

Does gum disease in pregnancy cause preterm birth or low birth weight?

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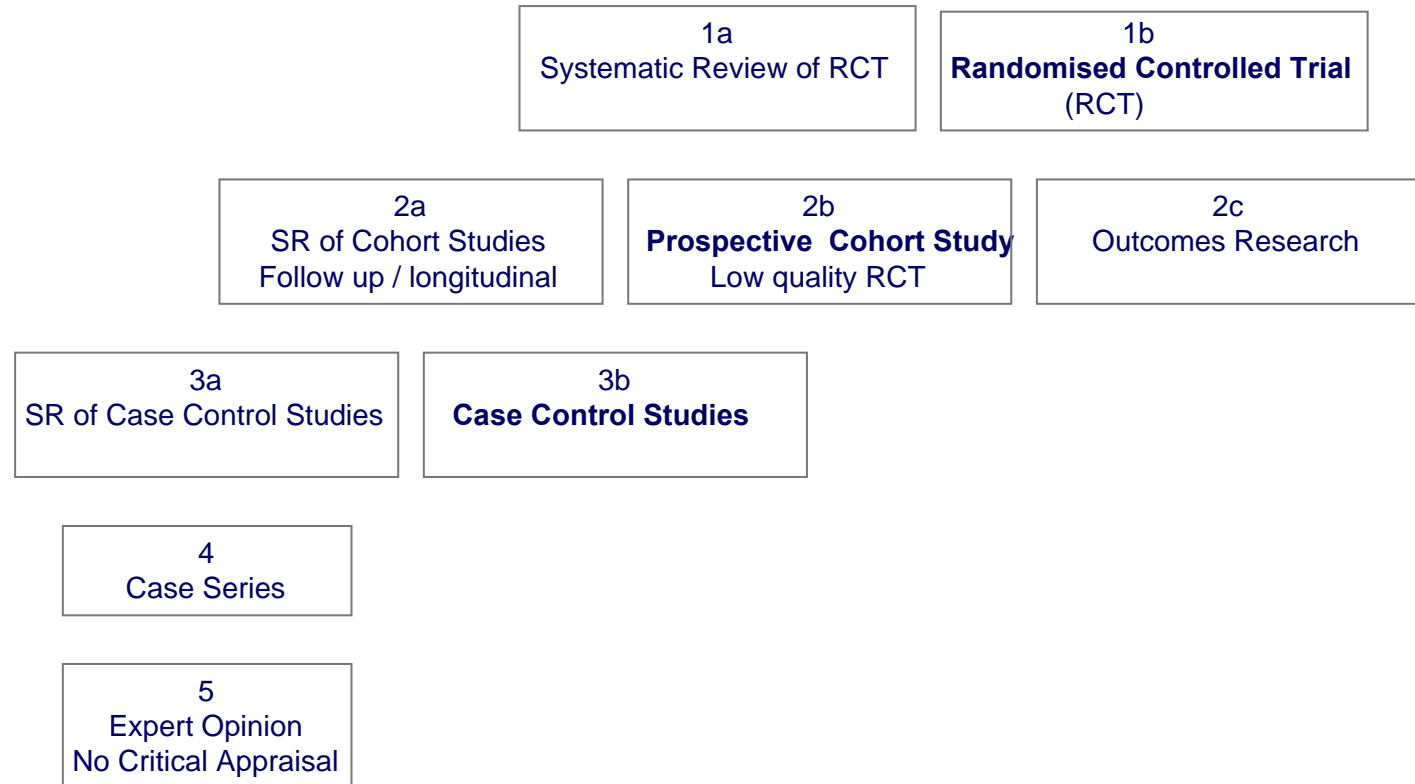
**Presented at: *Biting Issues in Health & Disease*
Healthy Development Adelaide, 1 August 2007**

