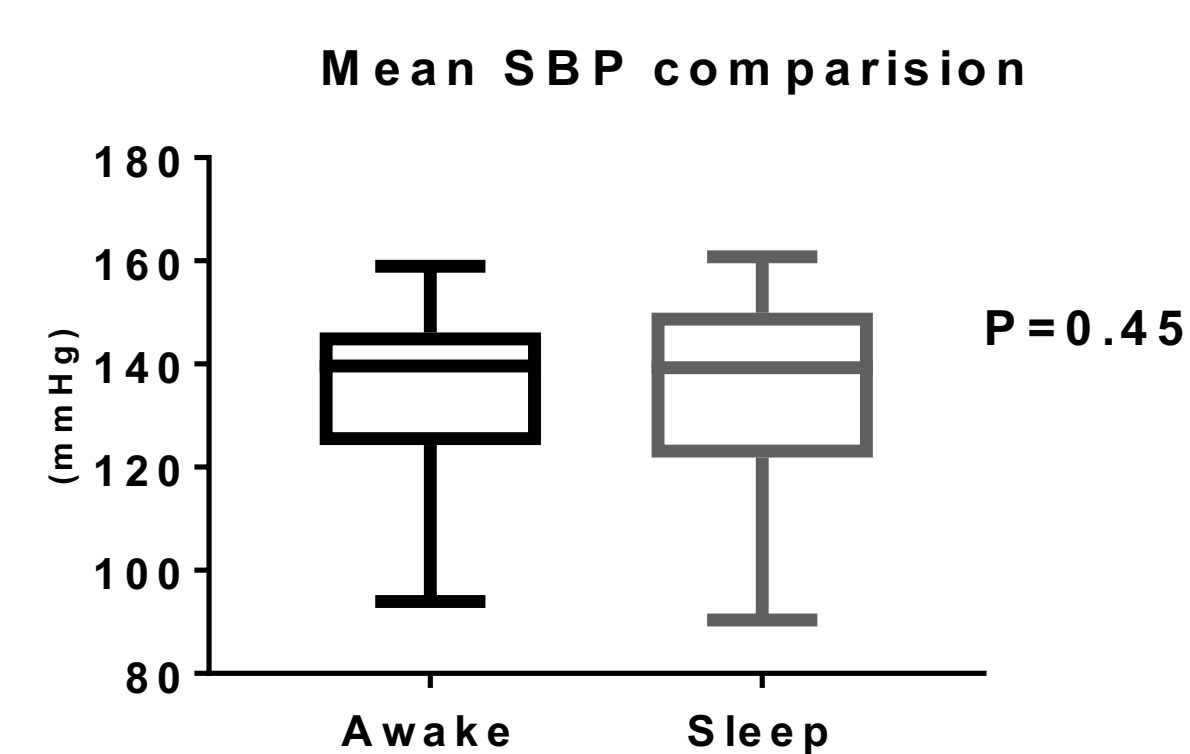
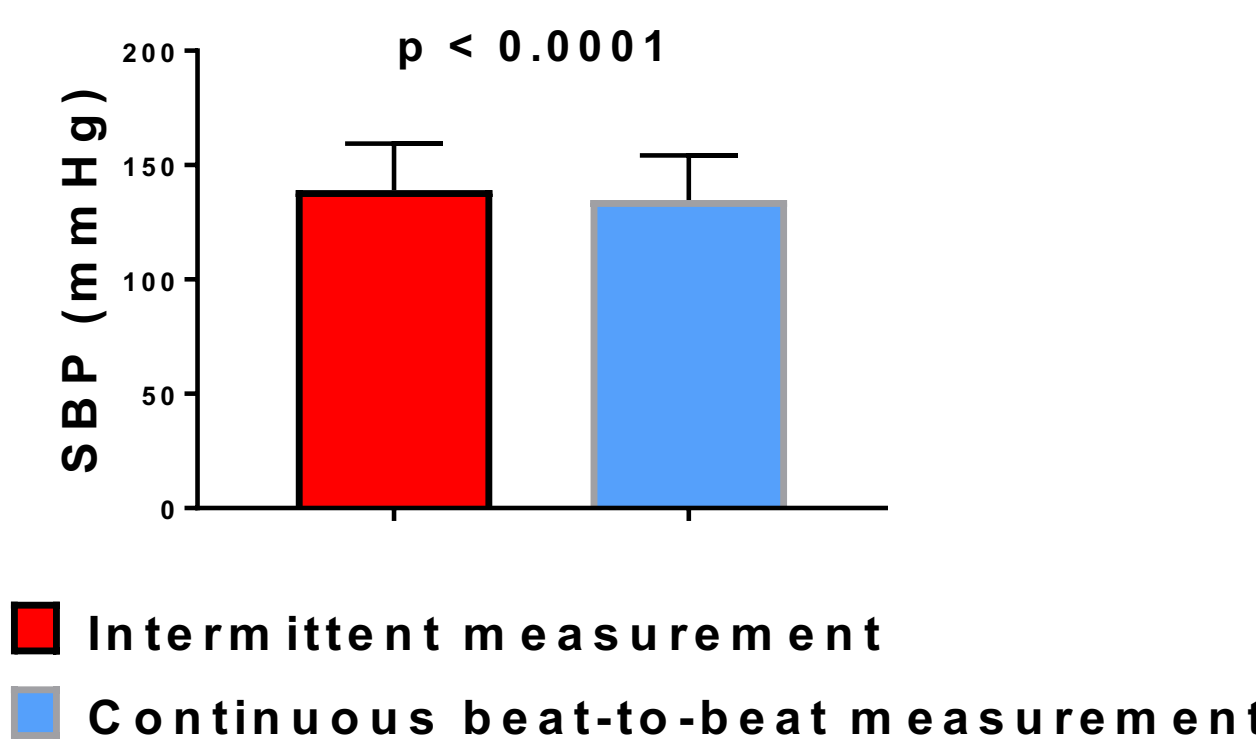
