Localized Oral Infections and Systemic Inflammation: The Oral Infections and Vascular Disease Epidemiology Study

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Oral INfections and Vascular Disease Epidemiology STudy

No disclosures to make

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Scientific Question:

How might infection influence atherosclerosis?

Are current local oral infections associated with elevated markers of systemic inflammation?

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METHODS

INVEST Design

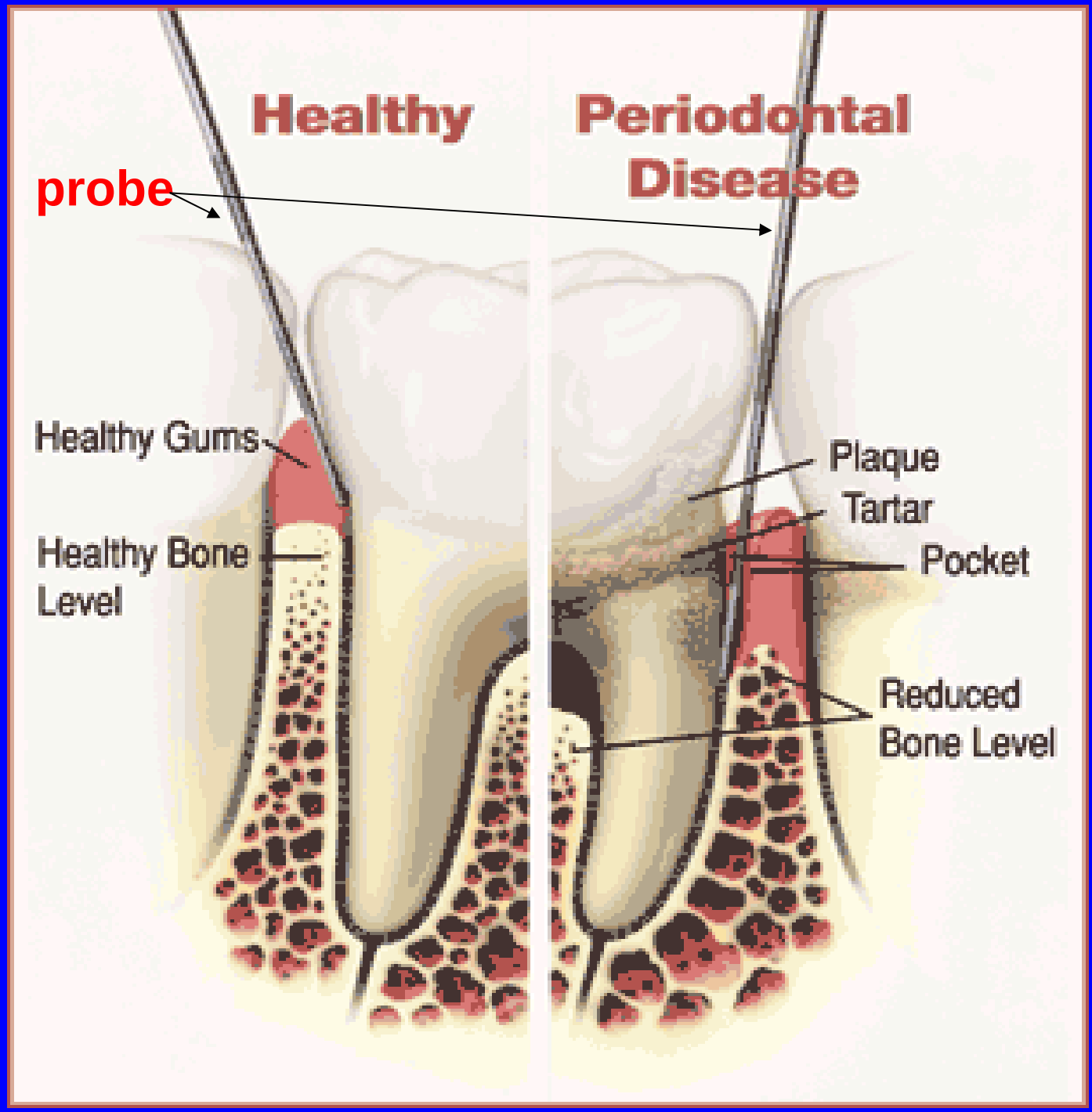
- Prospective cohort study investigating the relationship between oral infection and atherosclerotic progression
- Cross-sectional results presented here
  - Addressing potential mechanism by which infections and atherosclerosis might be related

