

National Primary Oral Health Care Conference
Scottsdale, AZ
December 11, 2006

Findings from the Obstetrics and
Periodontal Therapy (OPT) Multi-
Center Randomized Clinical Trial

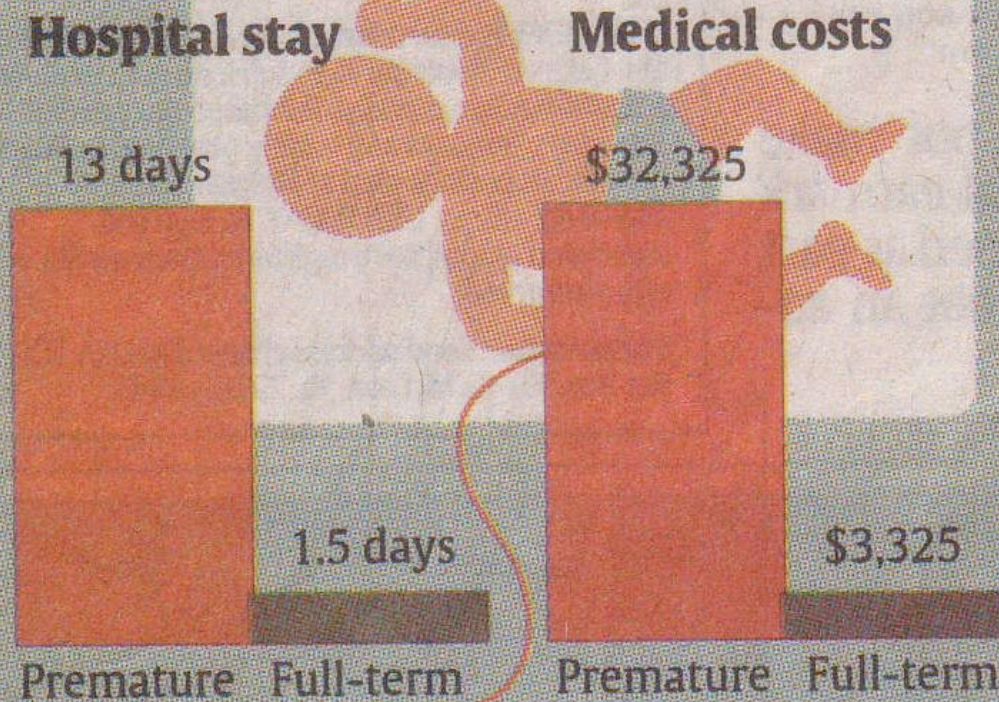
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Columbia University
College of Dental Medicine

Periodontal Health



Medical costs for infants

The average hospital stay and first-year medical costs for premature and full-term babies:



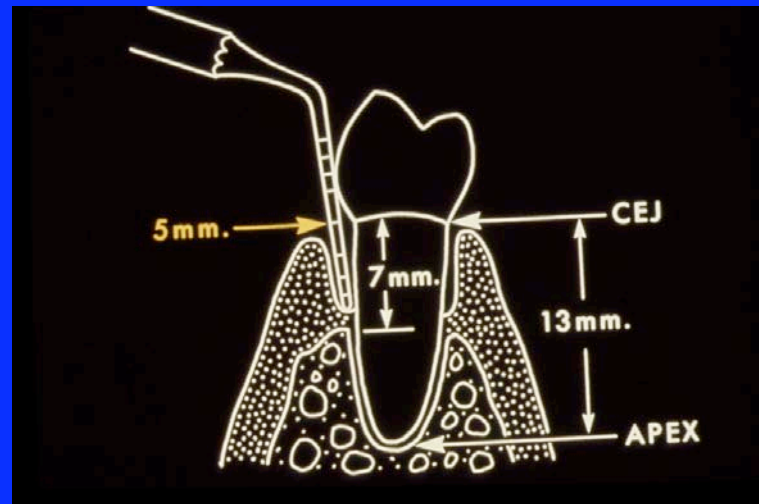
Sources: March of Dimes and Institute for Medicine

USA Today, November 14, 2006

Periodontal Diseases

- Gingivitis
 - Reversible, visible, no loss of tooth attachment
- Aggressive Periodontitis
 - Onset between puberty and early 20's
 - Affects 2-3% of African-Americans, <1% of Caucasians
 - Distinct pattern of bone loss
- Chronic Periodontitis
 - Slow progressing, associated with smoking
 - More common in older adults but can affect young adults (~16% have 2+ mm of CAL)

Periodontal Diagnosis





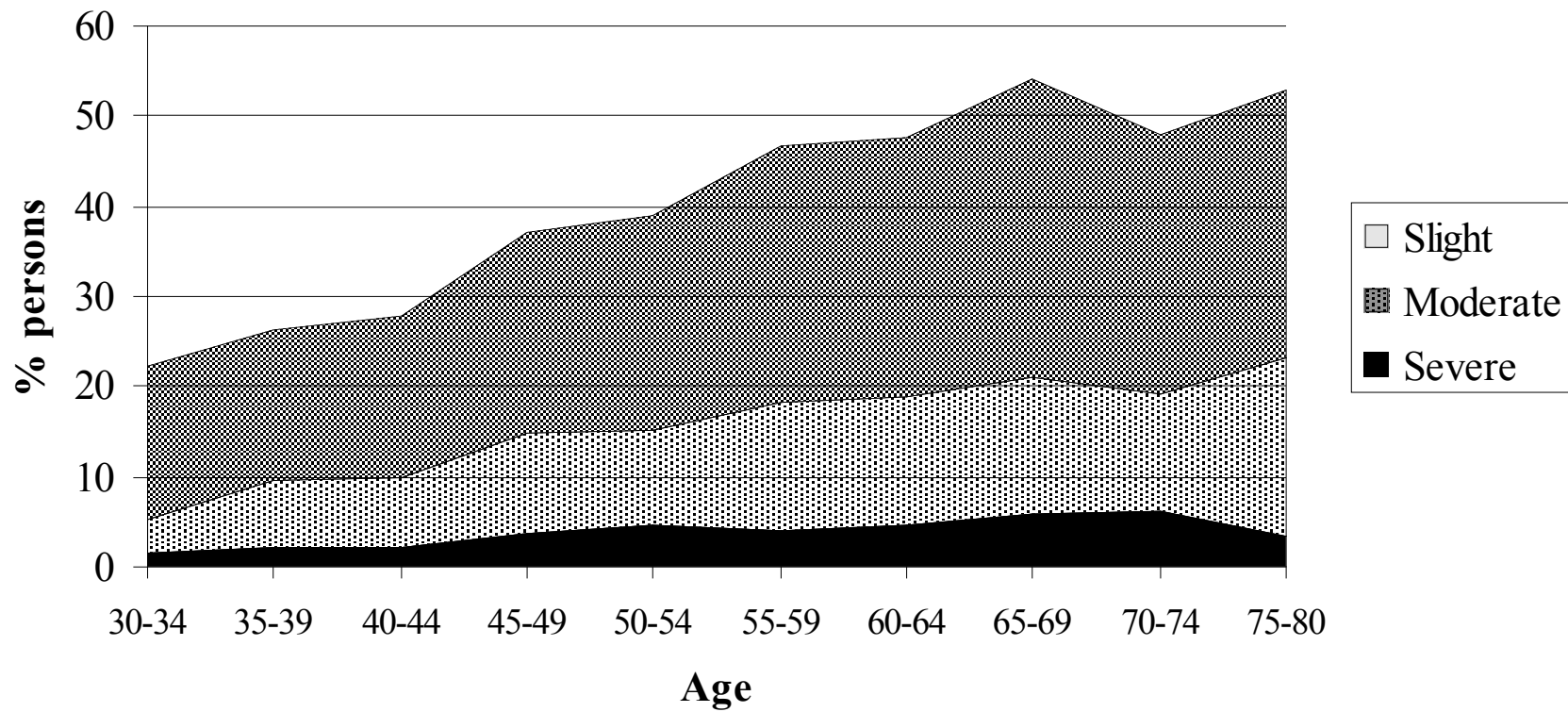
Gingivitis



Chronic Periodontitis



Fig. 3-5. Prevalence of slight, moderate and severe periodontitis in the U.S.
(Albandar et al. 1999)