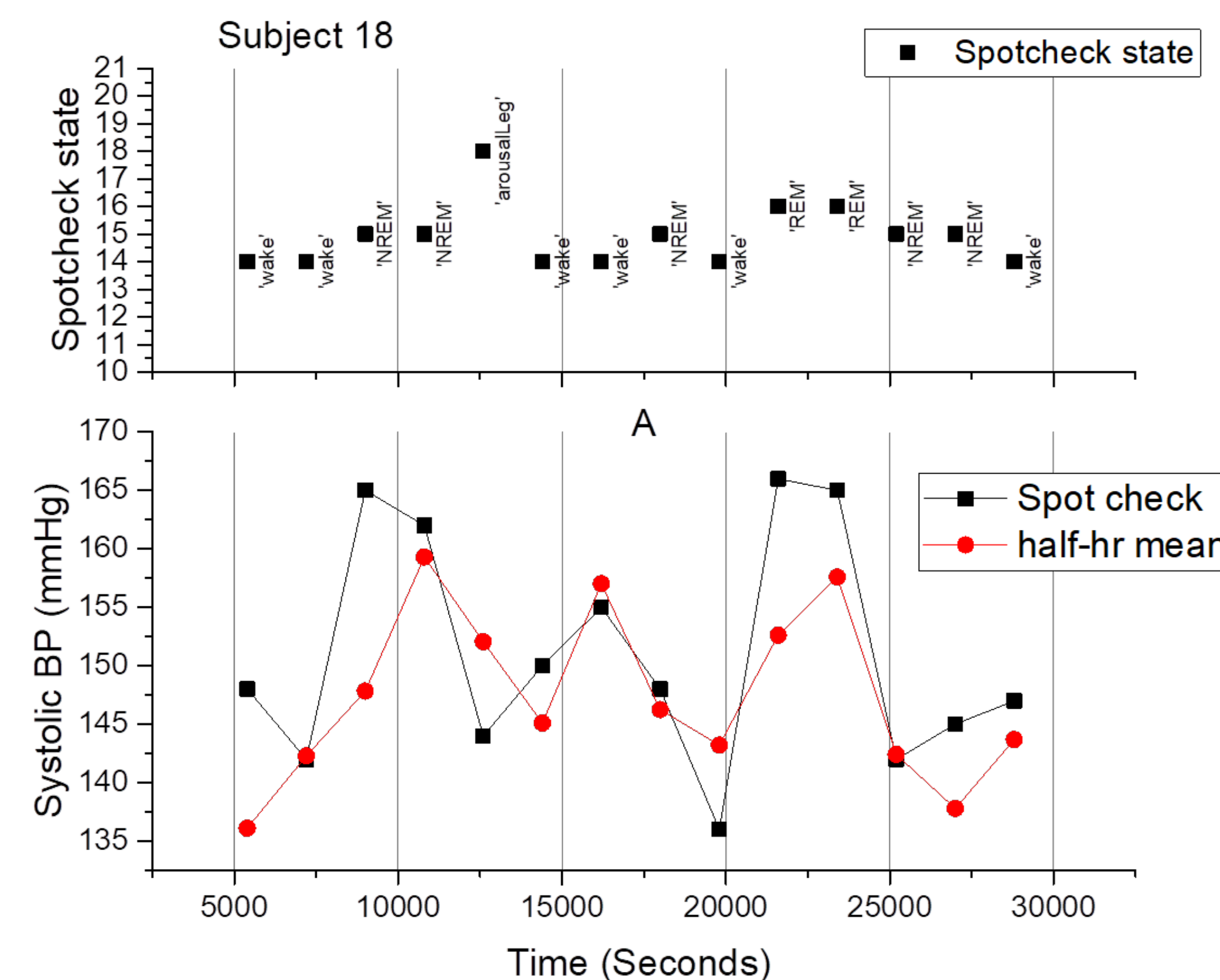


