

## IMPORTANCE FOR CHIARI PATIENTS

Little is known about how lung pressure can alter intracranial dynamics. Patients with Chiari malformation have reported symptoms associated with coughing and sneezing and have occurrence of sleep apnea. This study will help quantify how lung pressure can change the intracranial dynamics. A detailed understanding of these dynamics could help provide new treatment possibilities for patients.

## INTRODUCTION



Figure 1. Mechanism of obstructive sleep apnea

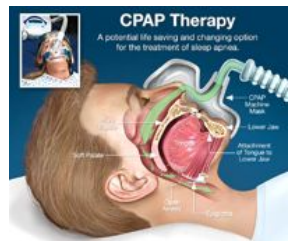
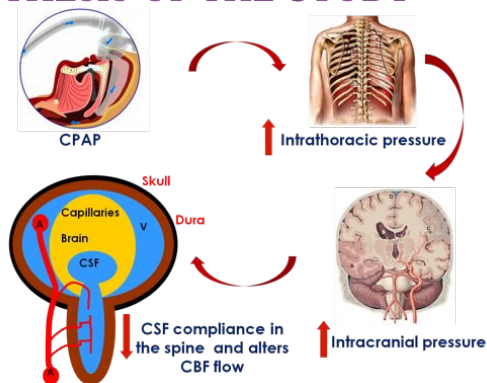


Figure 2. CPAP therapy as the gold standard treatment for sleep apnea

## HYPOTHESIS OF THE STUDY



## GOAL

To quantify the impact of CPAP at 15 cmH<sub>2</sub>O on cerebral blood flow (CBF) and CSF flow dynamics using a specific MRI protocol.

## METHODS

1. pcMRI prospectively gated with measurement of CSF and CBF flow with and without CPAP at 17 cm H<sub>2</sub>O
2. Study group: 25 healthy male subjects
3. Monitored: Transcutaneous PCO<sub>2</sub>, heart rate, SaO<sub>2</sub>

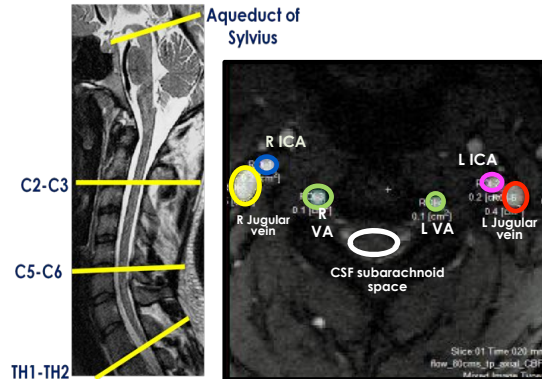


Figure 3. Sagittal view of the MR measurement locations (left). Axial view of the region of interest (ROI) of blood vessels and CSF at the C2-C3 level as visualized by Segment software (right).

## PRELIMINARY RESULTS

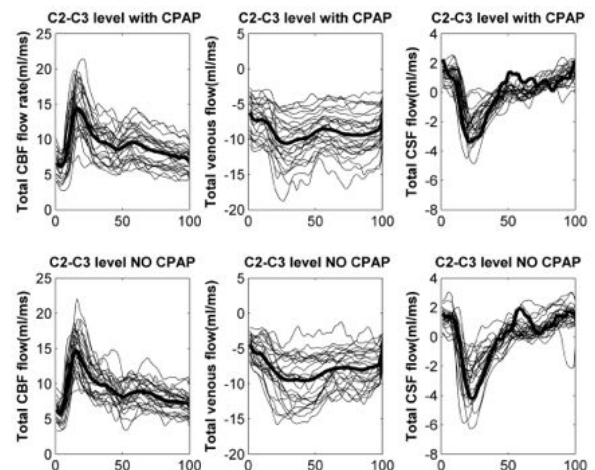


Figure 4. Arterial, venous and CSF flow measurements with (top row) and without CPAP (bottom row). Bold lines denote the average flow waveform for all the subjects

1. CSF pulsation ↓, Venous flow ↑ at the C2-C3 under CPAP
2. No significant change of CBF at the C2-C3 level under CPAP
3. PCO<sub>2</sub> ↓ 5%, HR ↑ 4% under CPAP

## CONCLUSION

1. CPAP at 17 cmH<sub>2</sub>O decreases CSF pulse amplitude at C2-C3
2. CPAP at 17 cm H<sub>2</sub>O increases venous outflow at the C2-C3
3. CSF system appeared to have a damping influence
4. No effect of CPAP on total CBF

## REFERENCES

1. Bowie, R. A. et al., 2001, "The Effect of Continuous Positive Airway Pressure on Cerebral Blood Flow Velocity in Awake Volunteers," Anesth Analg.
2. Yiallourou T.I et al., 2012 "The Effect of Continuous Positive Airway Pressure on Total Cerebral Blood Flow in 23 Healthy Awake Volunteers", Sleep & Breathing
3. Scala, R., et al., "Effects of Incremental Levels of Continuous Positive Airway Pressure on Cerebral Blood Flow Velocity in Healthy Adult Humans," Clin Sci
4. Dabrowski, W., 2007, "Changes in Intra-Abdominal Pressure and Central Venous and Brain Venous Blood Pressure in Patients During Extracorporeal Circulation," Med Sci Monit