US Surgeon General's report on oral health*

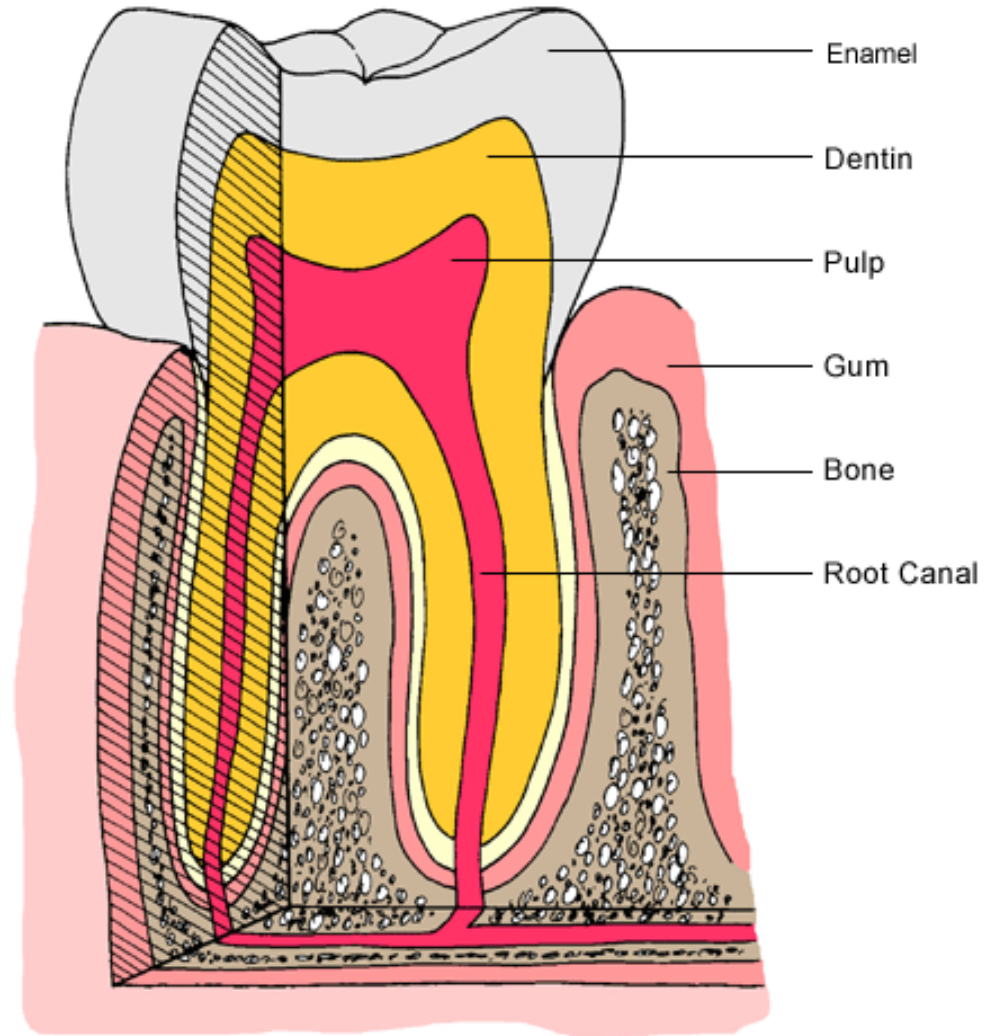
“Oral health is integral to general health; this report provides important reminders that oral health means more than healthy teeth and that you cannot be healthy without oral health.” –Donna Shalala

- **Chapter 5 reviews associations between oral infections and:**
 - **Diabetes**
 - **Heart disease/stroke**
 - **Adverse pregnancy outcomes**
- **Concluded that “sufficient evidence does not yet exist to conclude that one leads to the other”**

