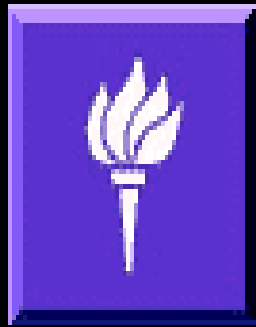# Pregnancy and Oral Health: Evidence and Opportunity

NOHC – Little Rock, Arkansas

Ananda P. Dasanayake, BDS, MPH, Ph.D
Department of Epidemiology & Health Promotion
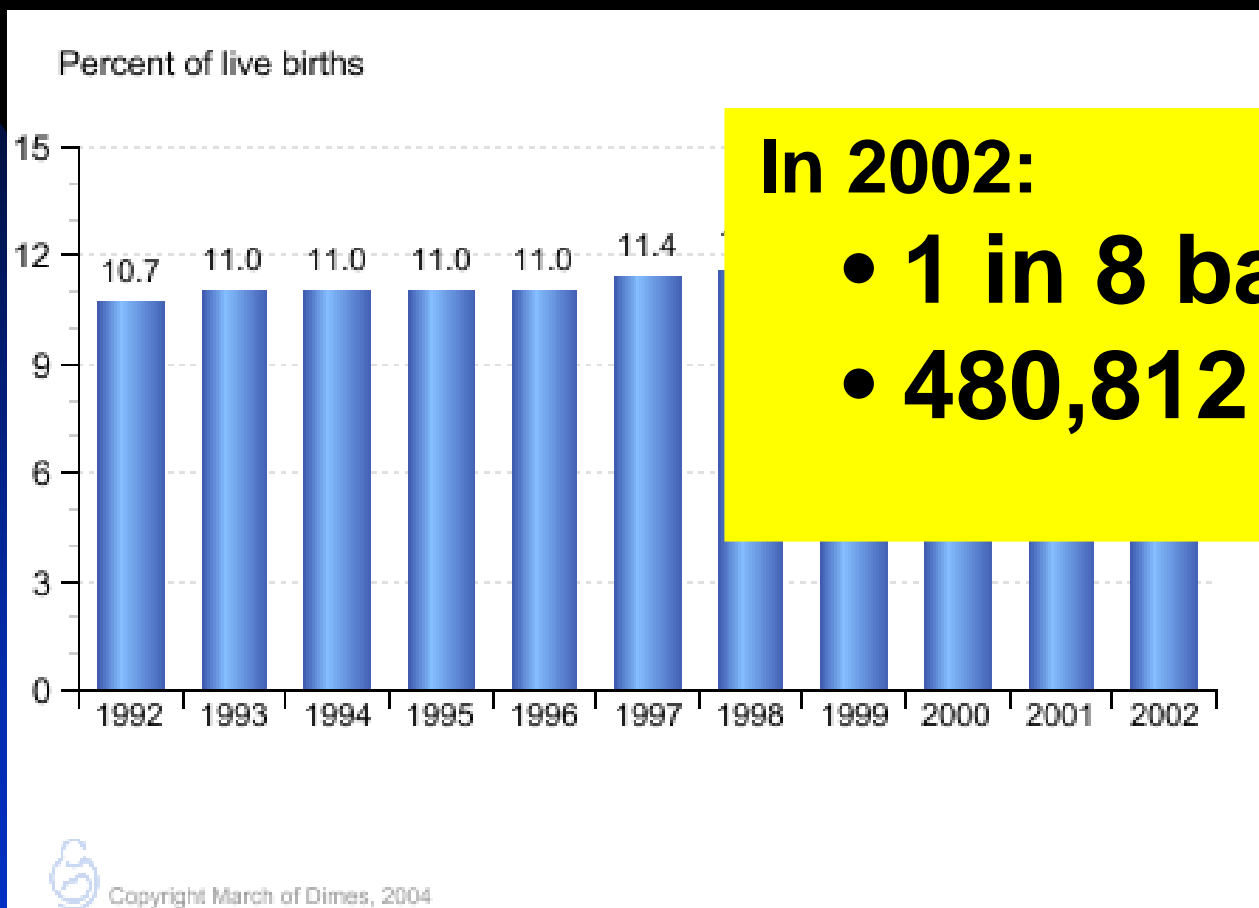**New York University College of Dentistry**

Overview

- Impact of Preterm Delivery (PTD)
- Possible mechanisms for the association between Periodontal Disease (PD) and PTD
- Overall evidence
- Data from selected studies
- Summary – From here to where?
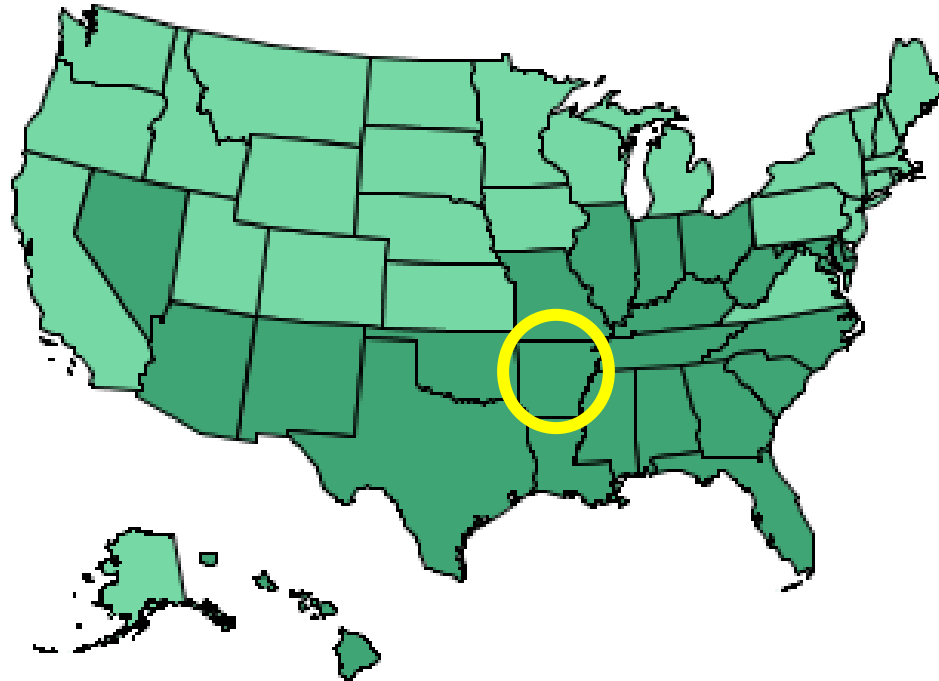
Background