Subject-based prevalence of CAL

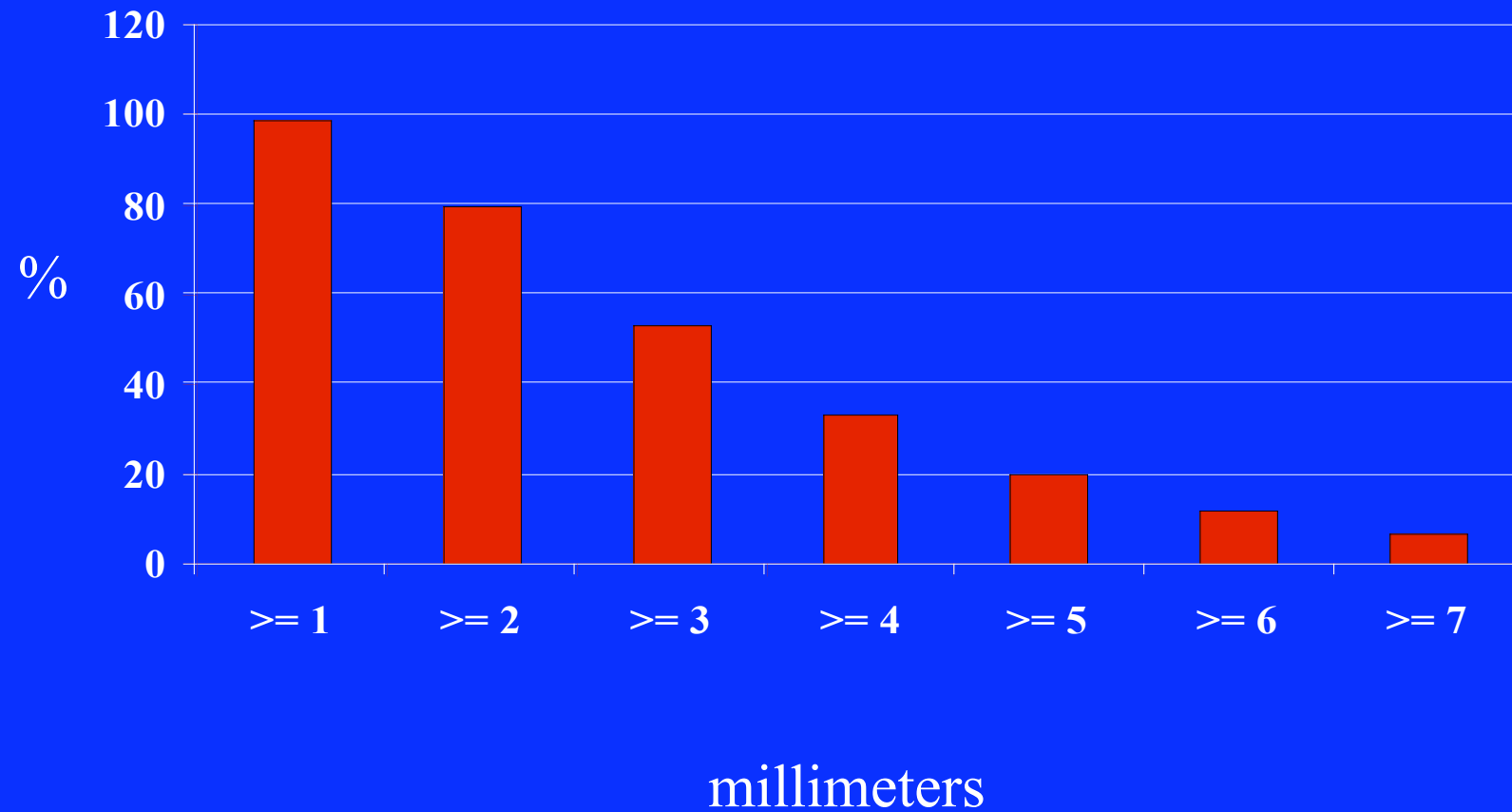
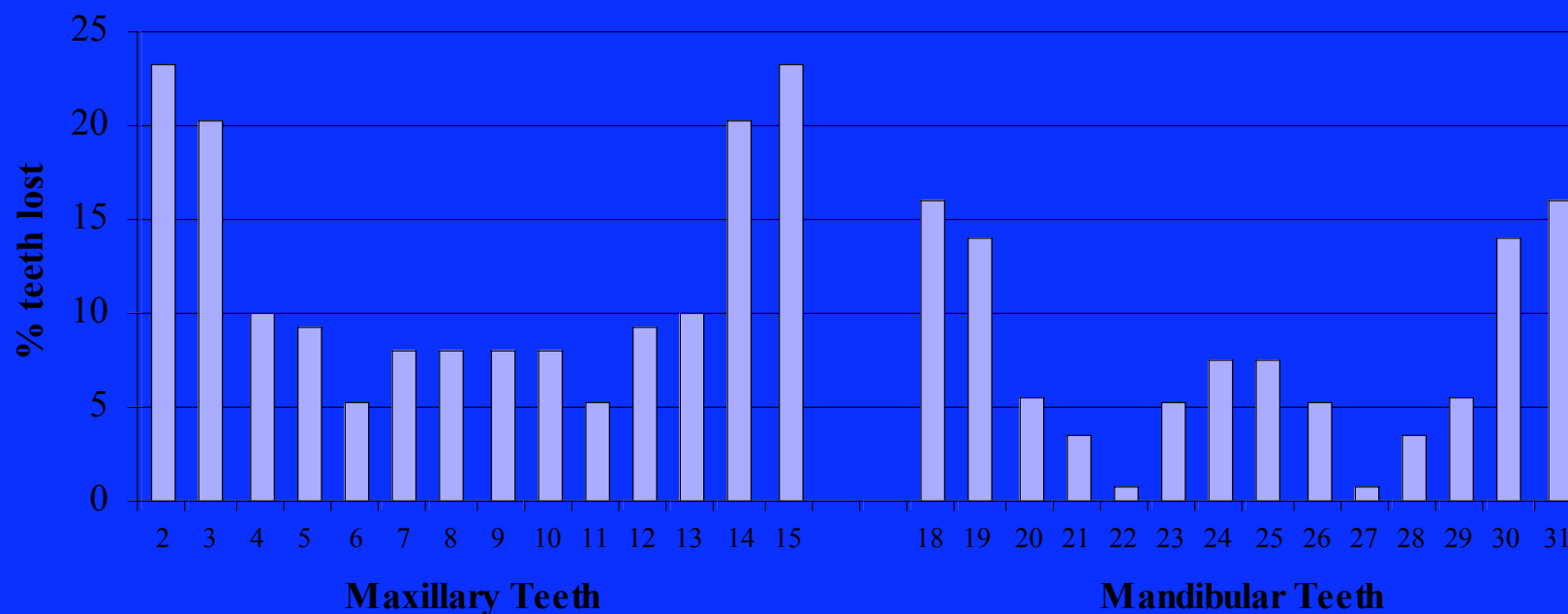


Fig 3-11. Percentage of teeth lost during 19 to 22 years of maintenance therapy in periodontal practices by tooth type



* The percentages represent unweighted averages of the percentage of teeth lost reported by Hirschfeld & Wasserman (1978), McFall (1982), and Goldman et al (1986).

Chronic Periodontitis



Pre-Treatment



3 months after scaling
and root planing

Pregnancy Gingivitis



Pregnancy “tumors”



Periodontal Disease & Pregnancy

- Gingival bleeding (*gingivitis*) increases throughout pregnancy then decreases post-partum
- Changes in the oral microbiota occur with pregnancy
- Pregnancy does not cause or increase a woman's risk for *periodontitis*
- Some pregnant women can experience an exuberant reactions to normal dental plaque bacteria or irritation

Why periodontal disease and preterm birth?