Figure 2



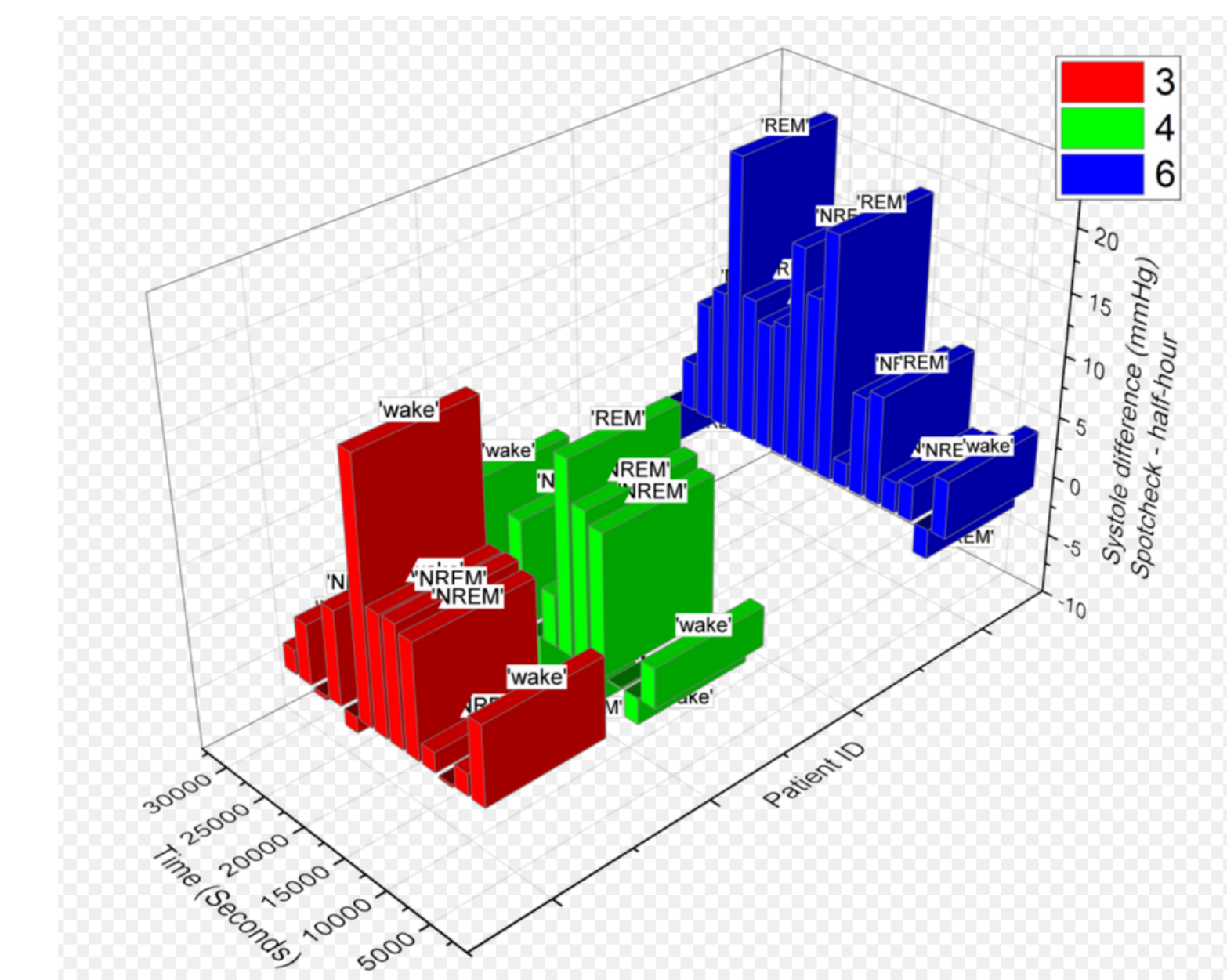
### SBP comparison between hypothetical spot check BP vs. continuous beat-to-beat (Example)