Preterm Birth: US 1992-2002

Percent of live births

In 2002:
- **1 in 8 babies**
- **480,812 PTB**

Year	Percent
1992	10.7
1993	11.0
1994	11.0
1995	11.0
1996	11.0
1997	11.4

Copyright March of Dimes, 2004

National Center for Health Statistics, Final Natality Data
www.marchofdimes.com/peristats

Preterm Birth: 2003

Percent of live births
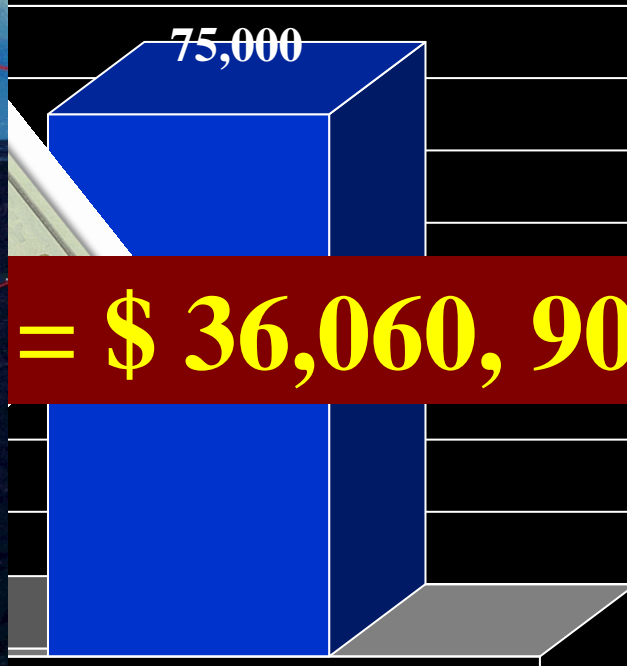
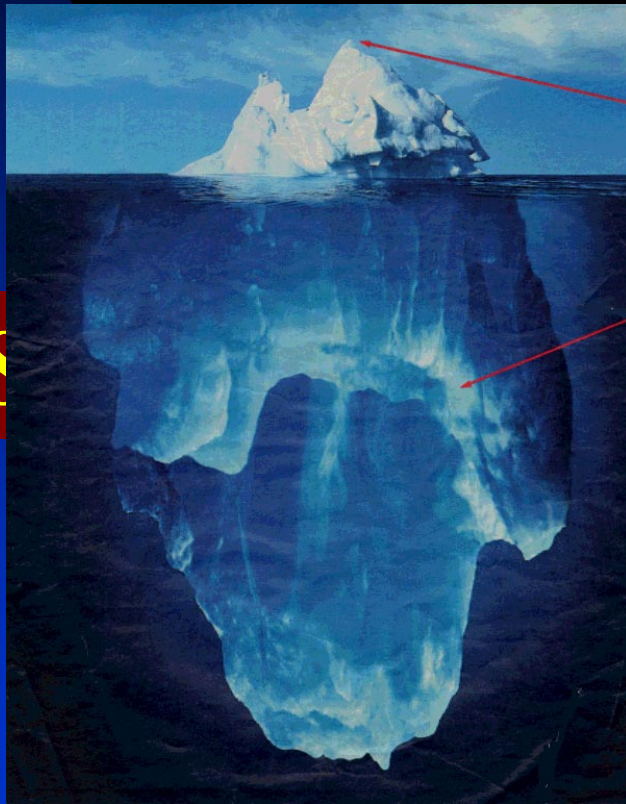Higher than US Rate of 12.3 (24)

Between HP2010 Objective and US Rate (27)

Met or lower than HP2010 Objective of 7.6 (0)

Hospital Charges for Newborns

75,000

480,8   = $ 36,060, 900, 000

Normal ☐ PTD

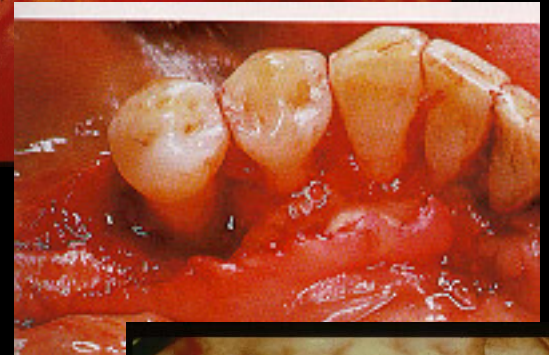# Why Do Women Deliver Early?

