Physiological Changes in a Mouse Model of Obstructive Sleep Apnea

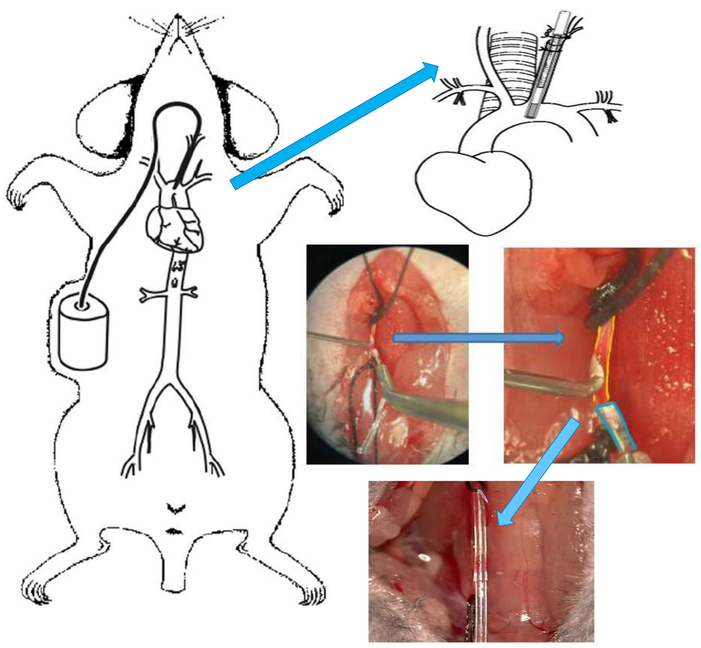
Aynur Aliyeva[1], *Laetitia Gaspar*[1], *Shweta Bhadri*[1], *Josette Smith*[1], *Bala S Koritala*[1], *David F. Smith*[1]

[1]Cincinnati Children's Hospital Medical Center,OH, USA;

Introduction:

- Obstructive sleep apnea (OSA) is a condition characterized by recurrent episodes of upper airway obstruction during sleep, leading to intermittent hypoxia (IH) and sleep fragmentation.
- While the pathophysiological mechanisms underlying OSA remain unclear, it is important to investigate the changes in physiological parameters that occur following short exposures to IH in order to gain a better understanding of the condition.
- In this study, we aimed to examine the effects of IH on blood pressure (BP), heart rate (HR), core body temperature (CBT), and activity in a mouse model.

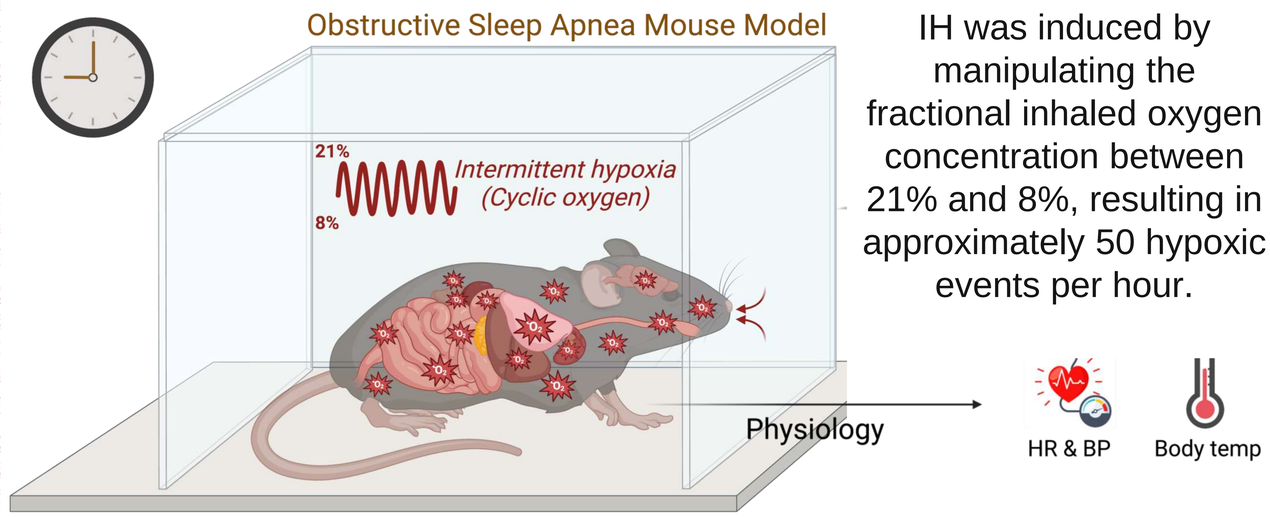
Methods



Following a 2-week surgical recovery, the mice were divided into 2 groups: an experimental group exposed to 4 weeks of IH during their inactive phase and a control group exposed to normal oxygen levels (normoxia).