Figure 3



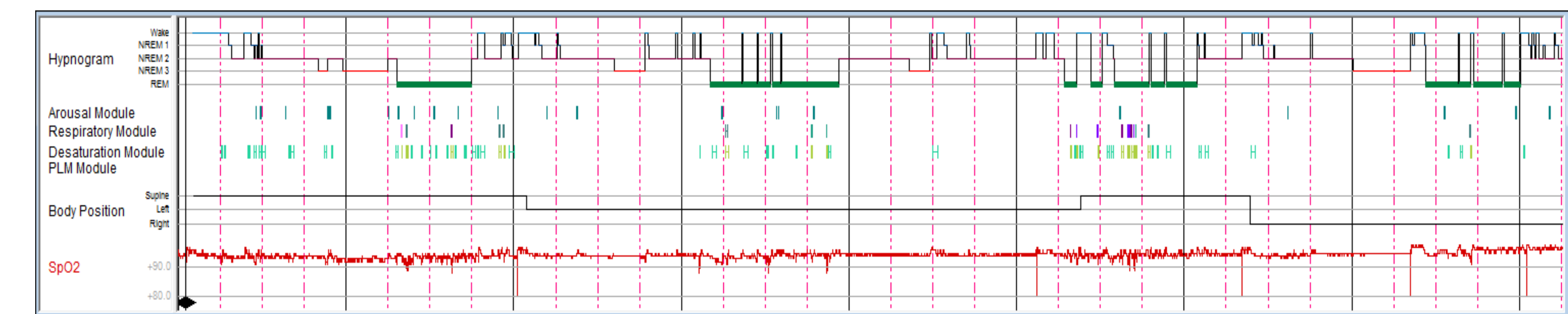
### Sample BP trend by sleep/awake state (Example from 3 subjects)

Figure 4



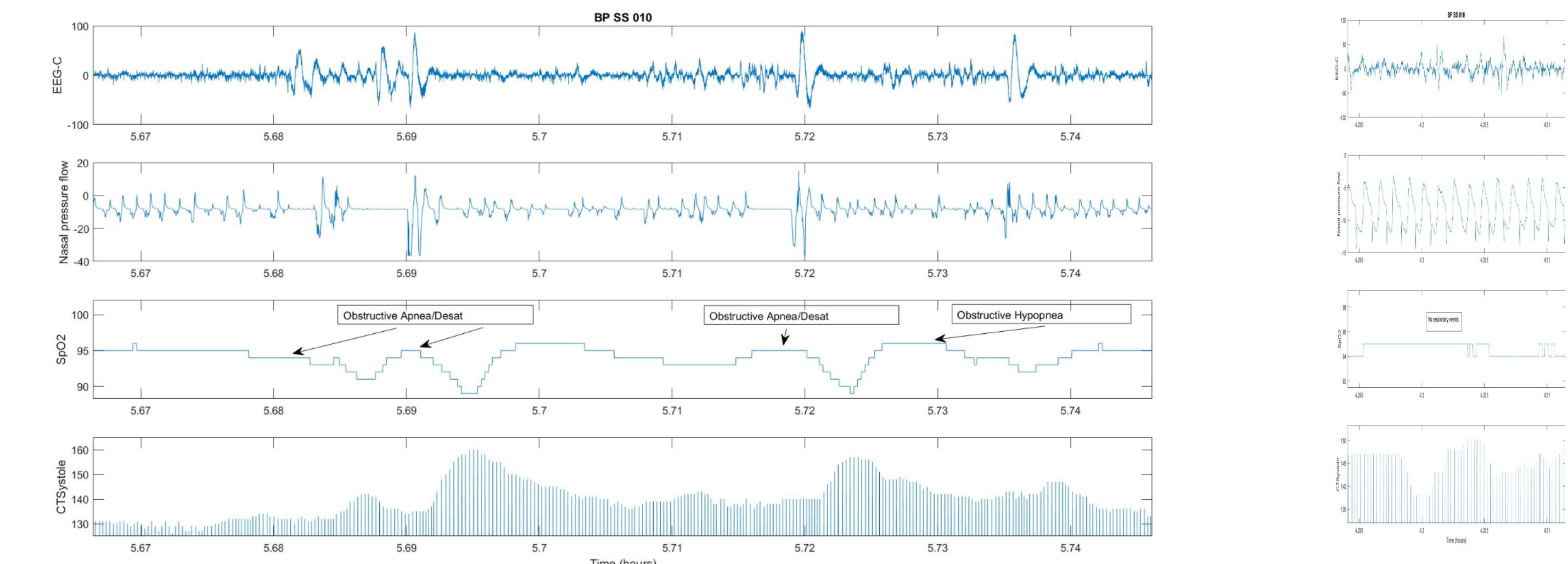
### BP change in sleep in the context of respiratory events and wakefulness (Example)

Figure 5



### Acute BP change during sleep (example)

Figure 6



## Conclusion

- Periodic BP measurement currently adopted by standard ambulatory nocturnal BP may not yield true nocturnal sleep BP pattern due to its spot-check nature and lack of sleep-awake information
- Incorporation of beat-to-beat continuous BP measurement along with sleep recording can provide more accurate and meaningful nocturnal BP information

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