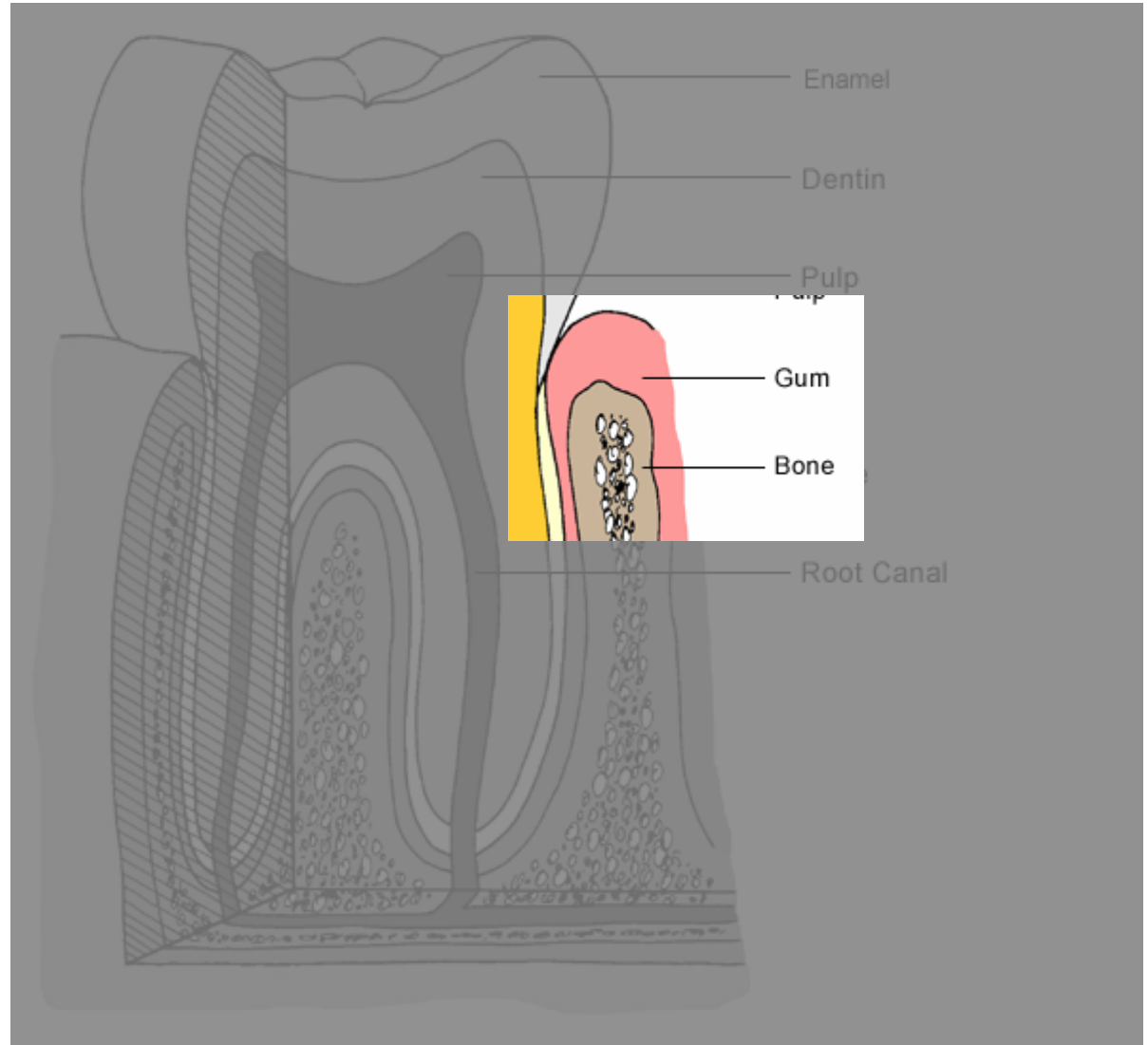
Levels of evidence



Dental anatomy