- Some infections are risk factors for PTB.
- Periodontal pathogens can enter the blood stream through infected gums.
- Chronic periodontal inflammation involves mediators that are associated with PTB (e.g., PGE2, IL-1, IL-6).
- Supporting evidence in animal models

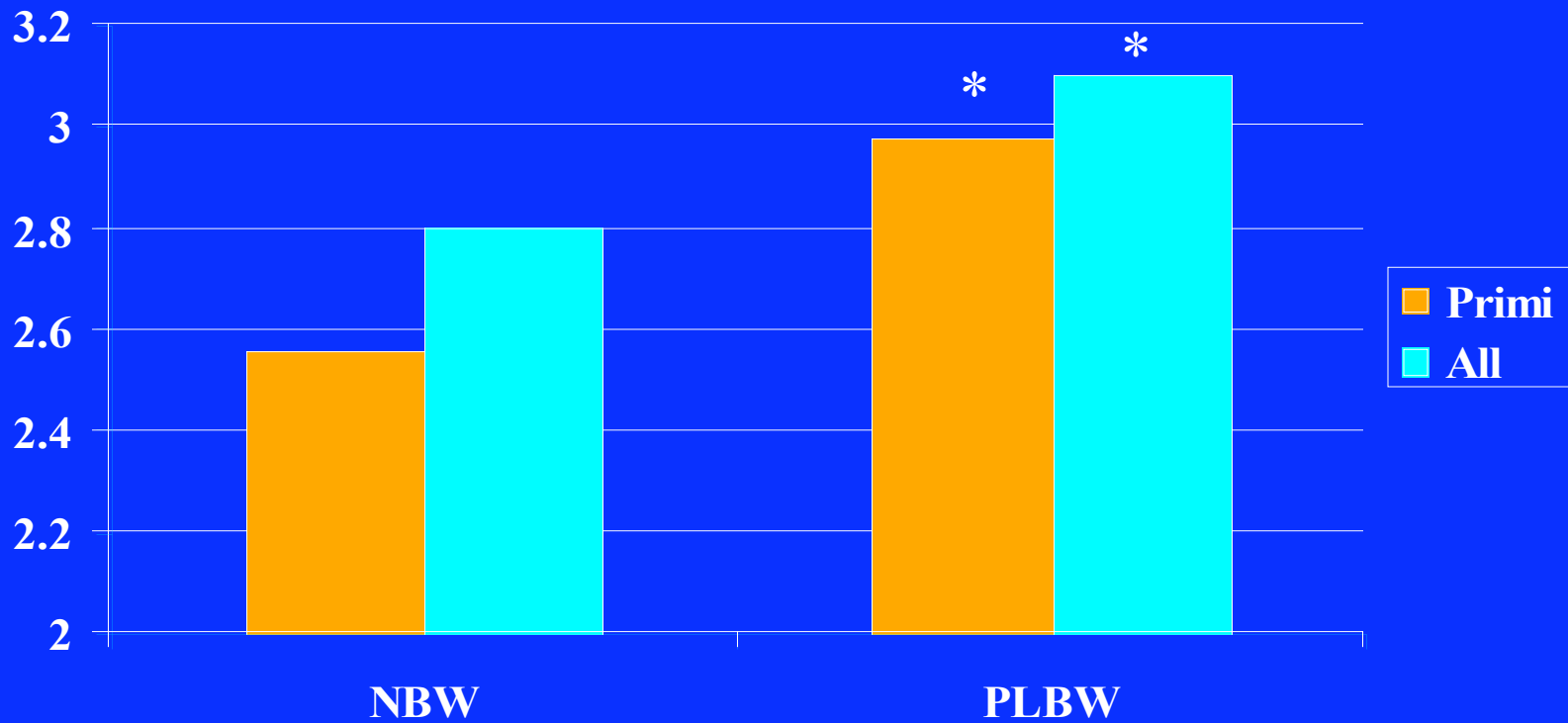
Periodontitis has been associated with:

- Smoking
- CVD
- PAD
- Stroke/TIA
- Diabetes
- Pre-eclampsia
- Low birth weight
- Preterm birth
- COPD
- Bacterial pneumonia
- Osteoporosis
- Poor physical fitness
- Foot balance
- Rheumatoid arthritis
- Obesity (young adults)
- Vitamin C intake

Offenbacher et al, 1996

- 124 women examined either at pre-natal visit or within 72 hours post-partum
- Cases (n=93): current or previous LBW baby ($< 2,500$ g) *and* spontaneous abortion < 12 wks, pre-term labor, PROM with resultant delivery < 36 wks, or delivery < 36 wks
- Controls (n=31): all birth weights $\geq 2,500$ g and no PTL or PROM

Mean CAL (mm) in cases and controls



* P = 0.04 compared to NBW controls

Offenbacher et al, 1996

- Adjusted* odd ratios for association between severe periodontitis (60% of sites with 3+ mm CAL) and PLBW were:

7.9 (1.95 – 28.8) for all PLBW cases

7.5 (1.52 – 41.4) for primiparous cases

- * Adjusted for race, age, previous births, tobacco use, BV, Hx of bacteriuria

Summary of cross-sectional & longitudinal studies

	N cases	N controls	Findings
Offenbacher et al, '96	93	31	OR for PT/LBW = 7.5 (2.0-28.8); For primiparous = 7.9 (1.5-41.4)
Offenbacher et al, '98	25	15	Oral PGE2 levels sig. higher in PT/LBW mothers; <i>Bf, Pg, Aa</i> and <i>Td</i> at higher levels in cases
Davenport et al, '02	236	507	OR for PT/LBW = 0.83 (0.68–1.00)
Dasanayake et al, '98	55	55	OR for ↑ healthy sites vs. LBW = 0.3 (0.12 – 0.72)
Romero et al, '02	56	13	↑ Russell's PI associated with ↓ birth weight
Dasanayake et al, '01	17	63	OR for ↑ <i>Pg</i> -specific IgG vs.LBW = 4.1 (1.1-12.8)
Moore et, al, '04	286	3452	No difference in periodontal measures between PT and full-term mothers

Pre-eclampsia (Boggess et al, 2003)

- 1,115 agreed to participate, 230 eventually excluded (e.g., spontaneous abortion, withdrew)
- Dental exams at 1st prenatal visit (850) and again within 48 hours post-partum (763)
- “Severe” disease = 15+ sites with PD \geq 4 mm
- “Progressive “ disease = 4+ sites increasing 2+mm
- 4.4% (39 of 885) dx with pre-eclampsia (BP \geq 140/90 on two occasions & 1+ proteinuria score)

Pre-eclampsia (Boggess et al, 2003)

	Controls n (%)	Preeclamptic n (%)	p- value
Black	373 (46)	26 (67)	.04
Insured	388 (48)	12 (31)	.04
Delivery < 37 wks	138 (17)	22 (56)	<.001
Severe periodontal disease at delivery	90 (12)	10 (29)	.009
Progression	187 (26)	14 (41)	.006