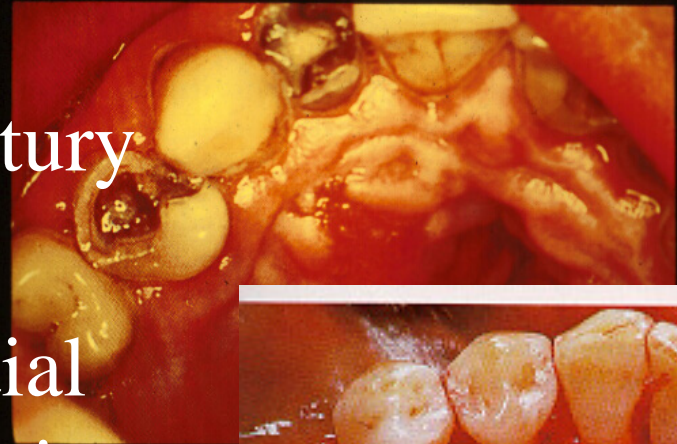**Preterm = 28-36w; Term = 37-41w; Post-term = 42+w**
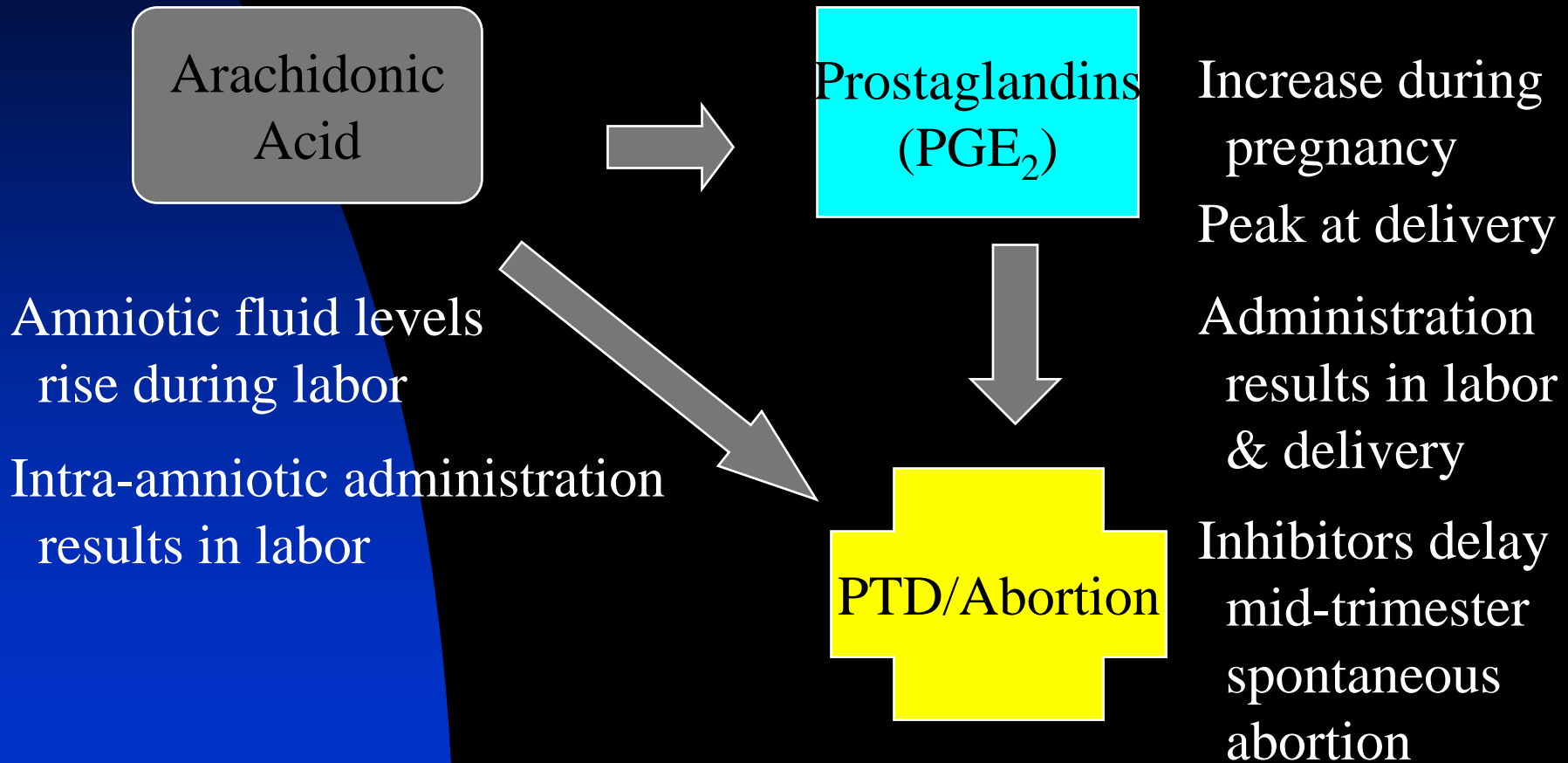
- 50% - unknown causes
- Others – 4 main pathways
  - Maternal and fetal stress
  - Infection and Inflammation
  - Bleeding
  - Stretching

Oral Sepsis

- William Hunter, 20th century English physician
  - ◆ Oral cavity as a potential source of bacterial sepsis that caused infections and disease through out the body
  - ◆ Lancet 1911;1:79-86

How might Periodontal Disease be related to PTD?

Arachidonic Acid → Prostaglandins (PGE$_2$) → PTD/Abortion

Increase during pregnancy

Peak at delivery

Amniotic fluid levels rise during labor

Intra-amniotic administration results in labor

Administration results in labor & delivery

Inhibitors delay mid-trimester spontaneous abortion

Periodontal Disease (PD) & Inflammatory Mediators

- PD is a chronic anaerobic gram-negative infection
- PGE_2 and IL-1beta levels in gingival crevicular fluid (GCF) associated with PLBW (Konopka, 03)
- GCF cytokine levels are highly correlated with amniotic fluid cytokine levels
- Experimental PD in pregnant animals has lead to increase intra amniotic fluid levels of PGE_2 and TNF-alpha
- PD bacteria can invade epithelial and endothelial cells and spread to amniotic fluid (Han, 04)

Fig 4. Model Showing Oral and Vaginal Bacteria in Relation to Prematurity

Dasanayake et al., J Perio 2005;76:171-177
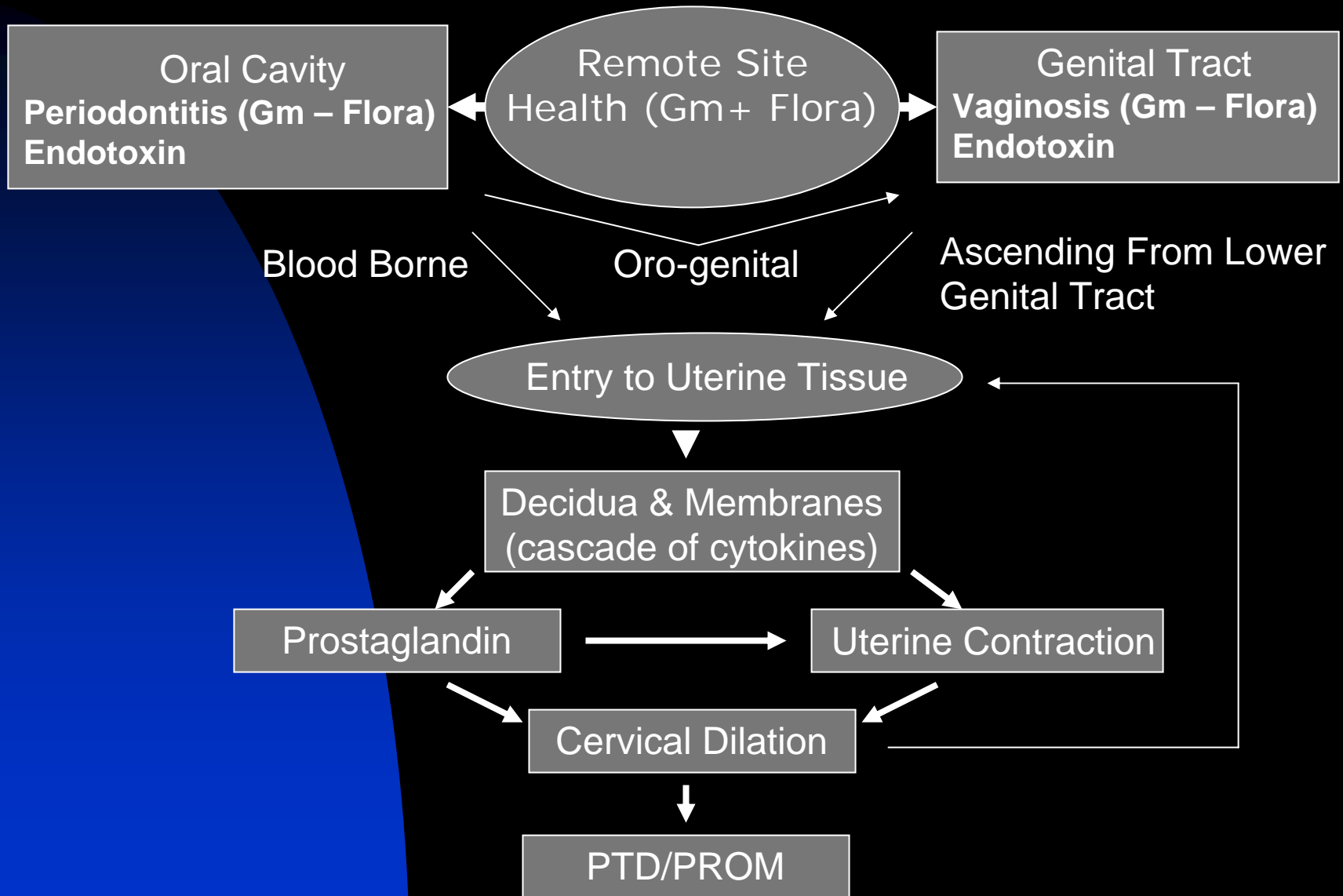
What do we know about the association between PD and PTD?