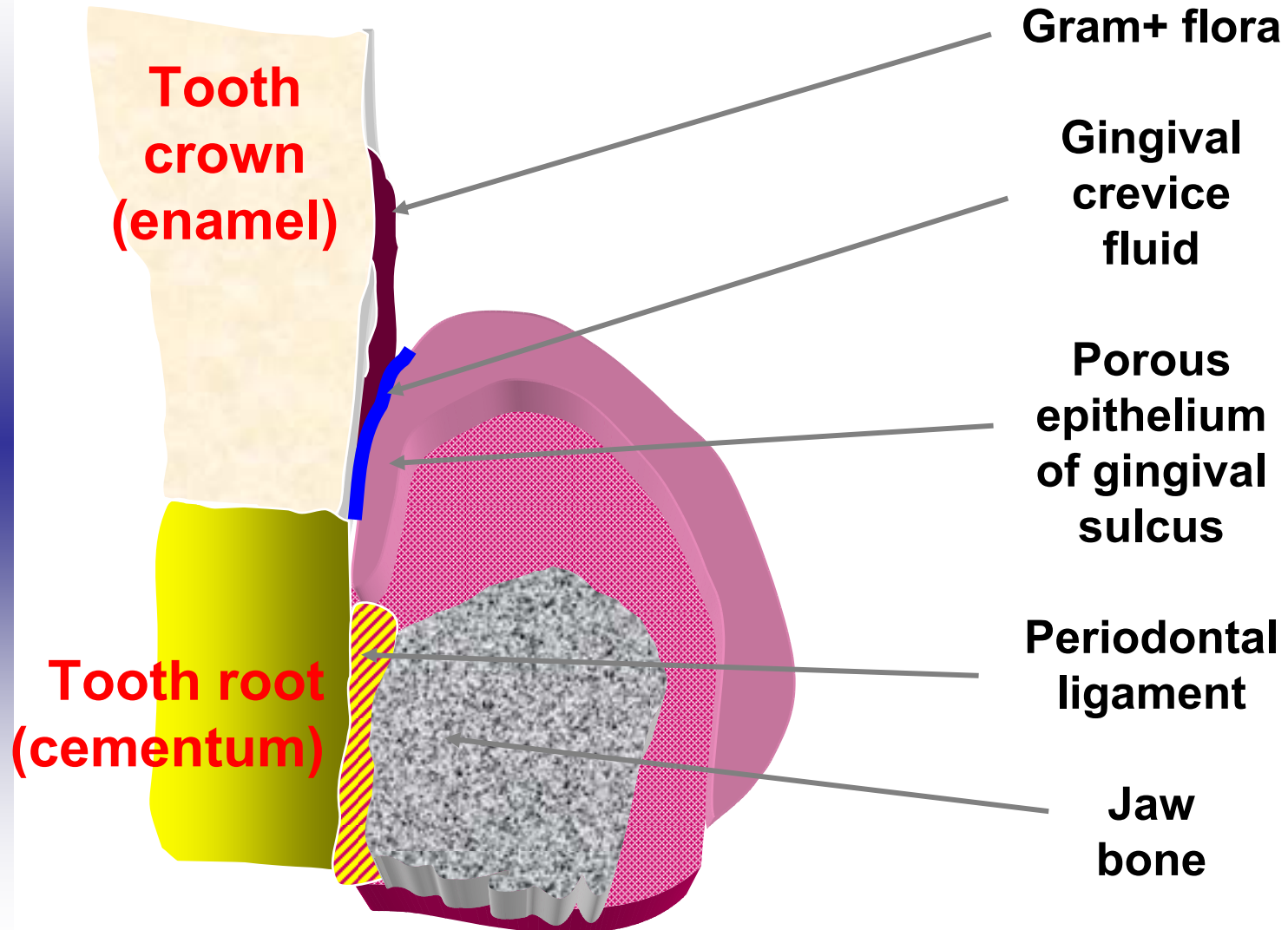


Dental anatomy

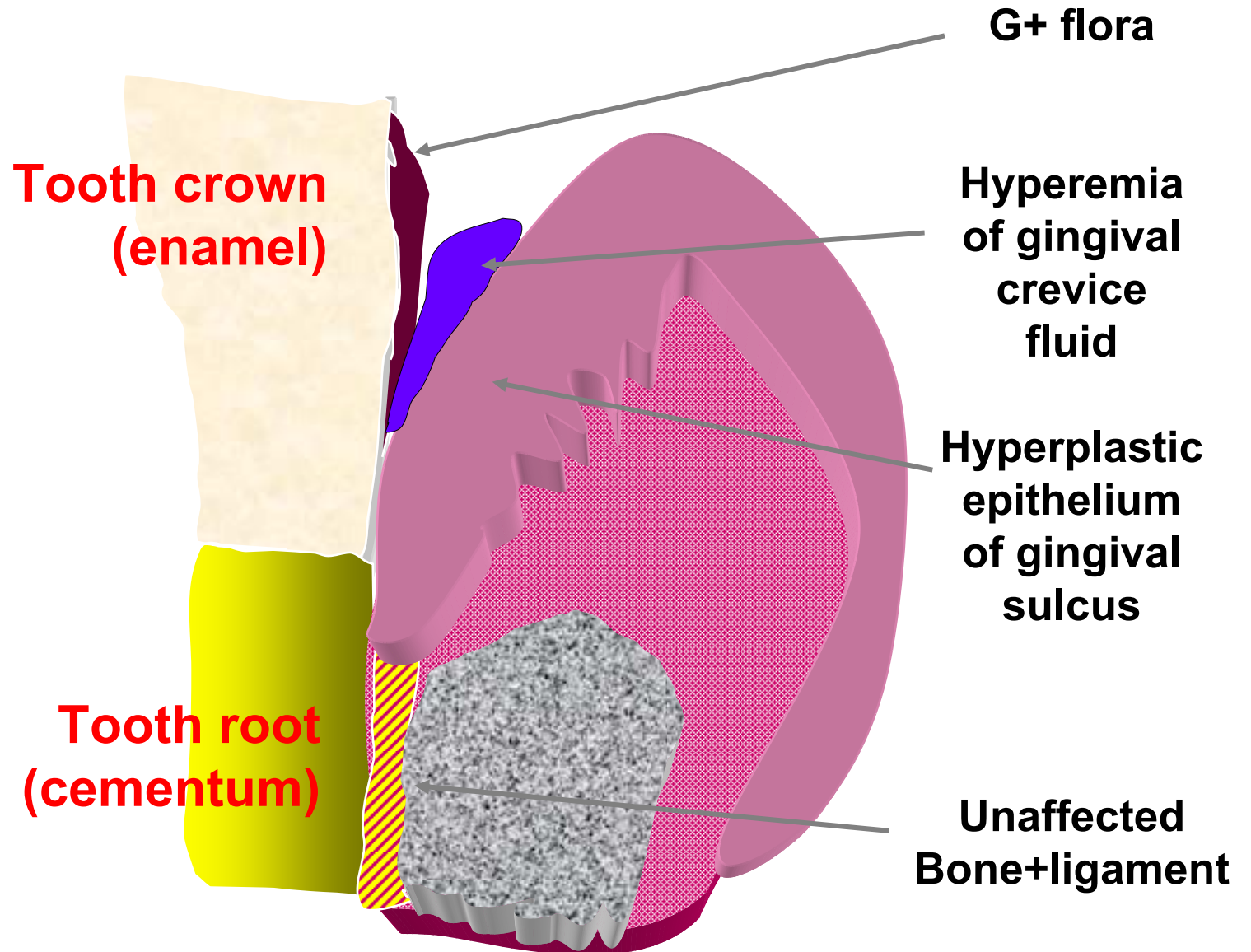