Methods: INVEST Eligibility

- Hispanic, Black or White
- Age 55 or older
- No baseline history of stroke, MI, or other chronic inflammatory conditions
- Living in a defined geographic area of Northern Manhattan
- Ability to come to clinic for in-person assessment

Methods: Clinical Oral Examination

- Pocket (probing) depth (PD) measures were made at six locations per tooth using a UNC-15 manual probe
  - Measured in mm
  - Measured in up to 192 sites per mouth
- PD is a strong correlate of current infection


Healthy
Periodontal Disease
probe
Healthy Gums
Healthy Bone Level
Plaque
Tartar
Pocket
Reduced Bone Level

Methods: Summary Exposure Definition

- Periodontal disease is defined by severity and extent of infection
- Severity (depth of pocket)
  - 4 mm selected as cutpoint
- Extent (# or % of infected sites per mouth)

Methods: Summary Exposure Definition

- Number of sites per mouth with PD ≥ 4 mm
  - Burden of infection
- Percent of sites per mouth with PD ≥ 4 mm
  - Intensity of infection

Methods: White Blood Cell Count (WBC)

- Fasting blood samples
- Whole blood collected in 5-cm^3 EDTA-anticoagulated tubes
- White Blood Cell Count (WBC) (# cells x 10^9/L) assessed with automated cell counter using standardized laboratory techniques
  - Coulter STK-R and Coulter STK-S, Coulter Electronics, and Sysmex SE-9500, TOA Medical Electronics

Methods: Risk Factor Assessment

(The following conventional CVD risk factors were included in adjusted analyses)

- **In person interviews**
  - Age on last birthday
  - Race/ethnicity
  - Smoking (current, former or never)
    - pack-years added no additional information
  - Gender
  - Education (completed high school)
- **Diabetes (yes/no via interview)**
  - Or fasting glucose > 126
- **Blood pressure (continuous mm Hg)**
  - Assessed in person by trained research assistants