Subsequently, we utilized the DSI telemetry system to measure the impact of IH on various physiological parameters

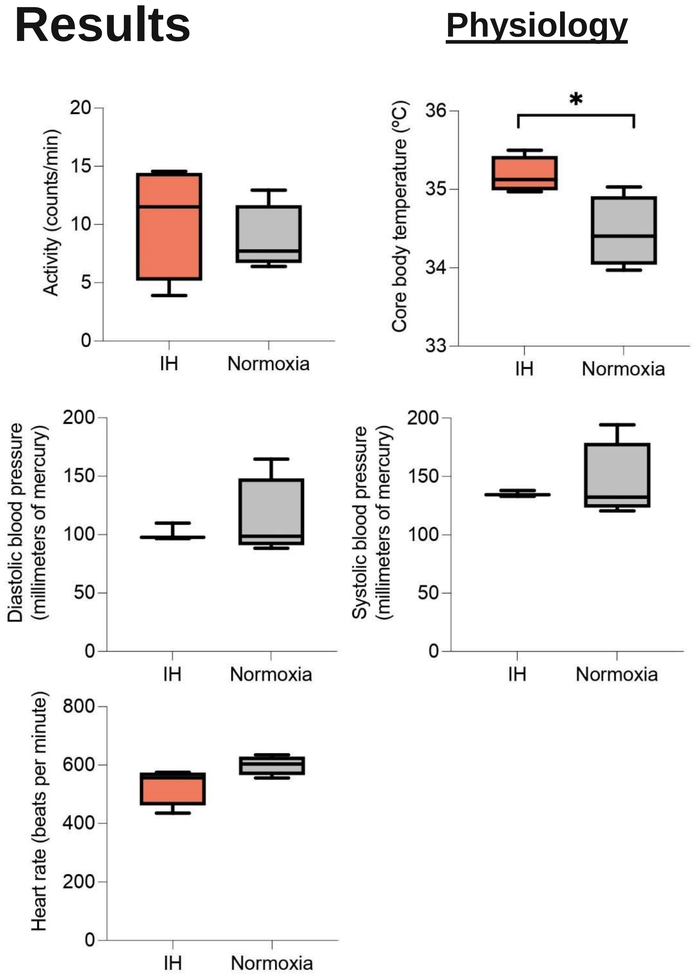
Fig 1. To assess physiological changes, DSI HD-X10 telemetry probes were surgically implanted into the carotid artery of mice aged 8 to 10 weeks



IH was induced by manipulating the fractional inhaled oxygen concentration between 21% and 8%, resulting in approximately 50 hypoxic events per hour.

Fig 2. C57BL6/J mice (8-10 week old) were subjected to normoxic and IH conditions to assess the physiological parameters associated with OSA.

Results



Exposure to 4 weeks of IH significantly increased CBT, suggesting a disruption in thermoregulation, but did not exhibit significant effects on BP, HR, and activity levels.

These findings may indicate that disrupted thermoregulation is influenced by IH, a characteristic feature of OSA.

Fig 3. . The effects of IH on body temperature, heart rate, blood pressure, and activity. Only the body temperature is significantly higher after 4 week iIH exposure.

Conclusions

- Gaining insights into the initial physiological changes associated with OSA is crucial for early detection and the development of intervention strategies.
- The mouse model used in this study provides valuable information about the physiological consequences of IH, particularly with regard to alterations in BP, HR, CBT, and activity levels
- These findings contribute to a better understanding of the physiological implications of OSA.

Summary

- This study explored the effects of intermittent hypoxia (IH), characteristic of obstructive sleep apnea (OSA), on various physiological parameters in a mouse model, aiming for better understanding and early detection of the condition.
- The results revealed that four weeks of IH exposure led to a significant increase in core body temperature (CBT), indicating disrupted thermoregulation, but didn't significantly affect blood pressure, heart rate, and activity levels.
- These insights from the mouse model contribute to a deeper comprehension of the physiological implications of OSA, aiding in the development of intervention strategies

Email: dr.aynuraliyeva86@gmail.com