

# Obstructive Sleep Apnea, Inflammation, and Immune Function

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# Definitions

- Obstructive sleep apnea (OSA)
- Metabolic syndrome
- Frailty Syndrome
- Subclinical Systemic Inflammation

# OSA and Inflammation

- Increase in pro-inflammatory proteins:
  - CRP (Punjabi, et al. 2007; Peled, et al 2007)
  - TNF- $\alpha$  (Vgontzas, et al 1997, 2000)
  - IL-6 (Vgontzas, et al 1997, 2000)
  - Neopterin (Punjabi, et al. 2007)
- Decrease in anti-inflammatory adipokine:
  - Adiponectin (Zhang, et al. 2007)

# CRP Levels and OSA Severity

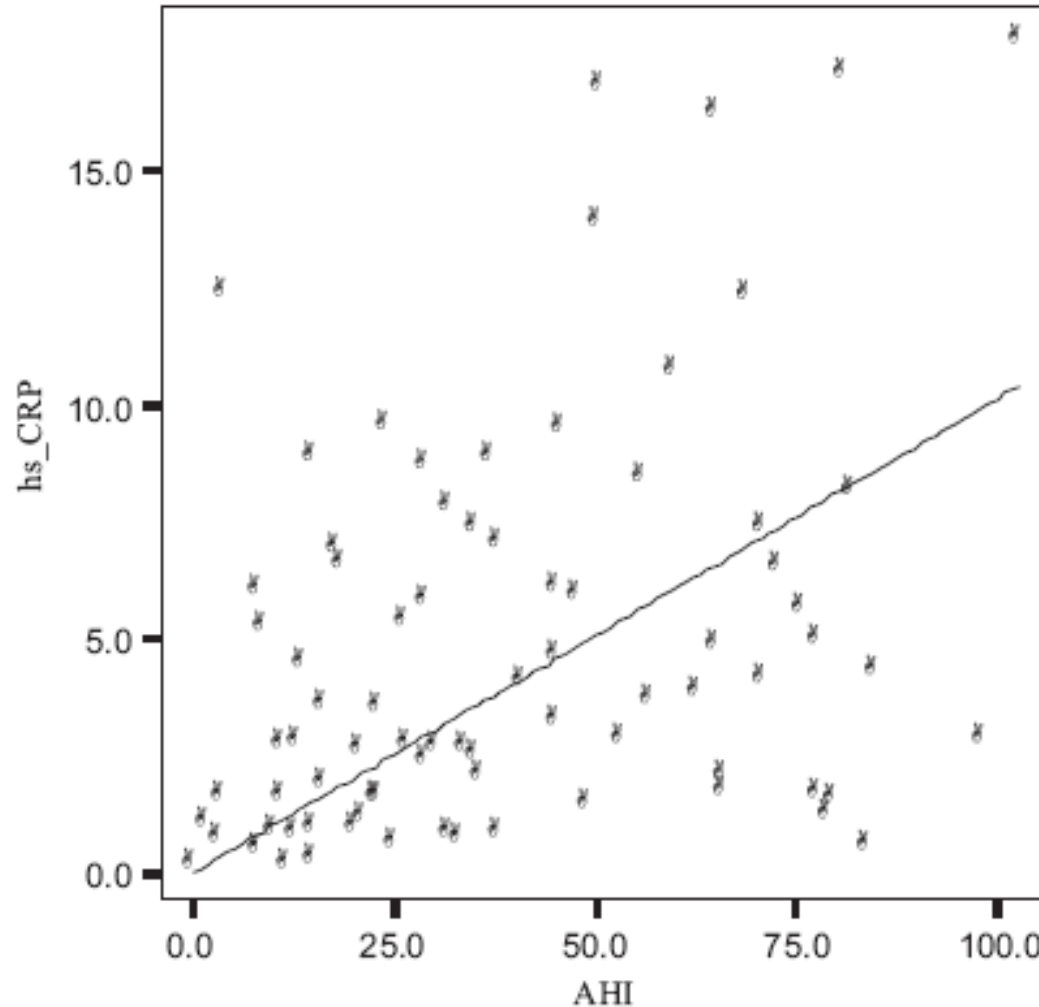


Figure 3 Increase in Hs-CRP by change in AHI (mg/dL;  $r = 0.348$ ;  $p = 0.002$ ).