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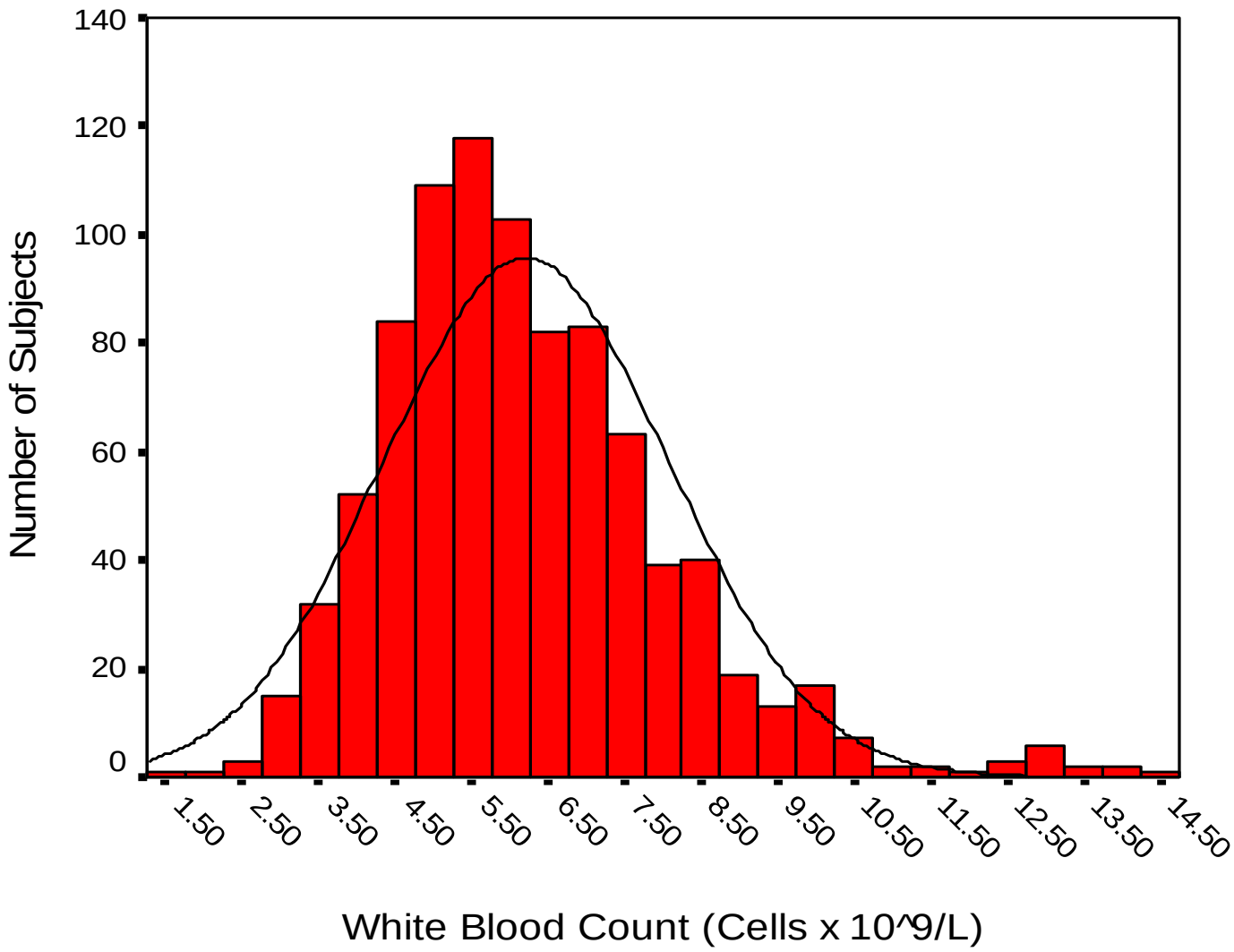
Results