Biological plausibility

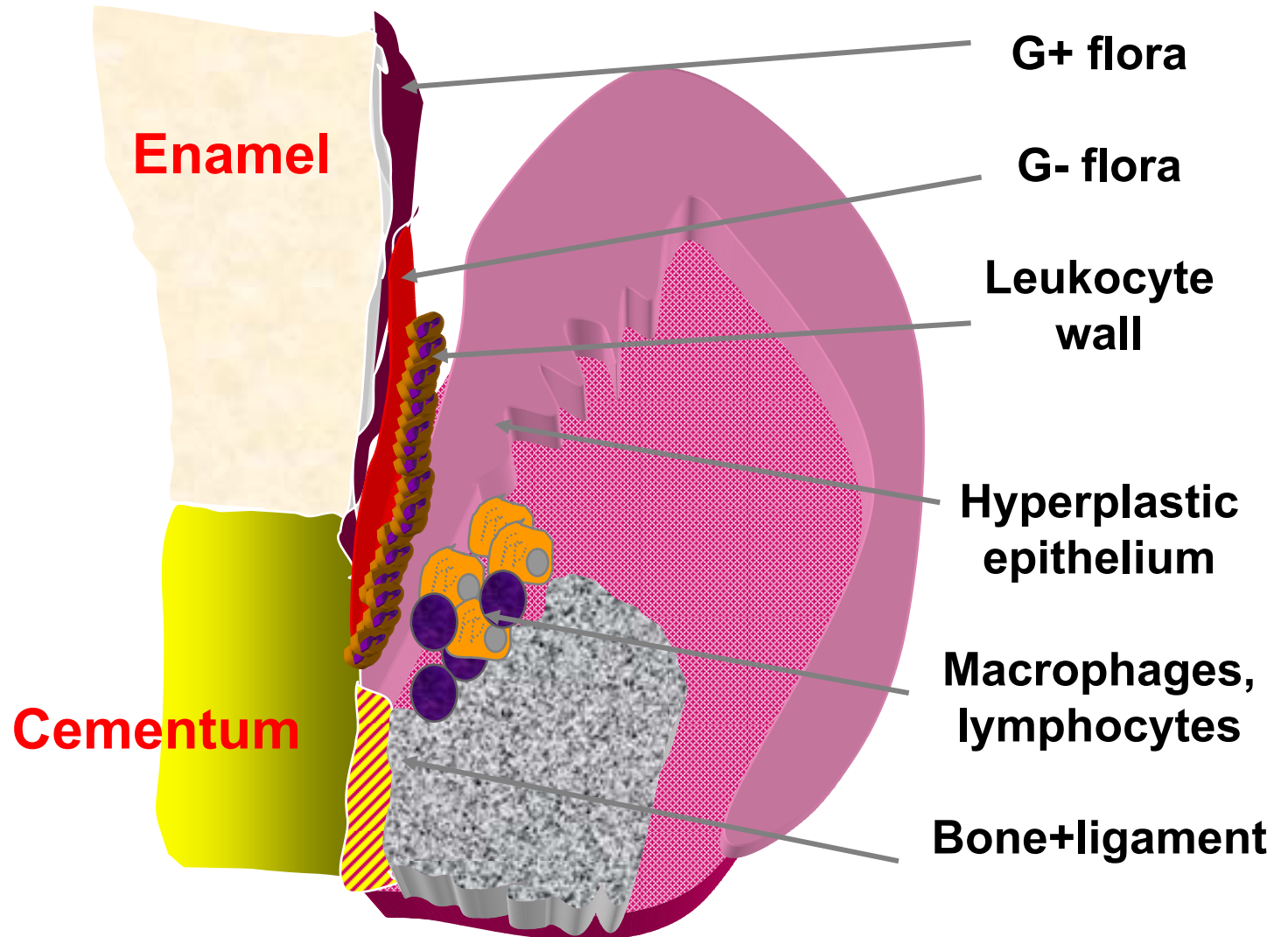
Gingival and periodontal health