What is Known About Periodontal Disease and Prematurity: A Summary of Literature

Gingival Crevicular Fluid Cytokines:
Positive[12, 20]

Plaque/Salivary Bacteria:
Positive[4,7, 8,17, 20]
Negative[4,15]

Clinical Periodontal Disease:
Positive[2,7,9,10,13,16,21,22]
Negative[5,18,19,23]

Intervention Studies:
Positive[14]
Negative[11]

Serum Antibodies/ Cytokines:
Positive[3,8]
Negative[1,9,15]

Cord Blood Antibodies:
Positive[15]

Amniotic Fluid Cytokines:
Positive[7]

Periodontal Disease

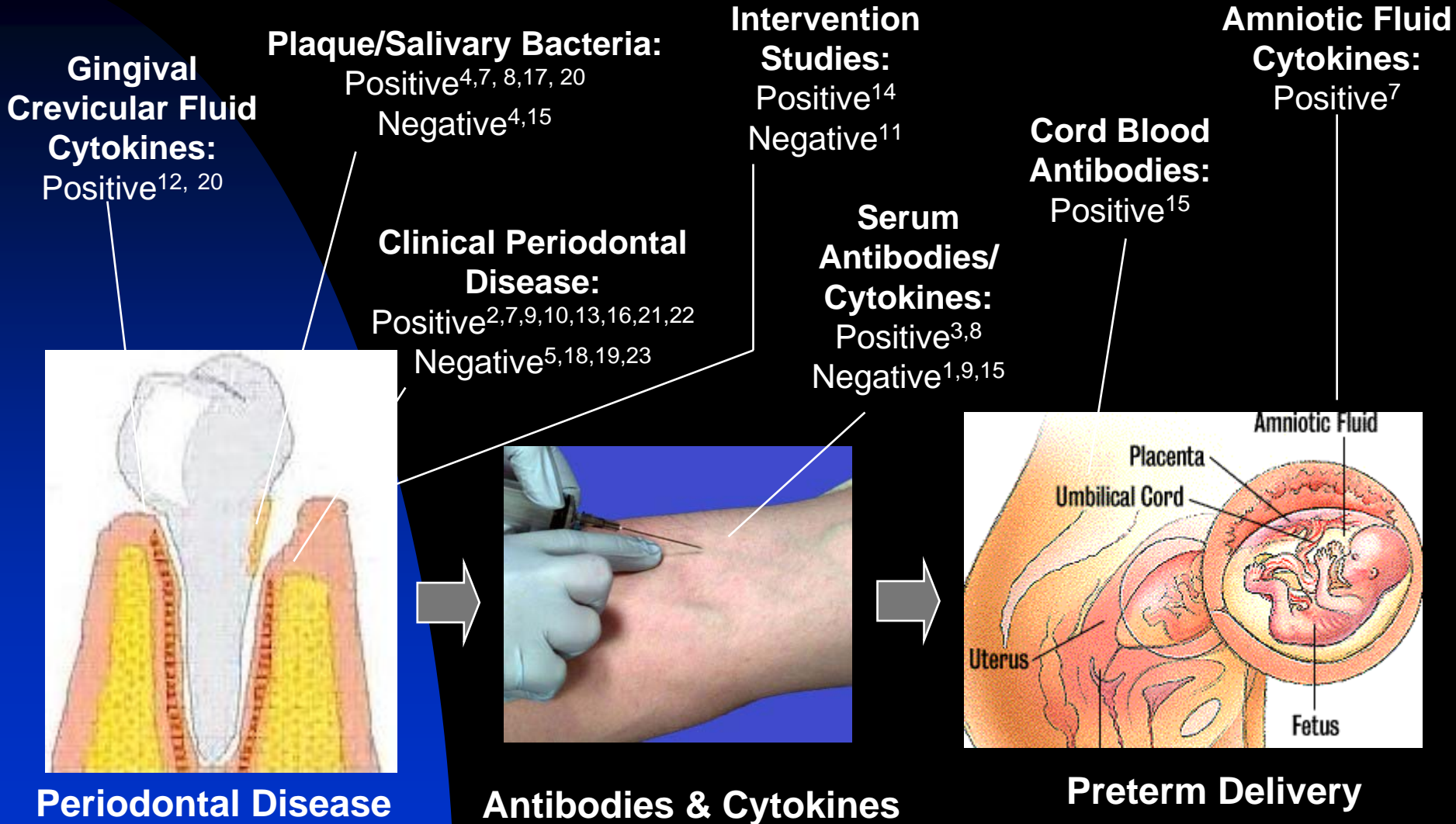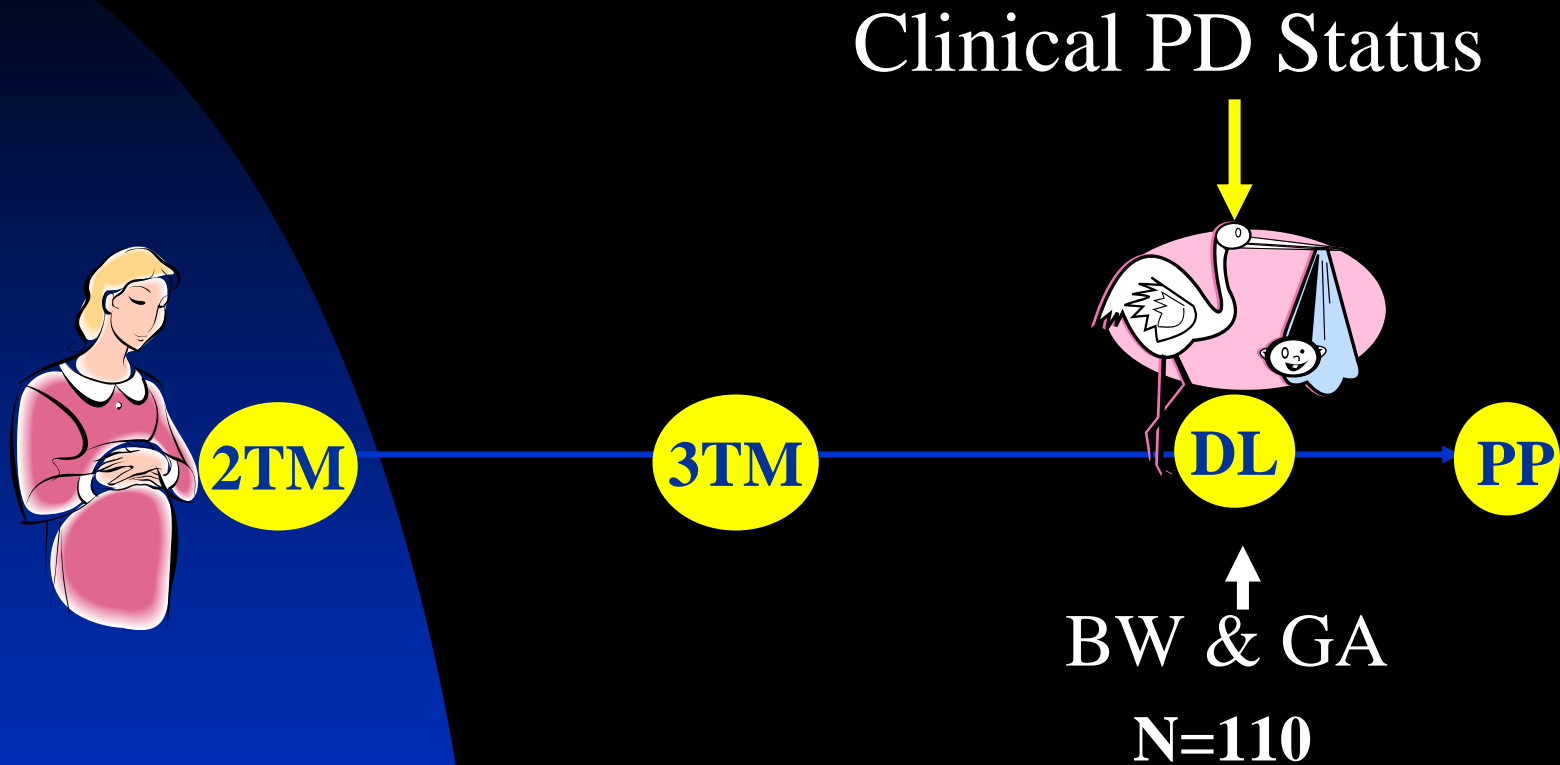**Antibodies & Cytokines**