General Characteristics
n = 911

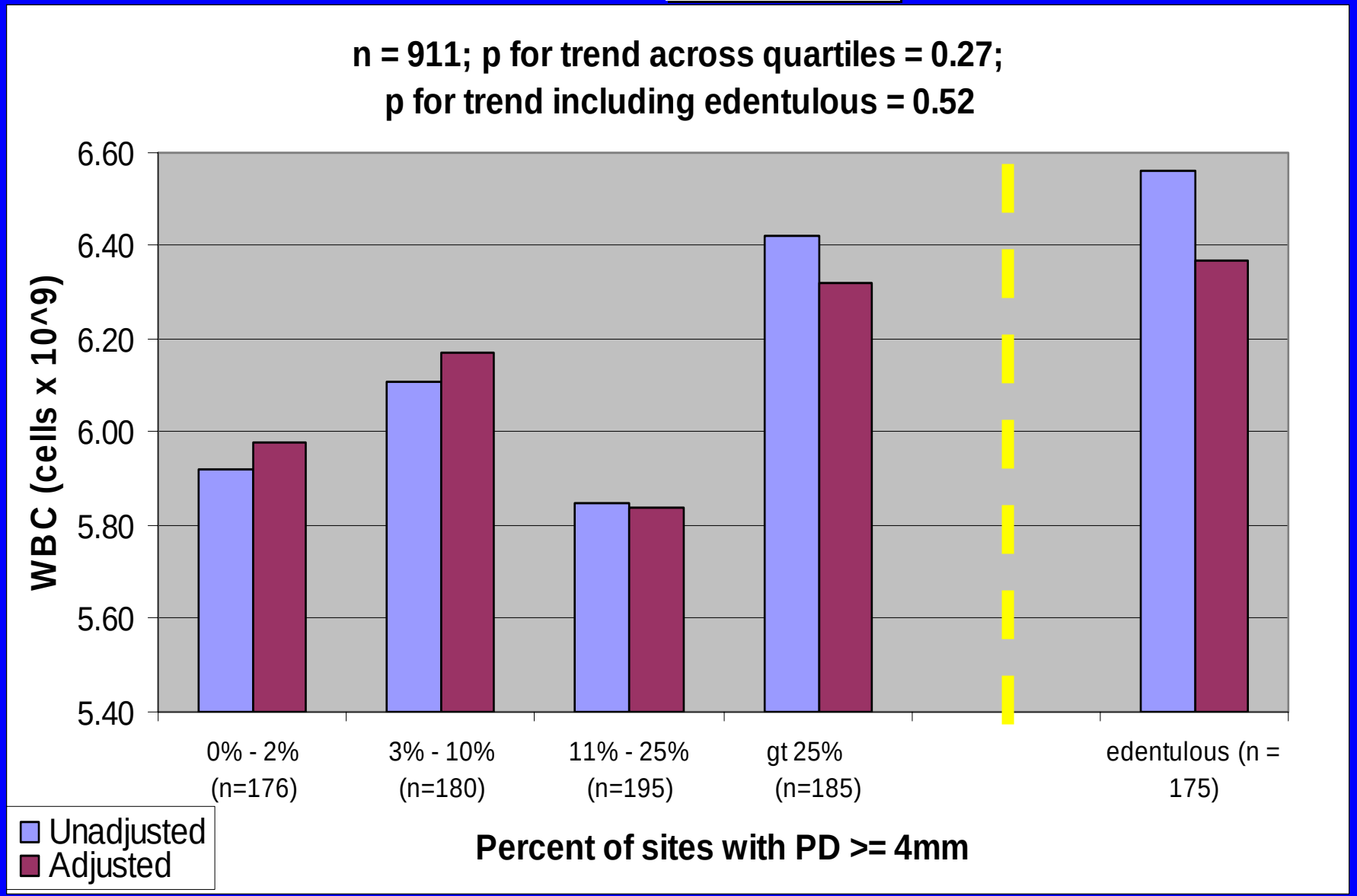
Variable	%	Variable	Mean +/- SD
Female	60%	Age	66 ± 8
Race/Ethnicity		# missing teeth	14 ± 8
Hispanic	63%	SBP	142 ± 20
Black	21%	DBP	81 +/- 12
White	16%		
Smoking			
Ever	53%		
Current	15%		
Edentulous	19%		