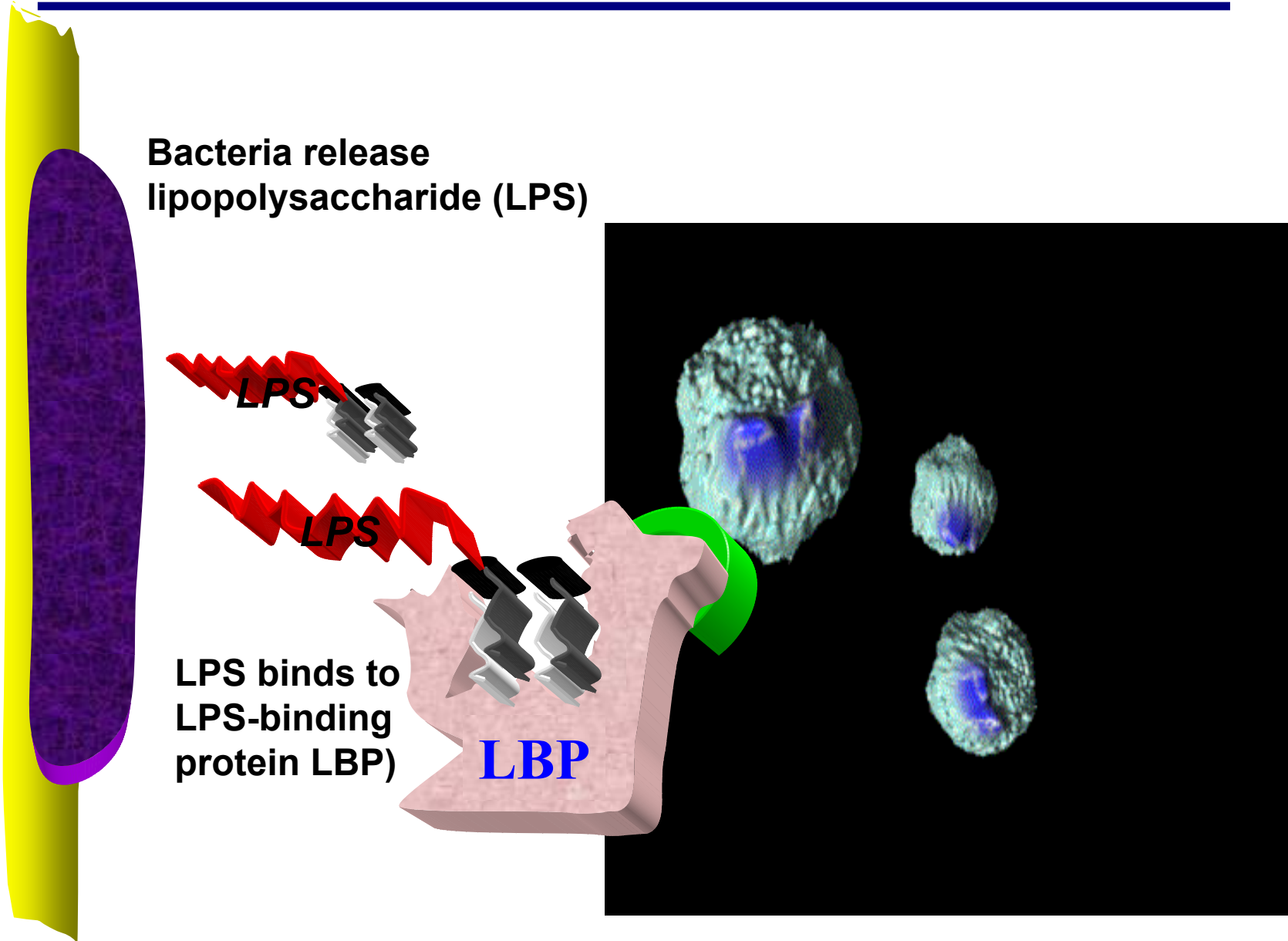
Gingivitis (days)



Periodontitis (episodic, repeated)