Preterm Delivery

Fig 1: Categorization of relevant literature by evidence. Studies grouped as positive when association was demonstrated and negative when not.

Q1. Do women who delivered PLBW infants have more PD?

Selected studies…

Fig 2. Study Methods*

Clinical PD Status

2TM — 3TM — DL — PP

BW & GA

N=110

* Matched Case-Control Study; Chiangmai, Thailand (88)

Table 1. Factors Associated with Low Birth Weight

Risk factor	OR	95% CI
Mother's height	0.8	0.75 - 0.98
Prenatal care: (no vs. yes)	3.9	1.24 - 12.2
Clinical PD	3.3	1.4-8.3
Infant gender: (F vs. M)	3.1	1.0 - 9.5
DMFT	1.1	0.97 - 1.4

Dasanayake, Ann Periodontol 1998

Q2. Do women with higher levels of oral bacteria deliver more PLBW infants?

Fig 2. Study Methods

Bacteriological Measurements*

2TM — 3TM — DL → PP

N=560

BW & GA
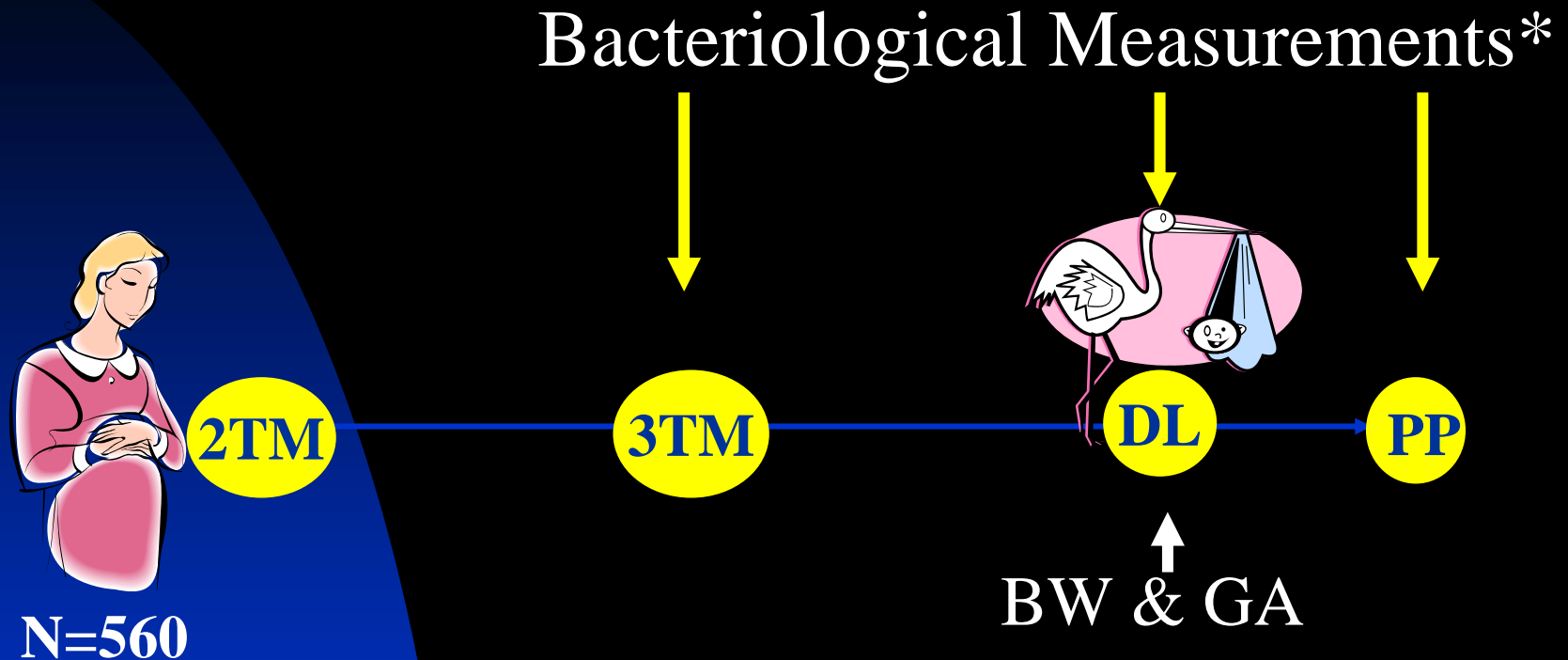
S. mutans, S. sobrinus, S. sanguinus, L. acedophilus, L. casei, A. viscosis, A. naeslundii, total streptococci, & total cultivable organisms

