

**Elevated C-Reactive Protein is
Associated with Sleep
Disordered Breathing in
Adolescents**

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Sleep Disordered Breathing

- **Syndrome**

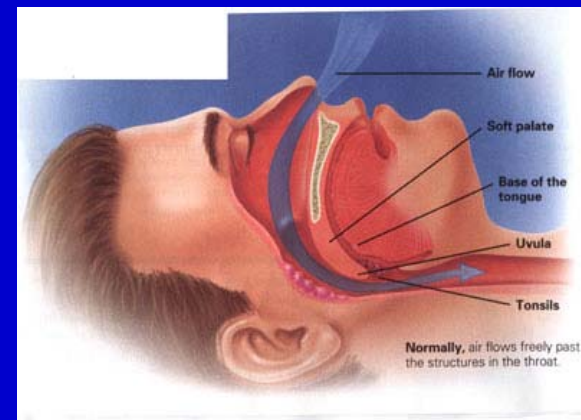
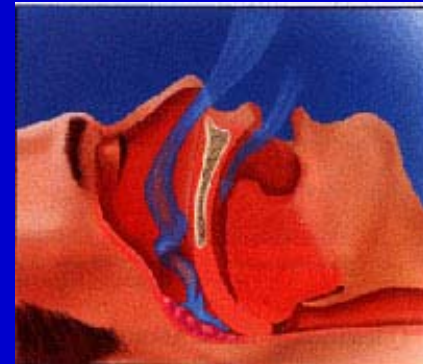
- Repetitive episodes of partial or complete upper airway obstruction during sleep, associated with hypoxemia, snoring, daytime sleepiness

- **Prevalence**

- 2-25% of the population
- Prevalent in the elderly and in young Blacks

- **Risk factors**

- Males,
- Advancing age
- Obesity
- Anatomy



C Reactive Protein

- Acute-phase protein produced by liver
- Non-specific marker for systemic inflammation
- ↑ weight, smoking, HRT, arthritis, diabetes, infection, respiratory disease, ↑ age, & female sex are associated with elevated CRP
- CRP identifies otherwise normal healthy adults who are increased risk of cardiovascular disease events

Objective & Rationale

- **Determine whether SDB is associated with High Sensitivity C-Reactive Protein in adolescents**
 - Exposure to intermittent hypoxemia and sympathetic nervous system excitation may upregulate inflammatory and oxidative stress pathways
 - Increasing evidence for the association of SDB and inflammatory markers, but confounded by other co-morbidities

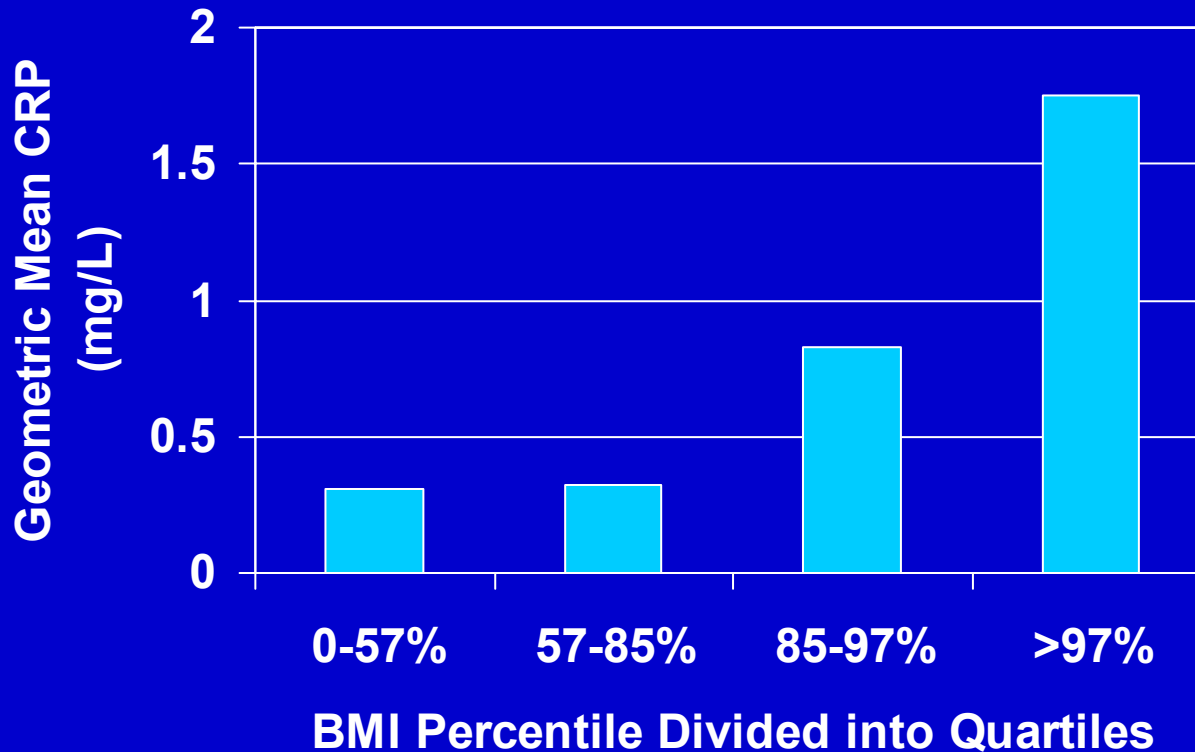
Study Population & Methods

- 113 Participants (12-18 years old)
- Morning and evening venipuncture to obtain CRP values
- High Sensitivity CRP obtained by ELISA range (0.1 – 98 mg/L)
- Body mass index percentiles calculated for age and sex
- Overnight Sleep Study
 - # events / hour sleep AHI