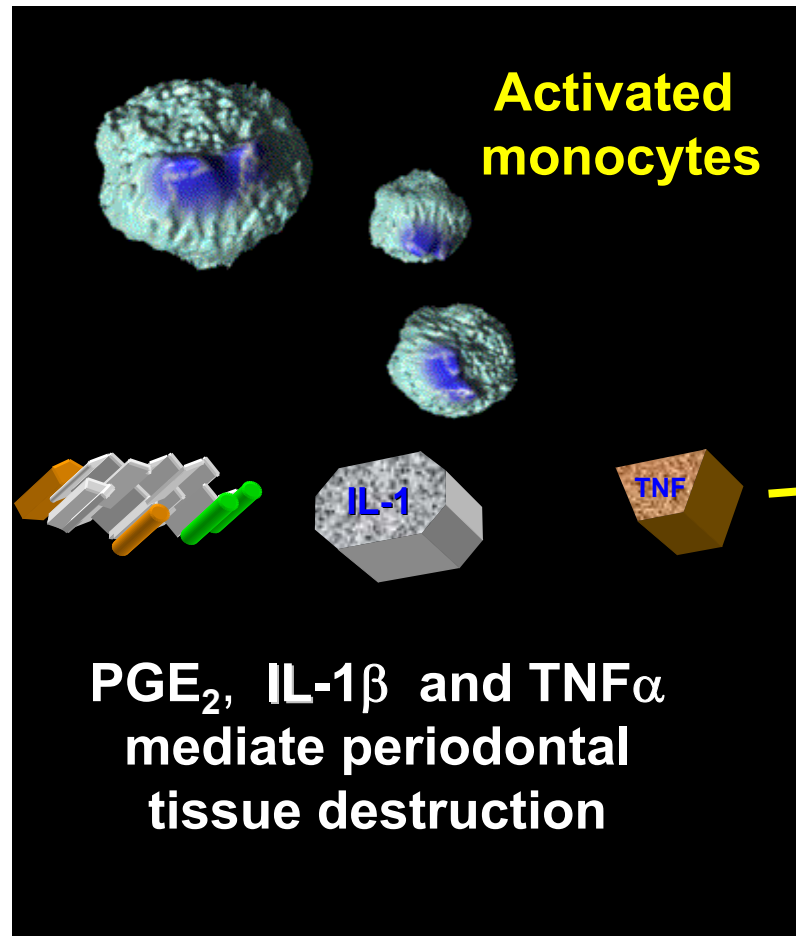


Microbial LPS activates monocytes

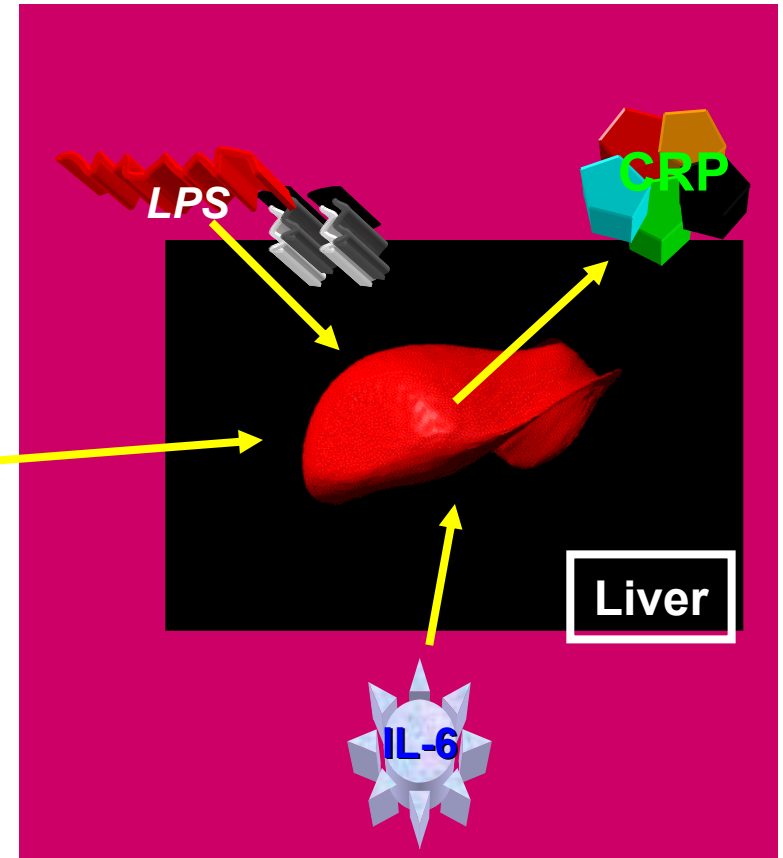


Systemic inflammatory response

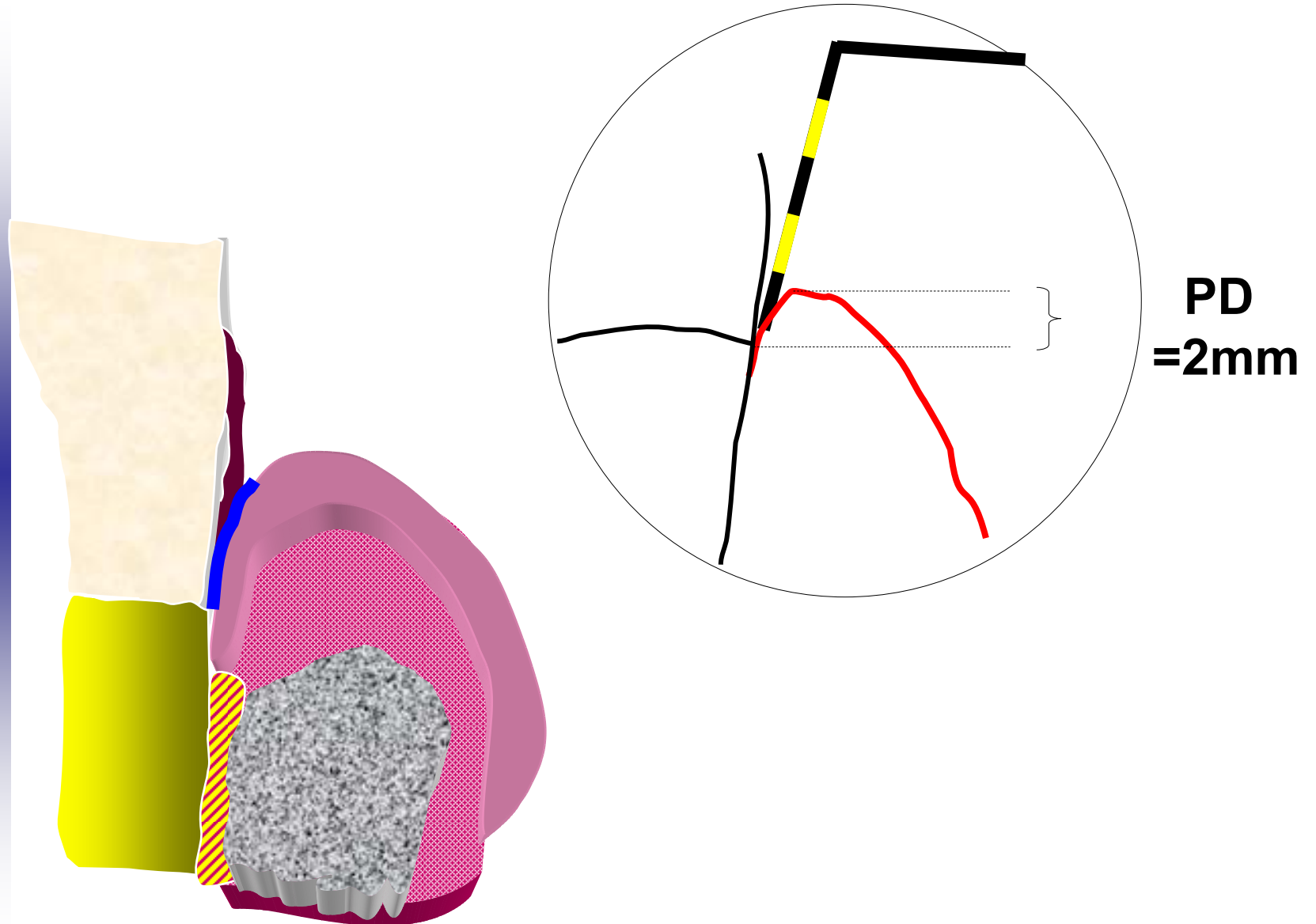