Table 4. Factors Associated with **Birth Weight**: Multivariable Model[a]

Variable	β	SE	p
Age	22.36	7.3	0.002
Gender: F vs. M	-162.9	56.5	0.004
A. naeslundii -2[b]	-59.7	29.1	0.04
L. casei[b]	42.2	19.3	0.03

[a] - Model R^2 = 7%; p=0.0003 (Backward Elimination)
[b] - Average over 3T and DL

Table 5. Factors Associated with Gestational Age: Multivariable Model[a]

Variable	β	SE	p
A. naeslundii-2[b]	-0.17	0.09	0.05
L. casei[b]	0.13	0.06	0.04
S. sobrinus[b]	-0.14	0.07	0.07

[a] - C- Section Excluded; Model $R^2 = 4\%$; p=0.02
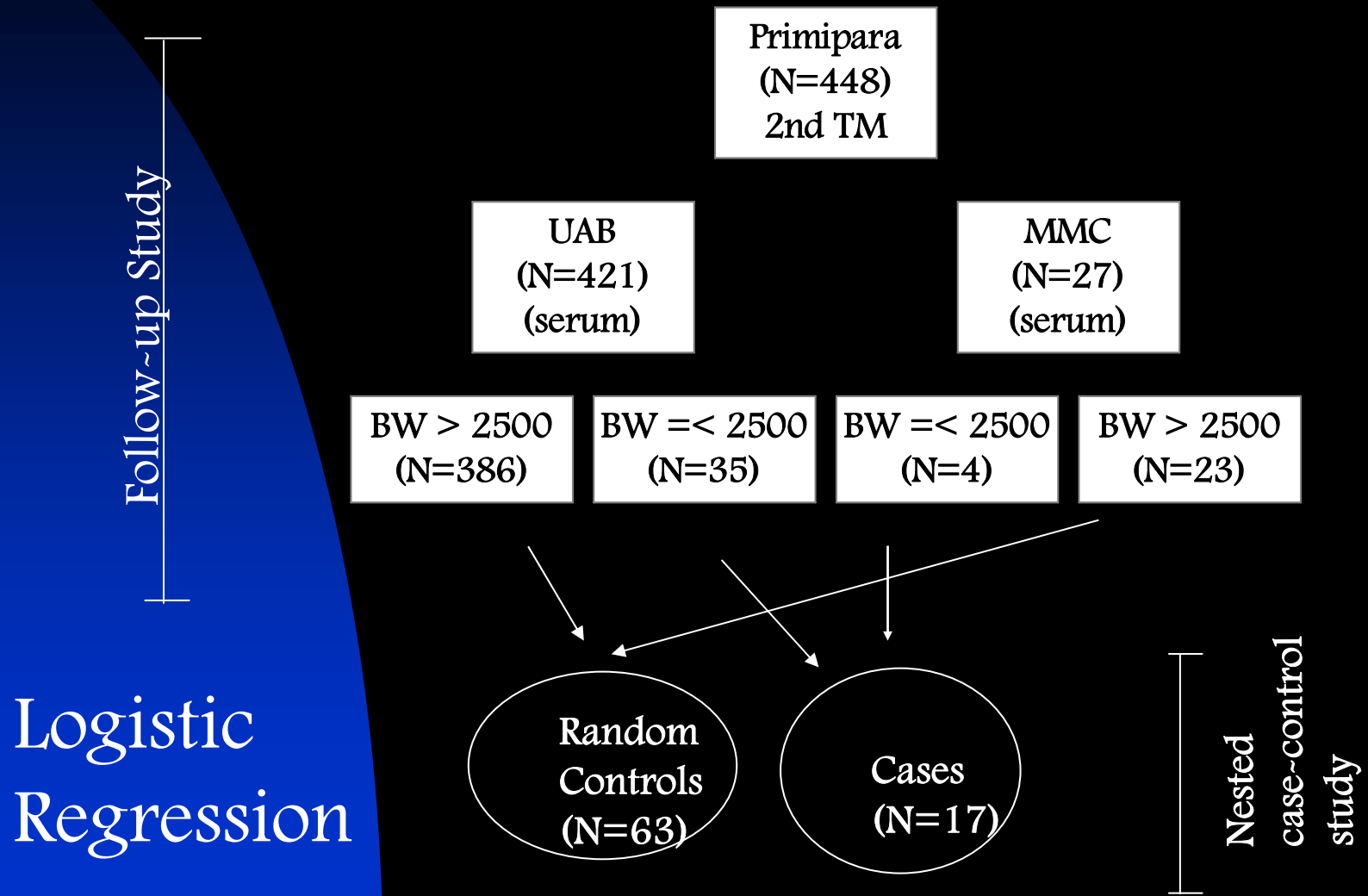   (Backward Elimination)
[b] - Average over 3T and DL