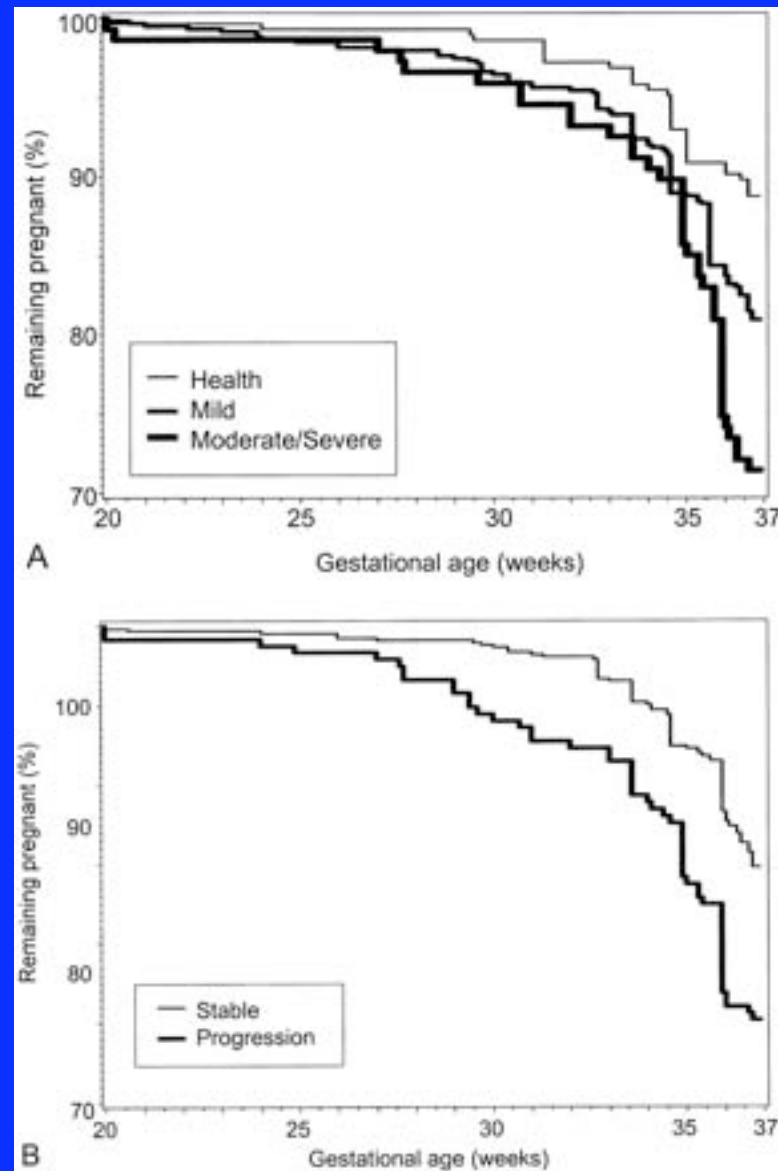
Periodontal Disease in Early Spontaneous Preterm Birth

- 59 with spontaneous preterm birth (< 32 wks), 32 with indicated PTB, 45 term (> 37 wks) controls
- Performed dental examinations at 24 wks (n=18) or within 72 hours post-partum
- Sampled and cultured cord blood and placentae

Odds Ratios for SPTB in Women with and Without Severe Periodontal Disease

	OR (95% CI) for Spontaneous PTB	
	Unadjusted OR	Adjusted OR*
Indicated PTB	2.9 (1.2 – 7.2)	3.2 (1.1 – 9.3)
Term Birth	2.3 (1.0 – 5.3)	3.2 (1.2 – 8.8)
Indicated PTB + TB	2.5 (1.3 – 5.2)	3.4 (1.5 – 7.7)

* Maternal age, black race, education, insurance, parity



Offenbacher et al., *Obstetrics & Gynecology* 2006;107:29-36

Intervention Studies

Lopez et al. *J Periodontol*, 2002

- 18-35 year old women in Santiago, Chile
- 9-21 wks of gestation with *fewer* than 18 teeth and 4+ teeth with 4 mm PD and 3+ mm CAL
- Randomized to receive either SCRIP + and pxs q2-3 weeks before 28 wks or no treatment
- 29 in treatment group received amoxicillin + metronidazole for severe AgP

Intent-to-treat analysis

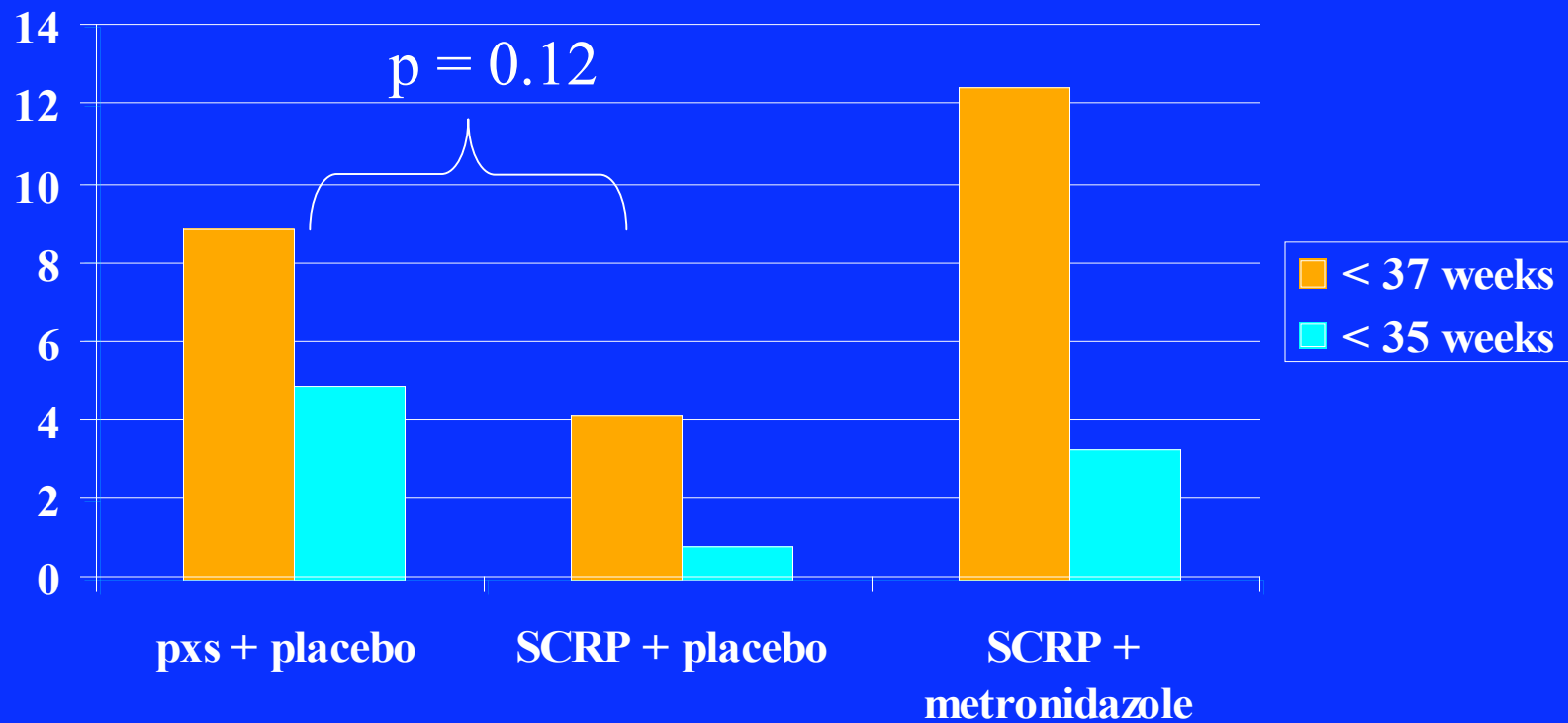
Lopez et al. *J Periodontol*, 2002

	Treatment Group	Control Group	
	n = 163	n = 188	p-value
< 37 weeks	2 (1.1%)	12 (6.4%)	0.017
< 2500 g	1 (0.6%)	7 (3.7%)	0.083
Both	3 (1.6%)	19 (10.1%)	0.001

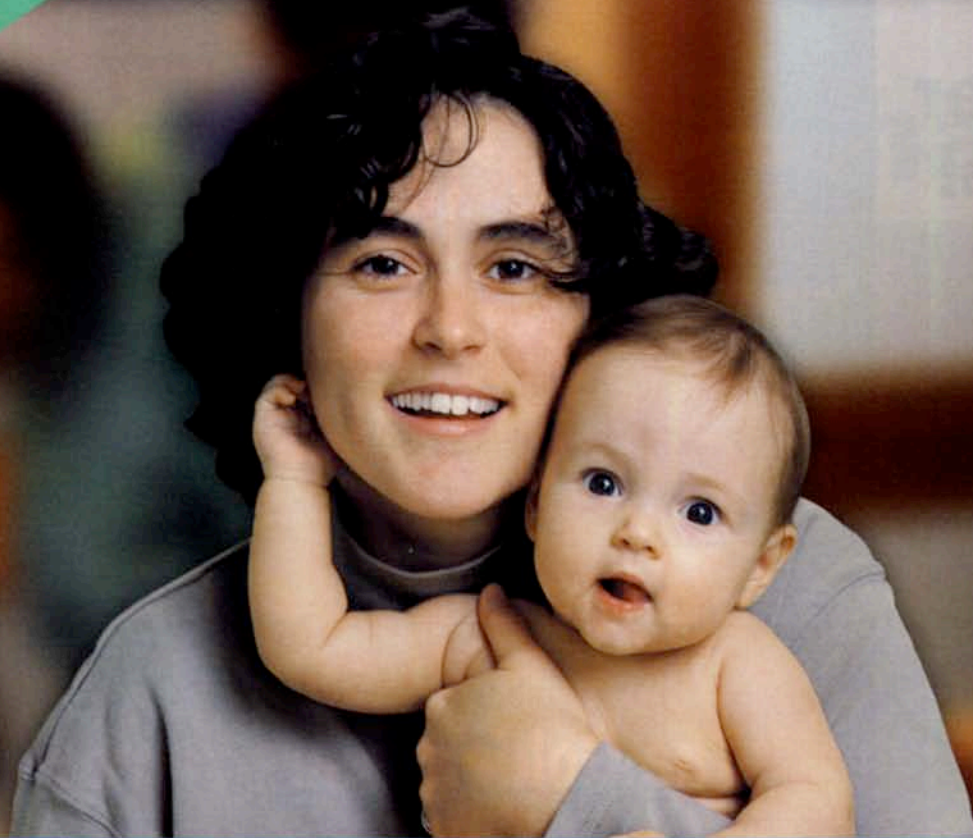
Jeffcoat, Hauth, et al. *J Periodontol* 2003