White Blood Cells Distribution



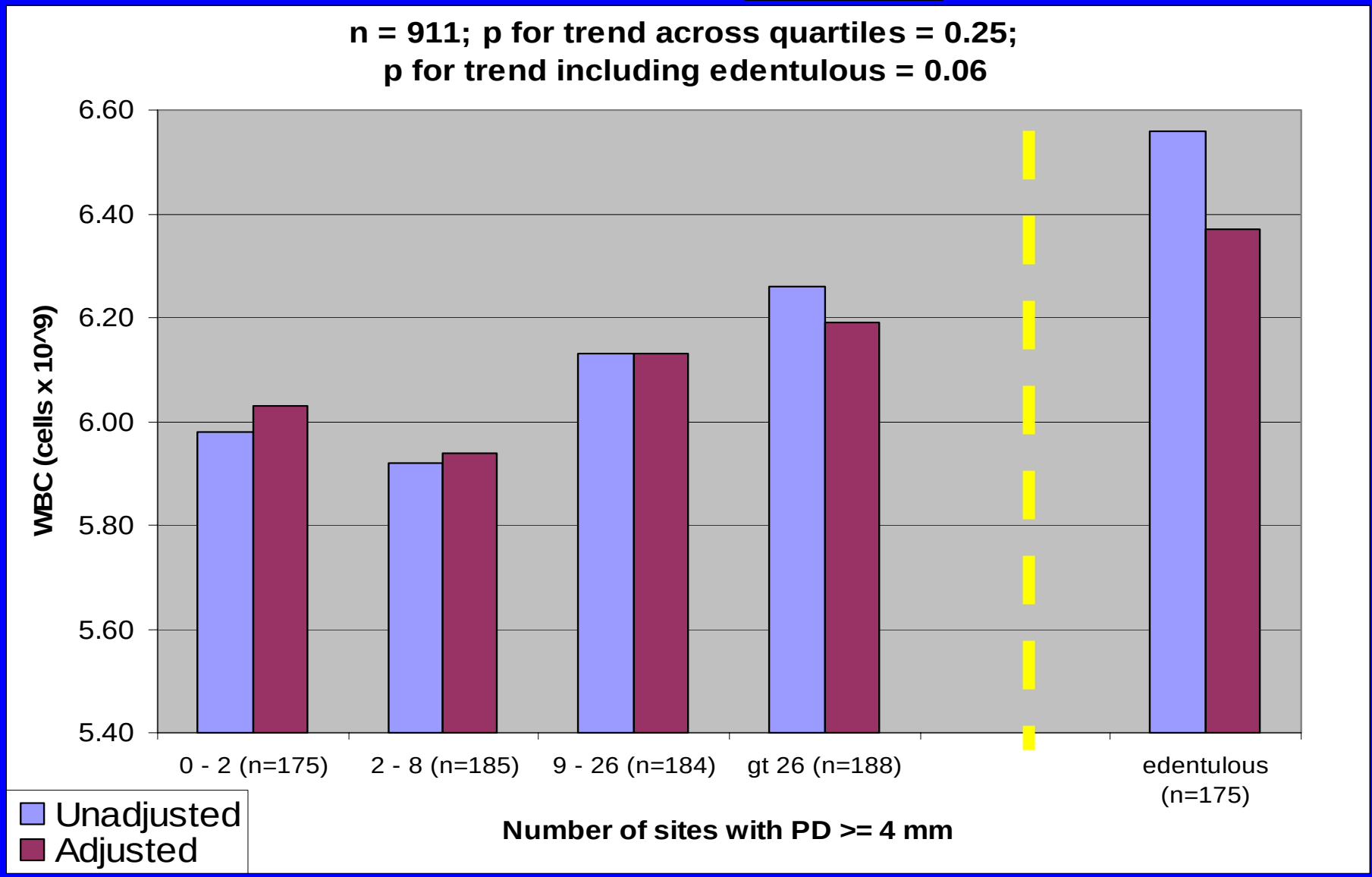
Mean = 6.20 ± 1.90; Median = 5.90

Mean WBC values across quartiles of % PD≥4 mm: Intensity of infection



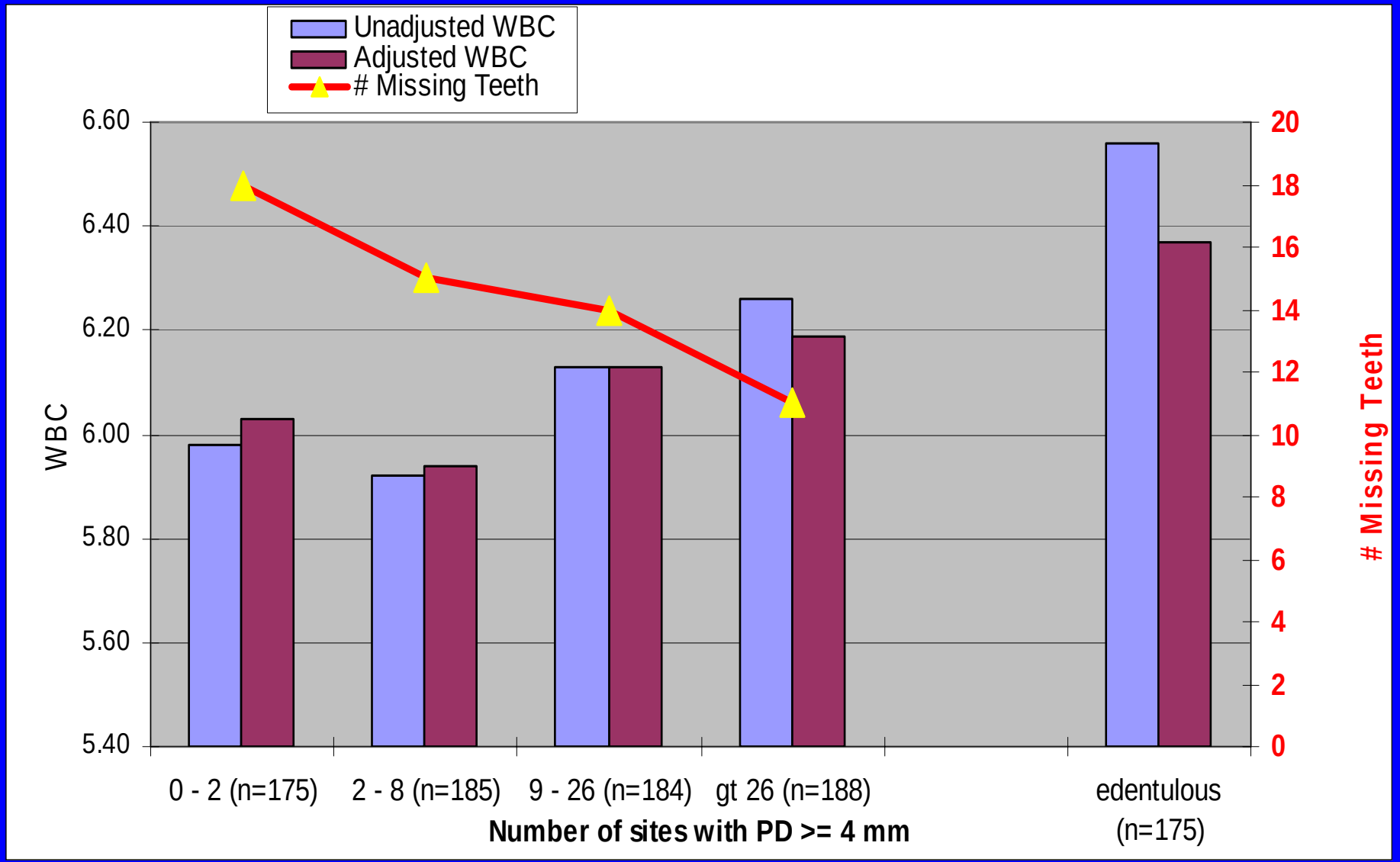
Adjusted model includes: age, gender, smoking, diabetes, race/ethn., education and SBP

Mean WBC values across quartiles of # PD≥4 mm: Burden of infection



Adjusted model includes: age, gender, smoking, diabetes, race/ethn., education and SBP

Red line = Mean tooth loss across quartiles of quartiles of # PD ≥ 4 mm



Adjusted model includes: age, gender, smoking, diabetes, race/ethn., education and SBP

Conclusions

- WBC appears to be positively related to extent of periodontal infection – although not in a monotonic fashion
- Relationship between periodontal status and WBC may be random in these data
  - Weak relationship relative to literature
  - Relationship may vary with age
- Burden (# of sites) of infection may be more important than intensity of infection

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Limitations

- Cross-sectional
- Use of pocket depth alone as exposure
  - misclassification
- No neutrophil data
  - Other studies have shown neutrophils to be explanatory
- CRP, IL-6 and Fibrinogen results unavailable at this time

Discussion

- Tooth loss may distort overall periodontal health
- WBC in edentulous difficult to interpret
  - Potential for infection is reduced
  - History of severe infection likely
- Edentulous have elevated levels of carotid artery plaque
  - After careful adjustment for health behaviors and other life style factors
  - Implication: removal of infection may alleviate periodontal disease but not eliminate CVD risk?

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