Q3. Do women with higher IgG levels against PD pathogens deliver more PLBW infants?
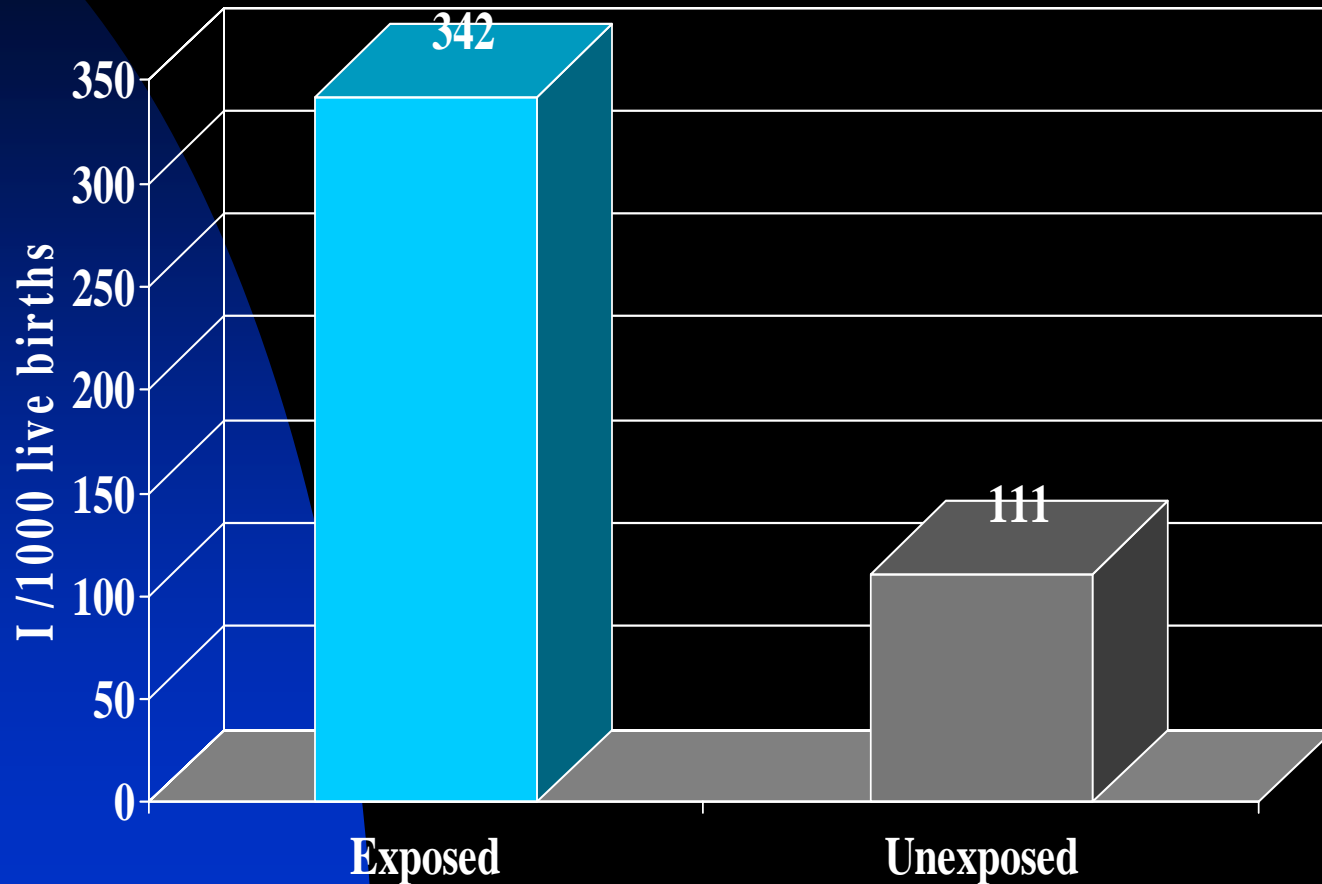
Fig 5. Study Methods

Serum IgG Levels

2TM

N=80

Birth Weight & Gestational Age

Fig 1. Study Design

Follow~up Study

Logistic Regression

Primipara
(N=448)
2nd TM

UAB
(N=421)
(serum)

MMC
(N=27)
(serum)

BW > 2500
(N=386)

BW =< 2500
(N=35)

BW =< 2500
(N=4)

BW > 2500
(N=23)

Random Controls
(N=63)

Cases
(N=17)

Nested case~control study

Incidence or PLBW by IgG Levels

Exposed = above median level of IgG

Table 2. Strength of the Association Between P.g Specific IgG Levels & LBW

IgG Level	LBW	NBW	OR	95% CI
Median:				
above	12	23	4.1	1.3 – 12.8
below	5	40		
75th %:				
above	8	12	3.8	1.2 – 11.6
below	9	51		

Q4. Can this association be confounded by smoking?