- 368 women between 21-25 weeks of gestation and >3 tooth sites with 3+mm CAL (UAB)
- Randomized to receive:
 - 1) Dental cleaning + placebo (tid)
 - 2) SCRIP + placebo
 - 3) SCRIP + metronidazole (250 mg tid for 1 wk)
- Randomization stratified on BMI, BV, and history of SPTB prior to 35 wks
- 723 additional women with periodontitis as controls

Jeffcoat, Hauth, et al, 2003



Join the 1,700
Dental Professionals
who participated last year



This dental professional helps deliver healthy babies. You can too...



American Academy of Periodontology Statement

- “Emerging science indicates that women with periodontal disease may be at greater risk for delivering preterm, low birth weight babies. For this reason, the [Academy] recommends that women who are pregnant or planning to become pregnant undergo periodontal examinations. Appropriate preventive or therapeutic services, if indicated, should be provided.”

March, 2004



Obstetrics and Periodontal Therapy Trial

The OPT Clinical Investigative Team

- **Hennepin County Medical Center:** A. DiAngelis, V. Lupo, L. Simpson, J. Anderson, K. Meyer, J. Danielson, T. Thompson
- **University of Kentucky:** M. J. Novak, J. Ferguson, D. Dawson, A. Buehl, D. Mischel, P. Stein, L. Cunningham, D. Dawson
- **University of Mississippi Medical Center:** W. Buchanan, J. Bofill, S. Vance, G. Young, A. Garner, N. Wood, K. Holmes
- **Harlem Hospital/Columbia University:** P. Papapanou, D. Mitchell, S. Matseoane, S. Lassiter, J. Mays, J. Jackson, E. Rijo, M. Bolden, C. Spicer
- **University of Minnesota:** B. Michalowicz, J. Hodges, A. Deinard, P. Tschida, H. Voelker, J. Osborn, I. Olson, Y. He, Q. Cao, L. Wolff, E. Delmore

Hypothesis

- Treatment of pregnant women with periodontitis reduces the incidence of preterm delivery.

OPT Trial

- Women randomly assigned to receive scaling and root planing either prior to 21 weeks (test) or after delivery (control)
- Test subjects receive monthly polishings and oral hygiene reinforcement
- All women receive essential dental care

- Inclusion Criteria

- At least 16 years of age
- have at least 20 natural teeth
- have periodontal disease, defined as: 4 or more teeth with probing depth ≥ 4 mm and clinical attachment loss ≥ 2 mm, and bleeding on probing at 35 percent or more tooth sites.

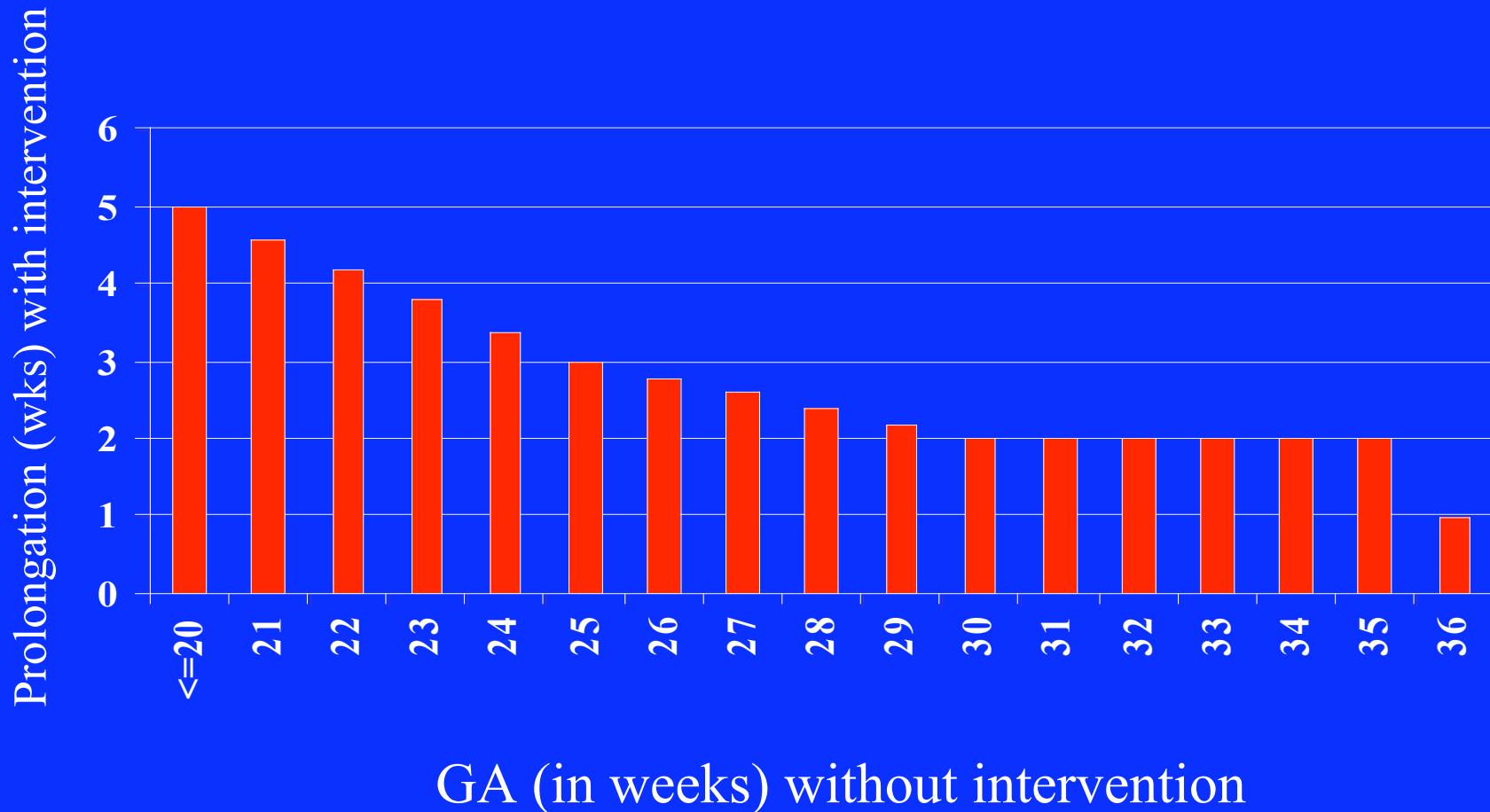
- Exclusion Criteria

- had multiple fetuses
- required antibiotic pre-medication
- had a medical condition that precluded elective dental treatment
- had extensive tooth decay or were likely to have fewer than 20 teeth after initial treatment.