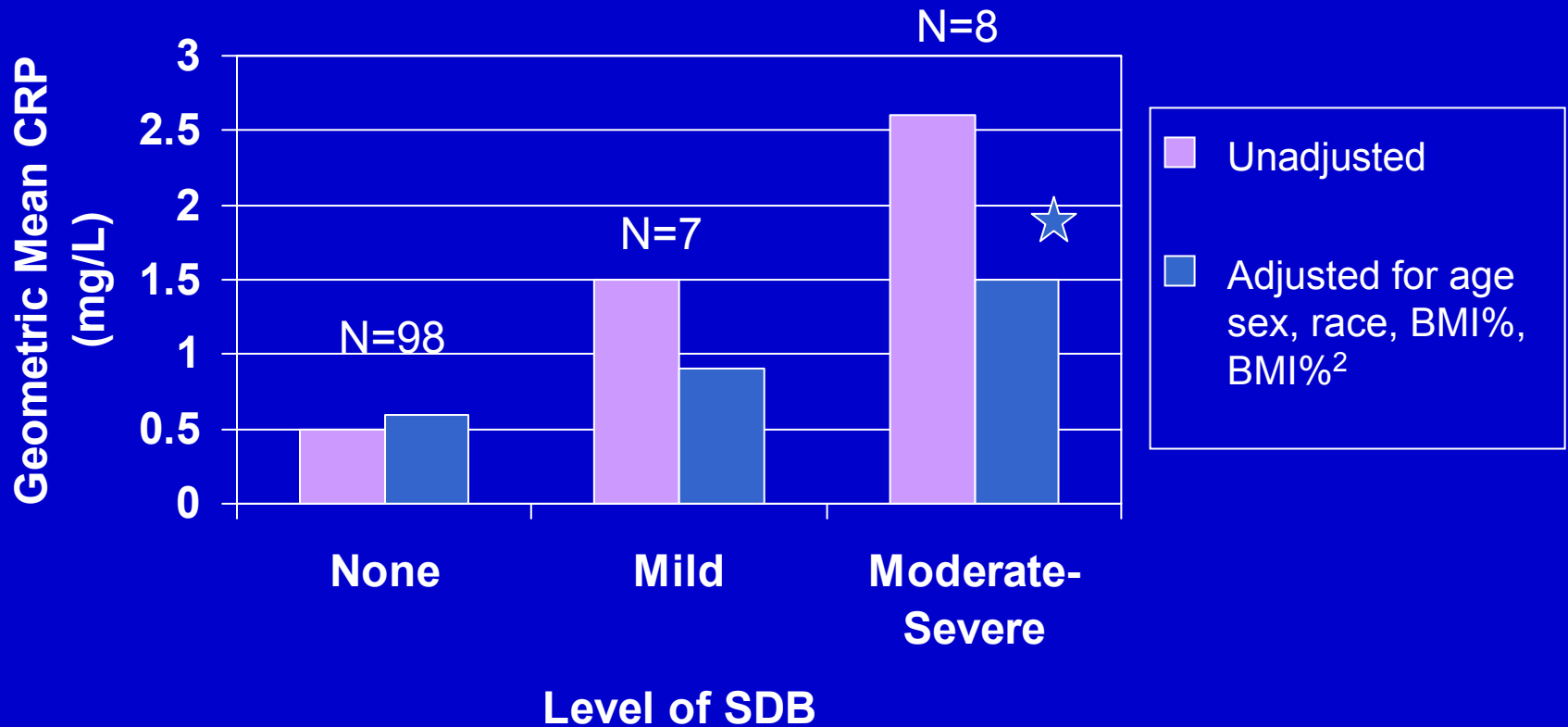
Sample Characteristics

N	113
% Female	51%
% Black	38%
SDB Categories:	
% None (AHI < 5)	87 %
% Mild (AHI 5 – 15)	6 %
% Moderate-Severe AHI \geq 15	7 %
CRP median (IQR) mg/L	0.55 (0.2 -1.6)
BMI Pctile:	
0-84 th	49%
85-94 th	19%
> 95 th	32%

Relationship Between BMI and CRP



Relationship Between SDB and CRP



☆ P=0.038 vs. No SDB

Discussion

- CRP levels consistent with normative values in the U.S. population
- No difference in CRP values by sex or race
- CRP is associated with increasing BMI
- There is a dose response relationship between SDB and CRP after adjusting for the main effect of BMI.

Conclusion

- The ↑ CRP levels in teens with SDB suggest that SDB may adversely influence their CVD risk profile.
- SDB may be one pathway by which obesity leads to increased CVD risk in adolescents that can persist into adulthood
- Efforts to prevent, screen and treat SDB in childhood may favorably modify CVD risk profiles of adolescents

Acknowledgements

The Cleveland TeenZZZ Study:

- Susan Redline, PI
- Carol Rosen, Co-investigator
- Judy Emancipator
- Annie Zambito, Nate Johnson
- Heather Rosebrock, Jean Arnold
- Lydia Cartar, Amy Storfer-Isser, Les Kirchner