Fig 5. Study Methods

Clinical PD

2TM

N=226

Birth Weight & Gestational Age

Rural prima-gravida
No tobacco (smoking or chewing), alcohol, or illicit drugs
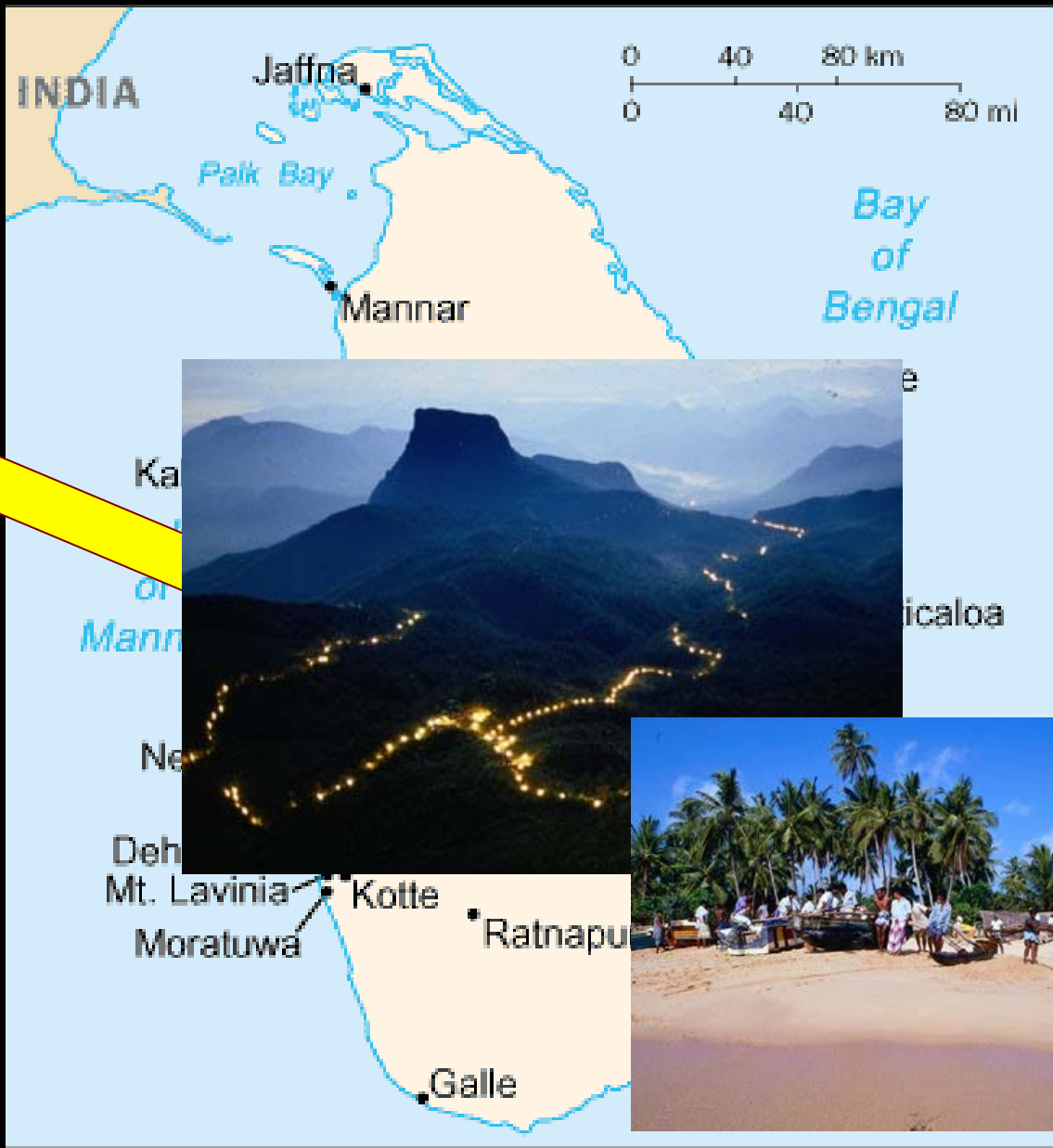
Fig. 2. PLBW by PD Status
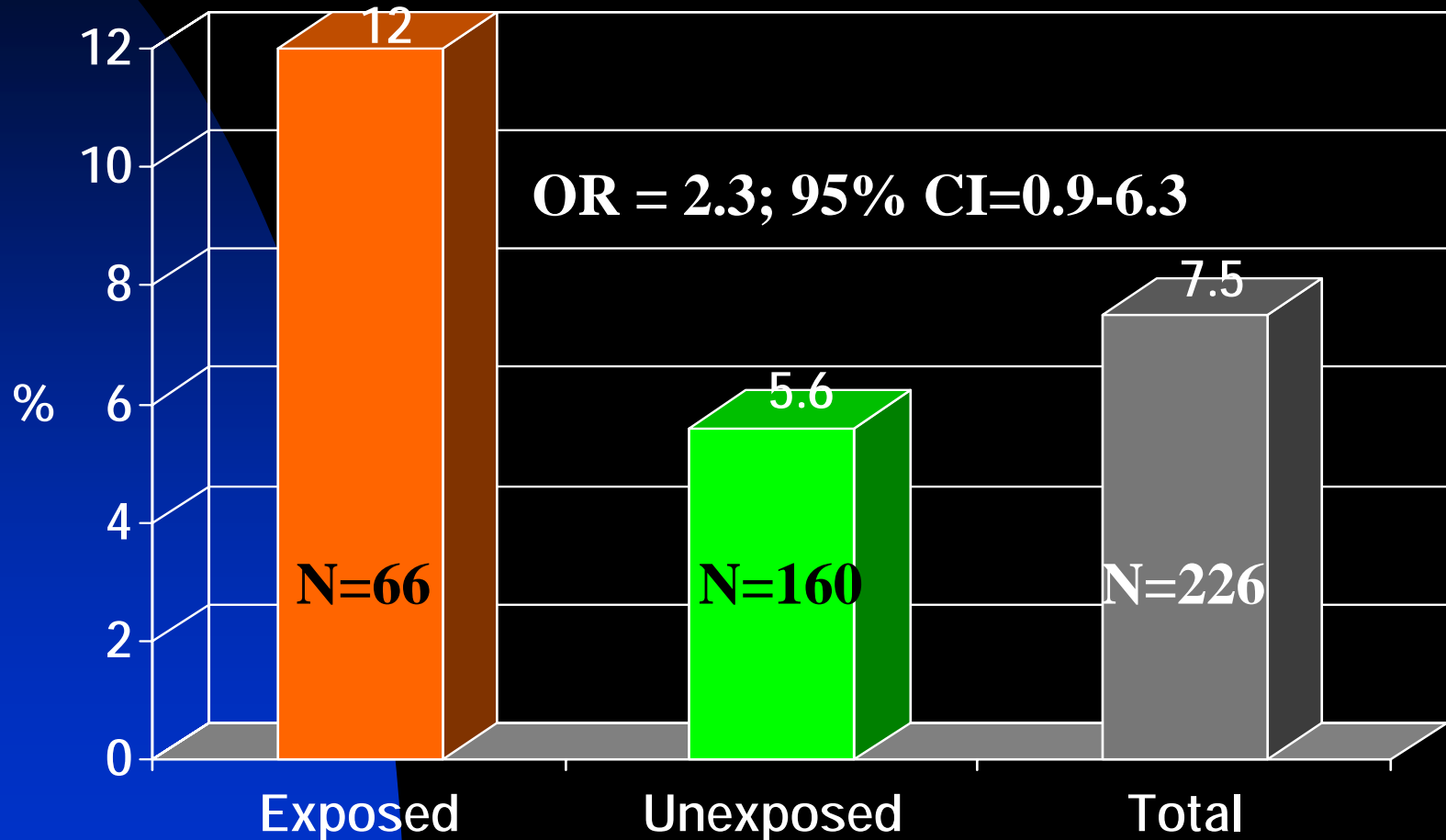
What Do We Conclude From All This?
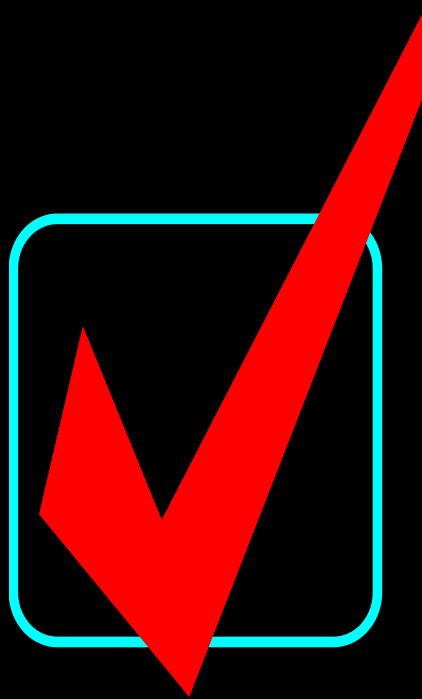
Conclusions…

- **Oral health of the gravida can influence her pregnancy outcome**

- **Available evidence - moderate to strong with some inconsistencies**

- **More research is needed to identify the true nature of these associations and to identify the effective prevention strategies**

In reality….

- Dentists can be reluctant to treat pregnant women during pregnancy
- OB/GYNs may or may not advise pregnant women on the importance of oral health

ADA Advice

- Continue regular dental visits during pregnancy
- It is safe to perform non-emergency dental procedures
- But avoid elective surgery during the 1st TM
- Some drugs and anesthetics can be used during dental procedures
- X-rays may be needed for emergency treatment that can't be postponed until after delivery. Lead apron may minimize exposure to radiation

(JADA 2004:135;127)

Coming soon….

◆ NY State Guidelines….