Obstetrical Outcomes

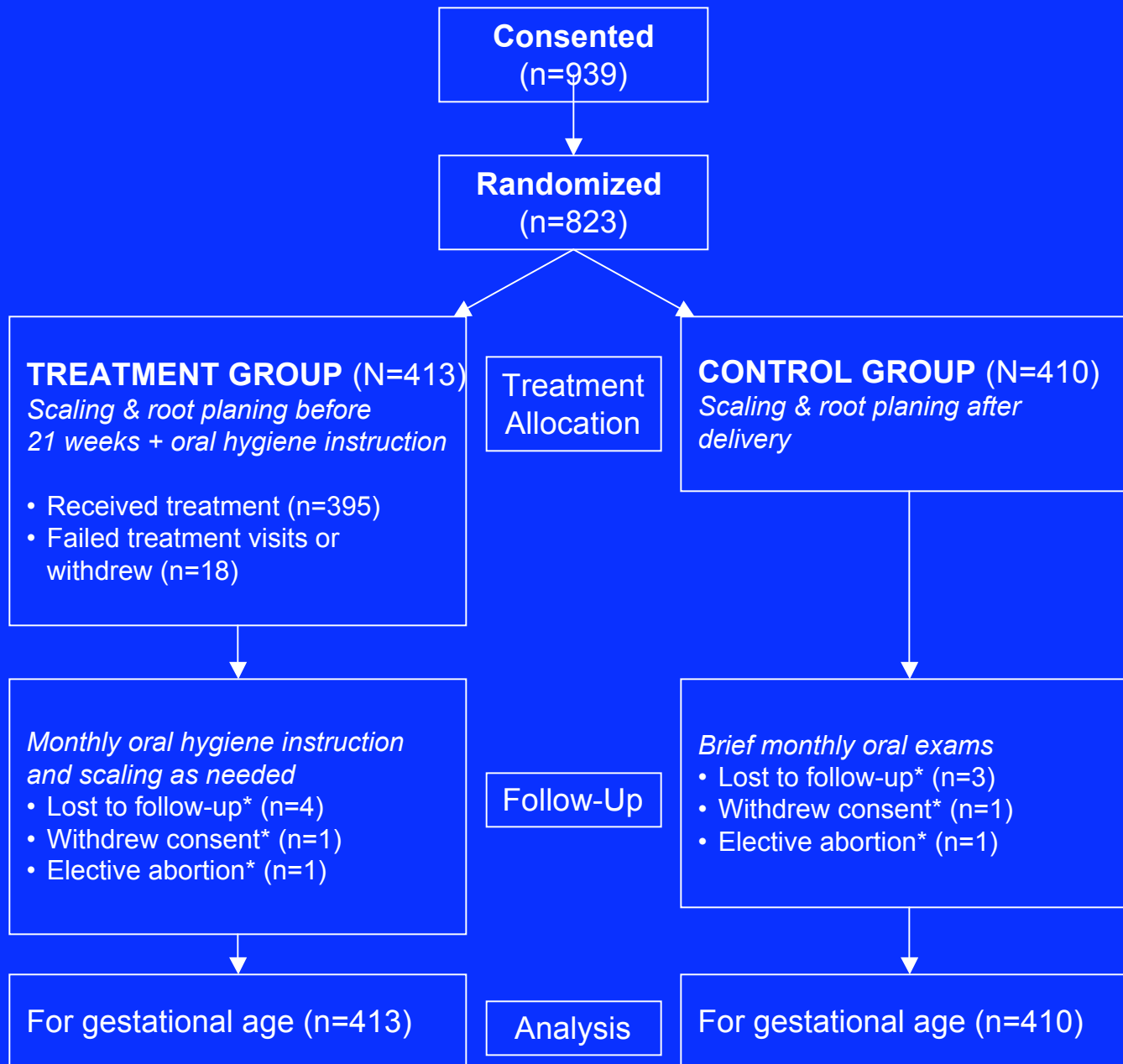
- Primary: Gestational age at the end of pregnancy
- Secondary: Birthweight

“Desired” Prolongations in Gestational Age



Statistical Approach

- Sample of 408 subjects per group gave 90% power for original assumptions and with 30% losses to follow-up
- Time to event analysis using the log rank test
 - Event was gestational age at the end of pregnancy
 - Censored gestational age at 37 weeks



Baseline Characteristics

	Control Group (N=410)	Treatment Group (N=413)	P Value
White	119 (29.0%)	116 (28.1)	0.77
Black	182 (44.4)	190 (46.6)	0.64
Hispanic	180 (43.9)	170 (41.2)	0.43
Obstetrical History			
Any pregnancy	305 (74.4)	306 (74.1)	0.92
Spontaneous abortion	94 (30.8)†	108 (35.3)	0.24
Induced abortion	67 (22.0)†	52 (17.0)	0.12
Stillbirth	6 (2.0)†	9 (2.9)	0.44
Live preterm birth	44 (16.5)*	33 (12.5)	0.18

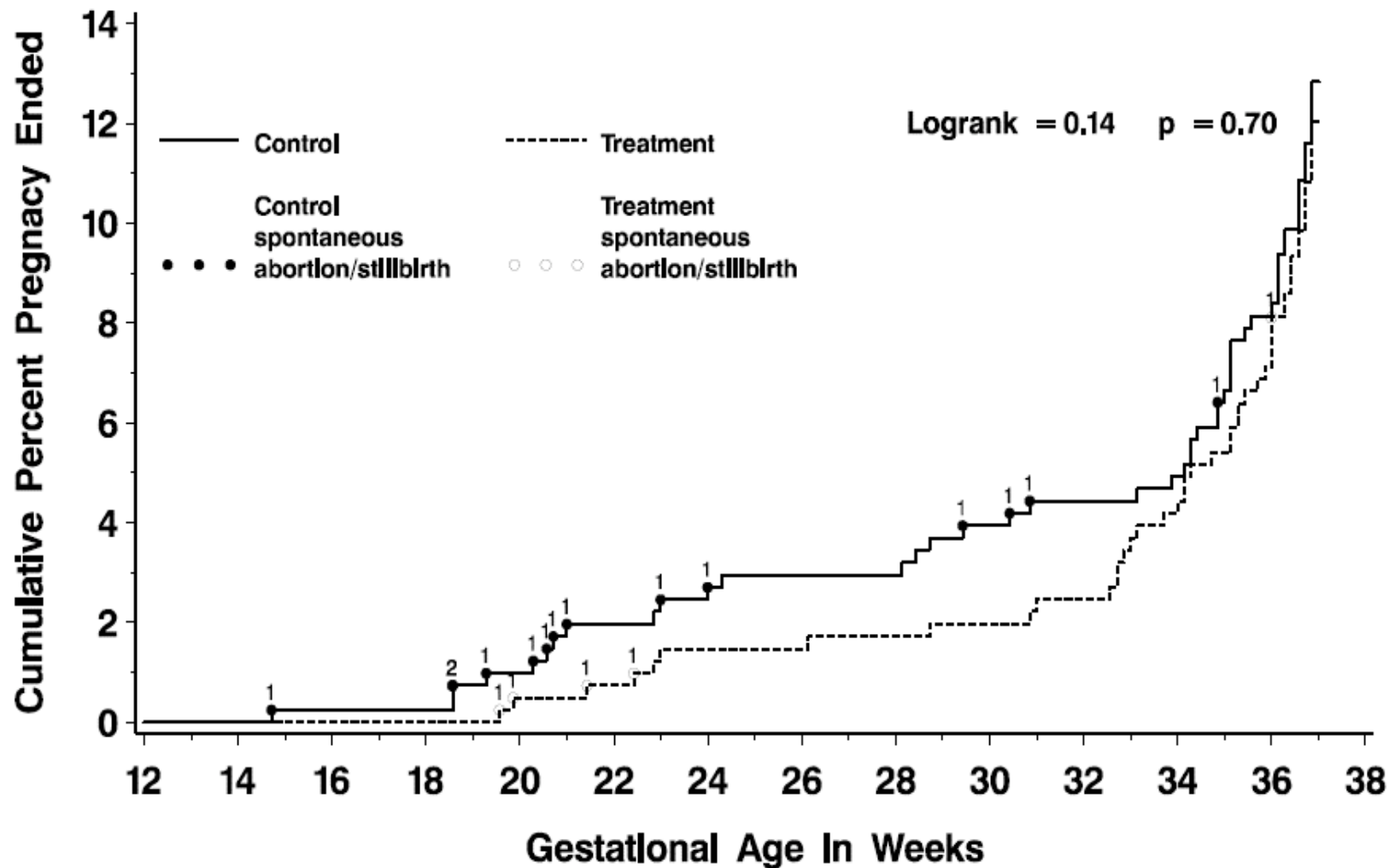
† As a fraction of women with a previous pregnancy

