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## Effects of continuous positive airway pressure (CPAP) sleep apnea treatment on mild cognitive impairment (MCI) and cardiovascular risk

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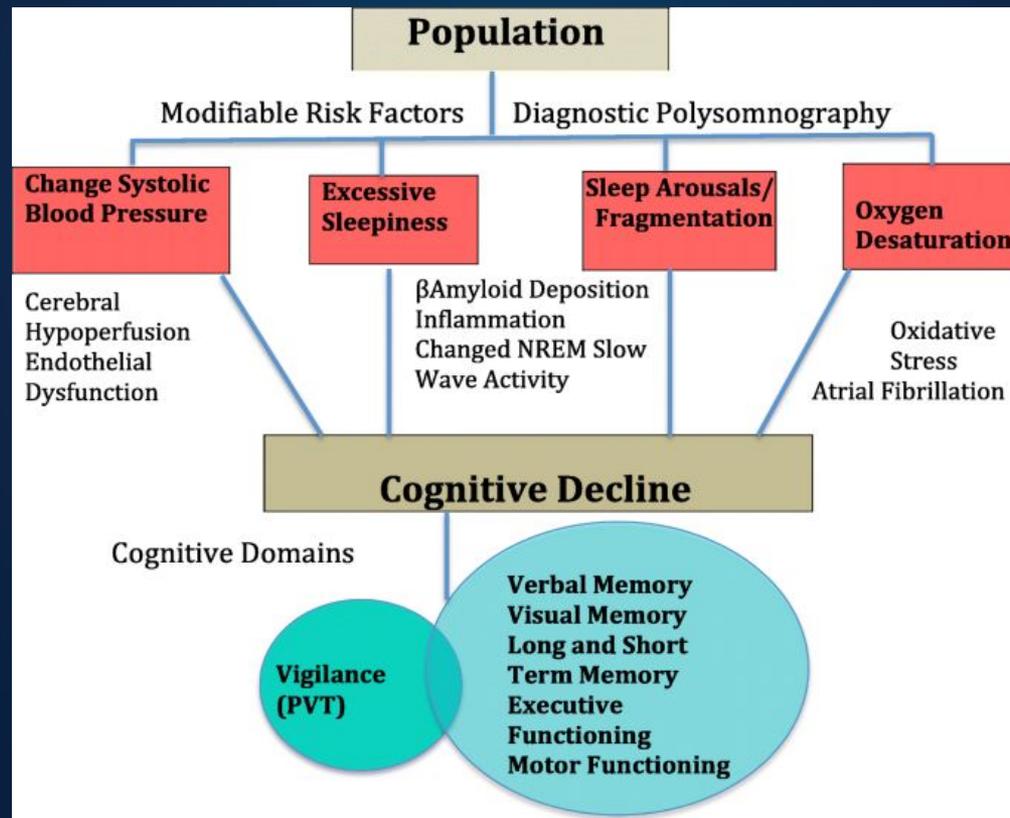


**Sidney Kimmel  
Medical College™**  
at Thomas Jefferson University

# Effects of continuous positive airway pressure (CPAP) sleep apnea treatment on mild cognitive impairment (MCI), a precursor state to Alzheimer's disease