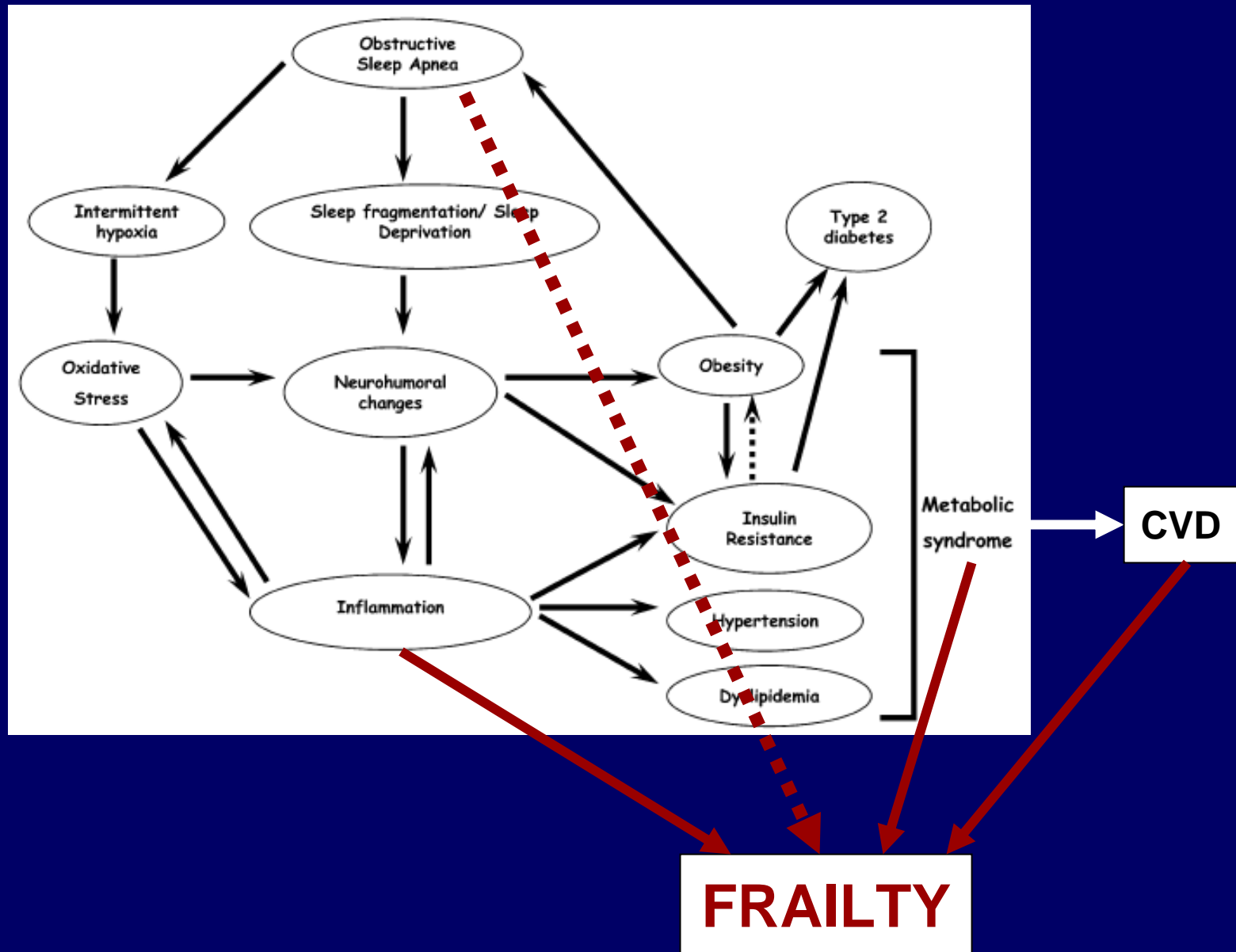
AHI: apnea hypopnea index

Peled, et al 2007

# OSA and Immune Function

- Modulating T cell phenotype and function:
  - Increase in CD8+ T cell activation and cytotoxicity (Dyugovskaya, et al. 2005)
  - Switch to type-2 T cell response (Dyugovskaya, et al. 2003, 2004, 2005)
- No effect on antibody response to influenza immunization (Dopp, et al. Pharmacotherapy 2007)

# Hypothetical Modal Pathway to Frailty



# Translational Relevance to Frailty Research

- Does OSA contribute to frailty?
  - Inflammation
  - Metabolic syndrome (Blum, et al. 2005)
  - Oxidative stress
  - Neuroendocrine pathways
- Immune dysregulation in frailty and OSA:  
Strategies to strengthen immune function