* As a fraction of all women with a previous live birth

Baseline Dental Characteristics

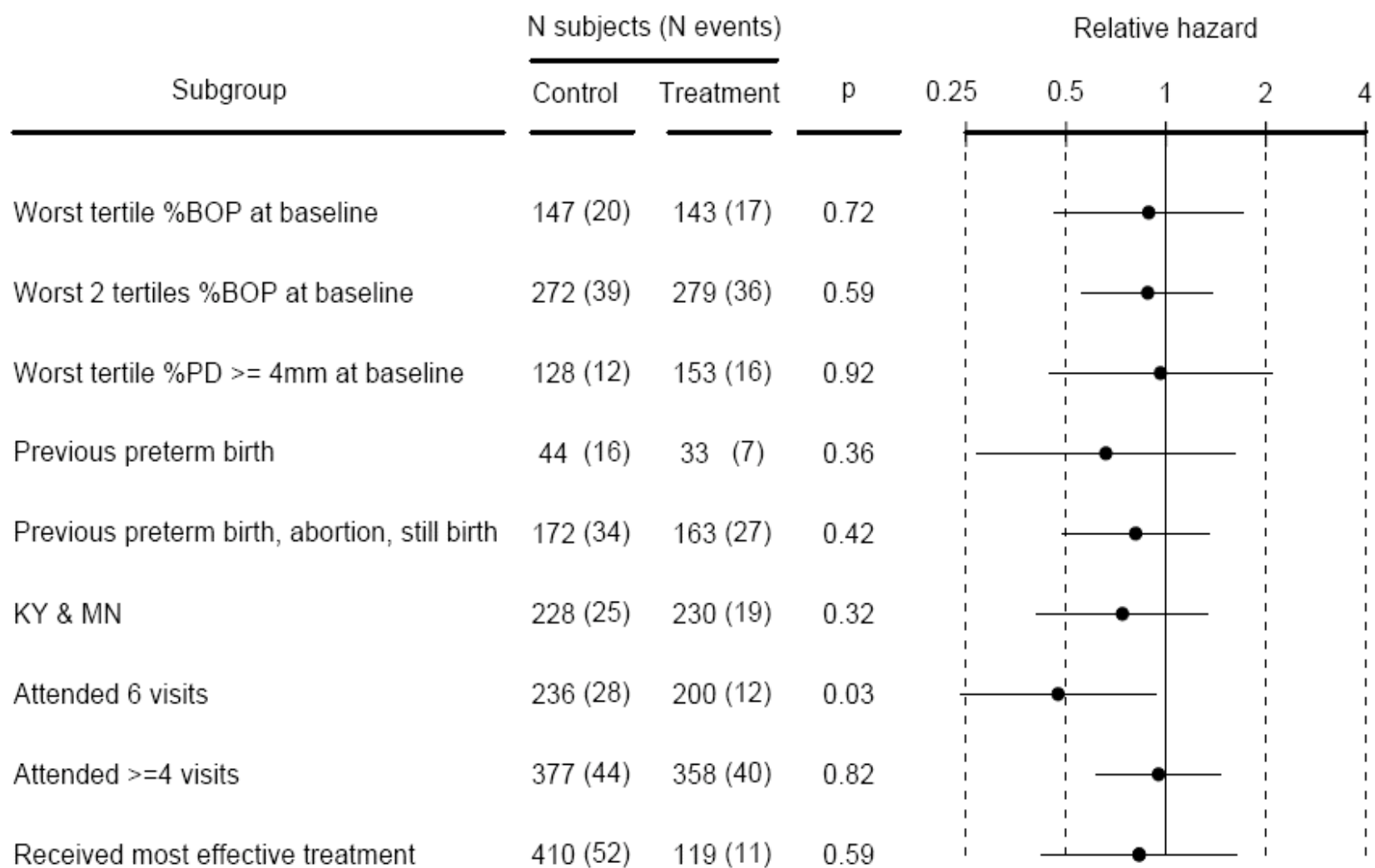
	Control Group (N=410)	Treatment Group (N=413)	P Value
Number of natural teeth	26.8 ± 1.7	26.7 ± 1.8	0.67
Number of qualifying teeth	14.4 ± 6.7	15.2 ± 6.8	0.08
% tooth sites that bled on probing	69.0 ± 17.1	69.6 ± 17.4	0.62
% tooth sites with probing depth ≥4 mm	24.8 ± 15.9	26.5 ± 16.6	0.13

Cumulative Incidence of Pregnancies Ending < 37 Weeks



Control:	410	410	409	408	403	398	395	393	393	389	387	385	372	353
Treatment:	413	413	413	410	406	404	401	401	400	399	397	390	378	358

Relative Hazard of the Pregnancy Ending < 37 weeks, According to Subgroup



Birth Outcomes

	Control Group (N=405)	Treatment Group (N=407)	P Value
Duration of pregnancy			
< 32 wk	18 (4.4%)	10 (2.5)	0.13
< 35 wk	26 (6.4)	22 (5.4)	0.56
< 37 wk	52 (12.8)	49 (12.0)	0.75
Birthweight, in grams	3258 ± 575	3239 ± 586	0.64
< 2500 g	43/403 (10.7%)	40/406 (9.9)	0.73
< 1500 g	15/403 (3.7)	8/406 (2.0)	0.14
Small for gestational age (10%)	48/391 (12.3)	51/402 (12.7)	0.91

Birth Outcomes

	Control Group (N=405)	Treatment Group (N=407)	P Value
Live births	391 (96.5%)	402 (98.8)	
< 32 wk	5 (1.3)	6 (1.5)	1.0
< 35 wk	12 (3.1)	18 (4.5)	0.35
< 37 wk	38 (9.7)	44 (10.9)	0.64
Pre-eclampsia	20 (4.9)	31 (7.6)	0.15

Neonatal Outcomes

	Control Group	Treatment Group	P Value
APGAR < 7 at 1 min	27/383 (7.0%)	37/394 (9.4)	0.13
APGAR < 7 at 5 min	3/383 (0.8)	4/394 (1.0)	0.74
Admission to NICU	31/389 (8.0)	45/397 (8.0)	0.12
NICU stay > 2 days	22/389 (5.7)	30/397 (7.6)	0.32
Discharged Alive	30/31 (96.8)	44/45 (97.8)	1.00

Periodontal Outcomes*

	Control Group	Treatment Group	P Value
Probing depth @ sites initially 4-6 mm, in mm	0.38 ± 0.02	0.88 ± 0.02	<0.001
Probing depth @ sites initially ≥ 7 mm, in mm	1.07 ± 0.14	1.84 ± 0.14	<0.001
Sites w/ CAL ≥ 2 mm	0.84 ± 0.85	9.72 ± 0.87	<0.001
% sites w/ BOP	2.1 ± 0.7	22.7 ± 0.7	<0.001

*Change from baseline. Positive number indicates an improvement.