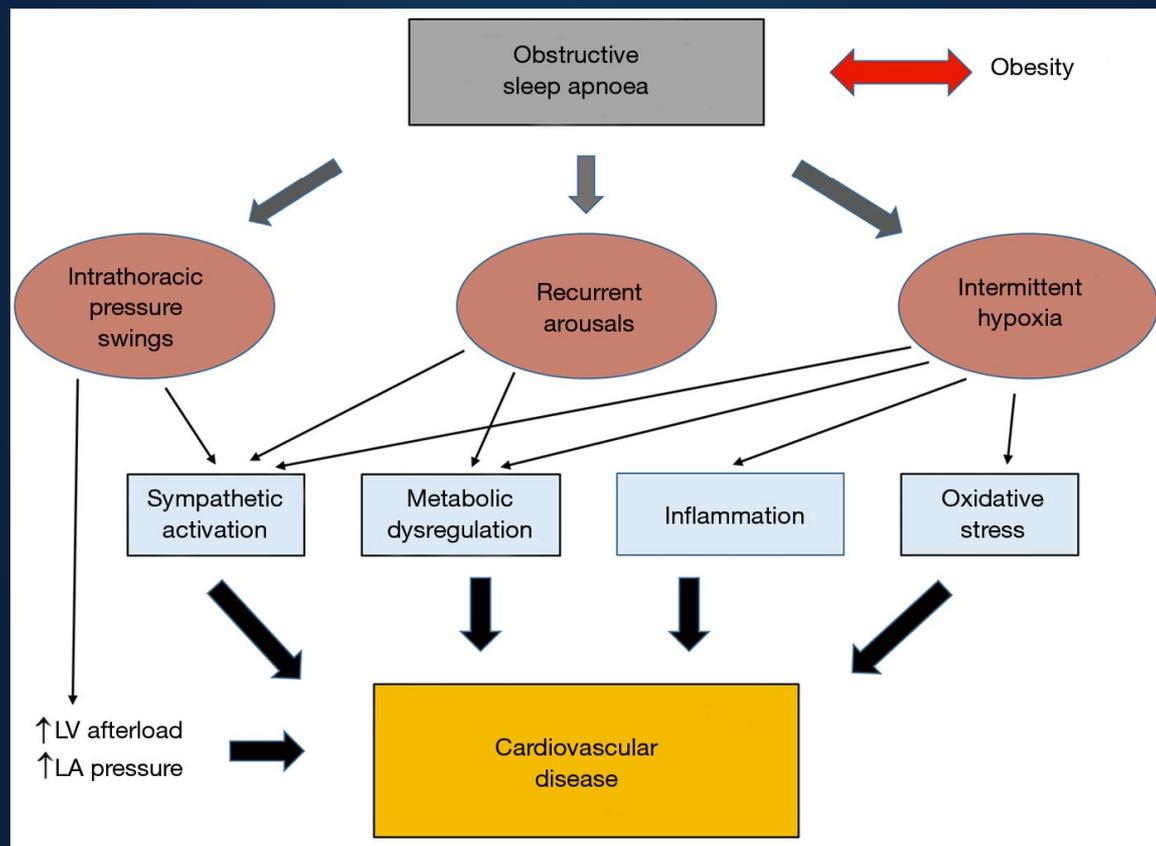
Olivia Taylor, Cynthia Cheng, MD, PhD\*

- Current estimates report the prevalence of obstructive sleep apnea (OSA) in the United States to be 7-9% of the population, thus affecting about 26 million people, many who are unaware of their condition



- My role in this multi-site project was to screen potential patients from Jefferson's sleep clinic for eligibility for study enrollment.
  - Some positive preliminary data – CPAP therapy does seem to have a beneficial effect as hypothesized on neuropsychiatric testing, indicating a possible benefit in slowing the progression of MCI
  - COVID delays led to my being less needed on this project in year 2
- Currently I am playing a key role in a related project examining the effect of CPAP compliance on cardiovascular risk and cardiovascular risk factors in OSA patients.
  - This is what I will be discussing for the rest of today

- OSA can have many, varied detrimental effects on the cardiovascular system
- I am specifically focusing on heart rate as a measure of sympathetic nervous system activation.



# Objectives & Hypothesis

- Research Question
  - What is the observed difference in heart rate before and after initiating CPAP therapy in moderate-severe OSA (AHI  $\geq 15$ ) patients who are compliant and noncompliant with CPAP?
- Hypothesis
  - Compliance with CPAP therapy ( $\geq 4$  hrs of usage/night for 70% of nights/month) leads to a decrease in average annual heart rate measurements compared to noncompliant/non CPAP users.

# Approach & Results

- Retrospective/prospective cohort study
- Patients with moderate-severe OSA (identified from Jefferson Sleep Medicine center) – 2000+ patients
- Intervention was CPAP therapy, separated into compliant, noncompliant, and non-CPAP control patients
- EPIC chart reviews, smart card (from CPAP machine) compliance data analyzed
- Many markers of cardiovascular health are being recorded – BP, HR, CVD events, lipids, diabetes, and more

- Analysis

- A 10 patient preliminary data analysis was completed using SAS 9.4

		Table 1 of sexA by raceA		
		Controlling for CTRL=N		
Frequency	sexA(sexA)	raceA(raceA)		
Percent		AA	C	Total
Row Pct				
Col Pct				
	<b>Female</b>	1	1	2
		14.29	14.29	28.57
		50.00	50.00	
		33.33	25.00	
	<b>Male</b>	2	3	5
		28.57	42.86	71.43
		40.00	60.00	
		66.67	75.00	
	<b>Total</b>	3	4	7
		42.86	57.14	100.00

		Table 2 of sexA by raceA		
		Controlling for CTRL=Y		
Frequency	sexA(sexA)	raceA(raceA)		
Percent		AA	C	Total
Row Pct				
Col Pct				
	<b>Female</b>	3	0	3
		100.00	0.00	100.00
		100.00	0.00	
		100.00	.	
	<b>Male</b>	0	0	0
		0.00	0.00	0.00
		.	.	
		0.00	.	
	<b>Total</b>	3	0	3
		100.00	0.00	100.00

# Findings

HR change in the CPAP compliant group was 1.3 + 7.5 (**decrease of 1.3**, n=5)

Compared to the control group (no CPAP), 0.5 + 2.8 (**decrease of 0.5**, n=3)

The p value was not significant, likely due to the small sample size as well as the small difference in heart rate between the groups.

## Variable: HRCHANGE

CTRL	N	Mean	Std Dev	Std Err	Minimum	Maximum
<b>N</b>	<b>5</b>	<b>1.3000</b>	7.5465	3.3749	-5.5000	12.0000
<b>Y</b>	<b>3</b>	<b>0.5000</b>	2.7839	1.6073	-2.5000	3.0000
<b>Diff (1-2)</b>		0.8000	6.3679	4.6504		

CTRL	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev
N		1.3000	-8.0702 10.6702	7.5465	4.5214 21.6854
Y		0.5000	-6.4155 7.4155	2.7839	1.4495 17.4960
<b>Diff (1-2)</b>	<b>Pooled</b>	0.8000	-10.5792 12.1792	6.3679	4.1034 14.0225
<b>Diff (1-2)</b>	<b>Satterthwaite</b>	0.8000	-8.5712 10.1712		

Method	Variances	DF	t Value	Pr >  t
<b>Pooled</b>	Equal	6	0.17	<b>0.8691</b>
<b>Satterthwaite</b>	Unequal	5.4586	0.21	0.8383

# Conclusions

- Our findings are still interesting even though the sample size is so small
- The work that has been done for the past several months was mostly setting up the database and protocol so that future students can collect the sample size needed to follow out the trends
- Excited that the preliminary heart rate finding is in the expected direction, demonstrating more of a heart rate drop for the CPAP group compared to control
- This is positive because lower heart rate is better for CV risk

# Future Directions

- Now that the protocol, variables, and database are all set, future students can help reach the goal of 2000+ patients included in the study
- More patients and a longer study period (more data points per patient) will strengthen the study power
- The preliminary data analysis showed trends in the direction towards improving heart rate, which is a predictor of CV risk, which is encouraging (although this was not significant)

# Acknowledgements

- Thanks to Dr. Cheng for all of her help and hard work!
- Also thanks to the whole CPAP CV risk team, Amy, Dani, Zach, Peter, Grace, Natalia, and Rani



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