Conclusions

In pregnant women with periodontitis:

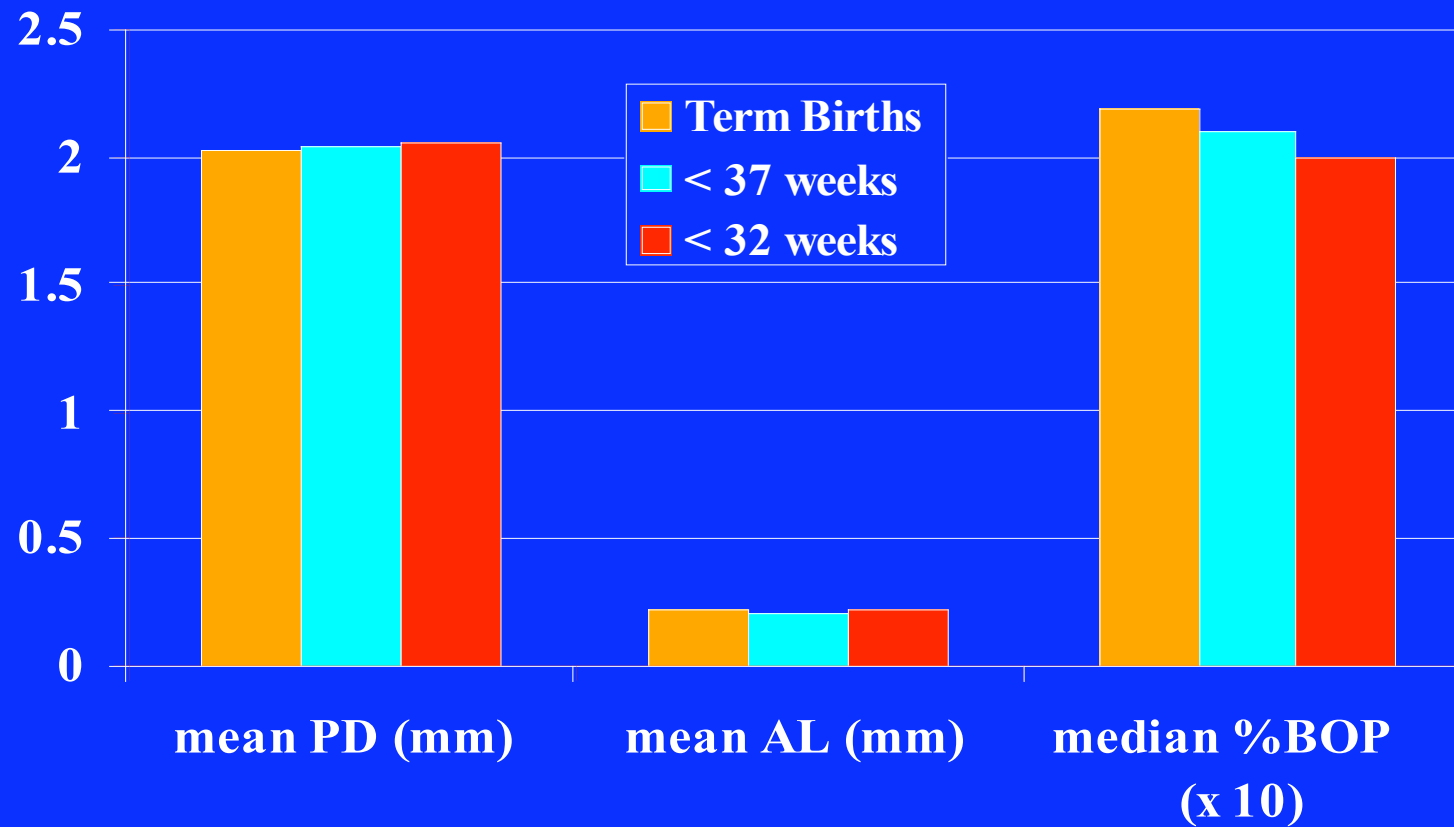
- Non-surgical periodontal therapy delivered between 13 and 21 weeks of gestation does not significantly alter rates of preterm birth, low birthweight or fetal growth restriction
- Non-surgical periodontal therapy delivered between 13 and 21 weeks of gestation is safe and effective

Guy's and St. Thomas Hospital

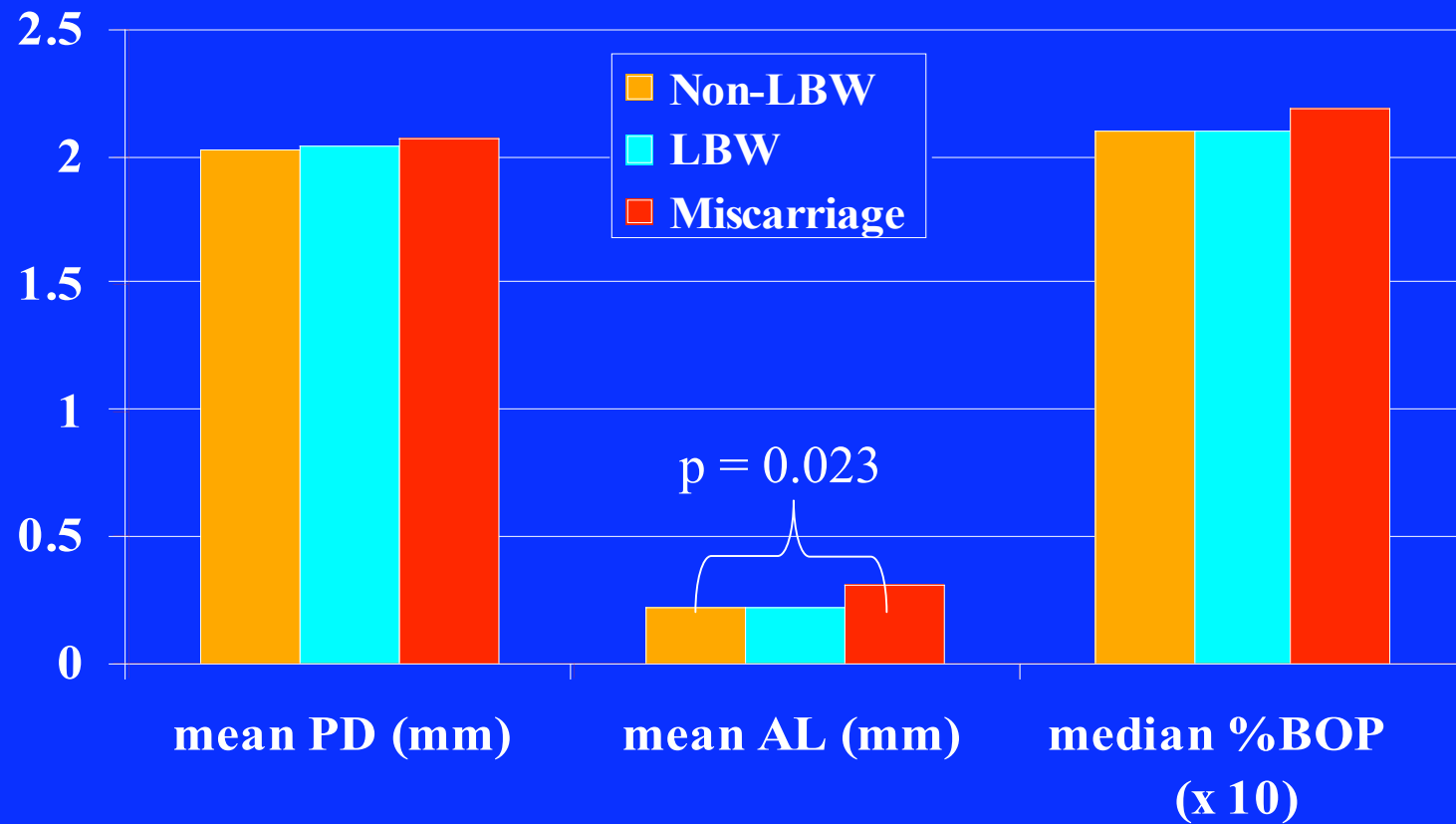
Moore, et al. *Br Dent J*. 2004;197(5):251 – 8.

- Enrolled women at 12 weeks of gestation
- Conducted dental exams in hospital beds, evaluated two sites per tooth
- Data available for 3,452 term, 286 preterm (< 37 wks), and 112 very preterm (< 32 wks) mothers

Moore et al., *Br Dent J* (2004); **197**, 251–258.



Moore et al., *Br Dent J* (2004); 197, 251–258.



Where to go from here?

1. *Ongoing studies*

2. *Community concerns*

- Improve dental health awareness and access to care in pregnant women with periodontitis – care to improve oral health *per se*

3. *Possible research questions*

- Does periodontal therapy delivered prior to conception affect birth outcomes?
- Do comprehensive approaches that address all infections/chronic inflammatory states as well as deleterious habits and lifestyles improve birth outcomes?
- What is the effect of periodontitis on early pregnancy losses?