Periodontal tissues



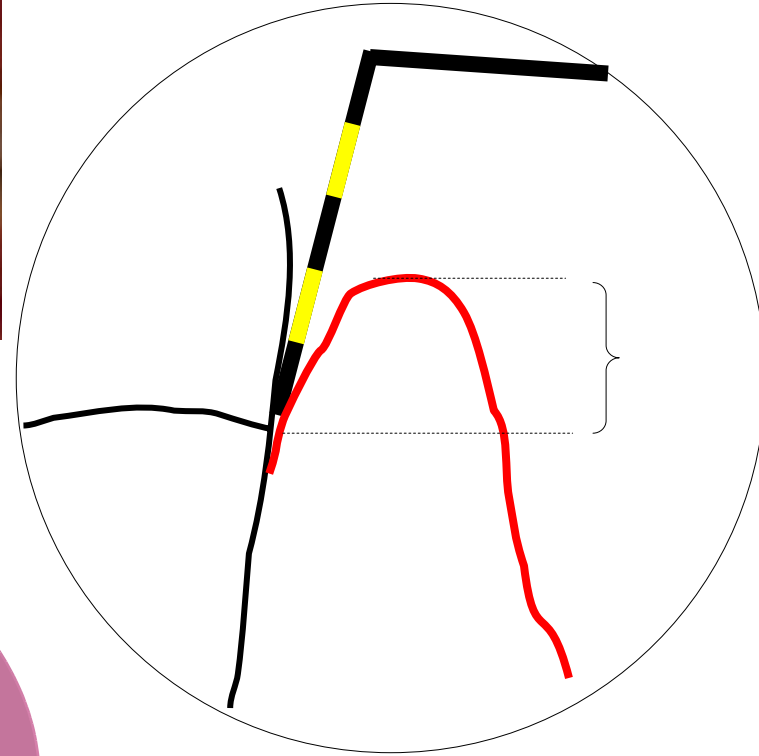
Systemic circulation



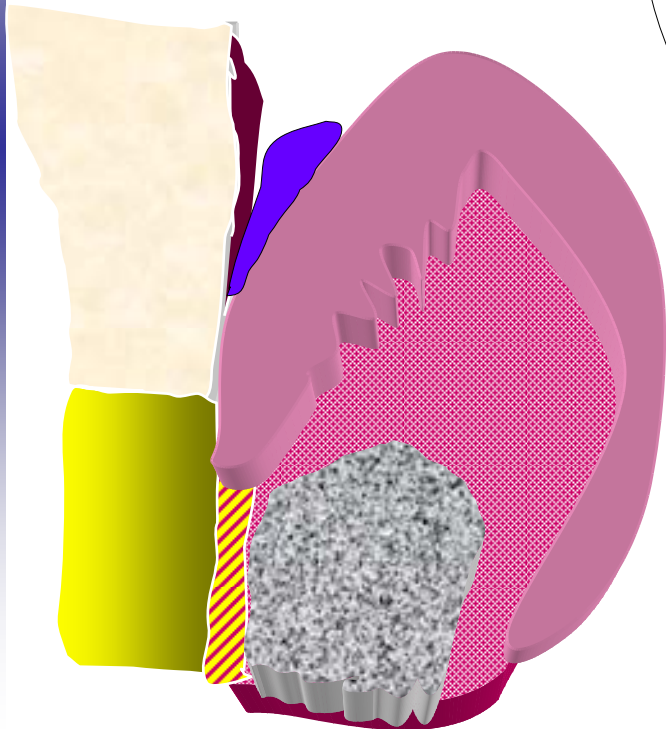
Probing depth (PD) in health



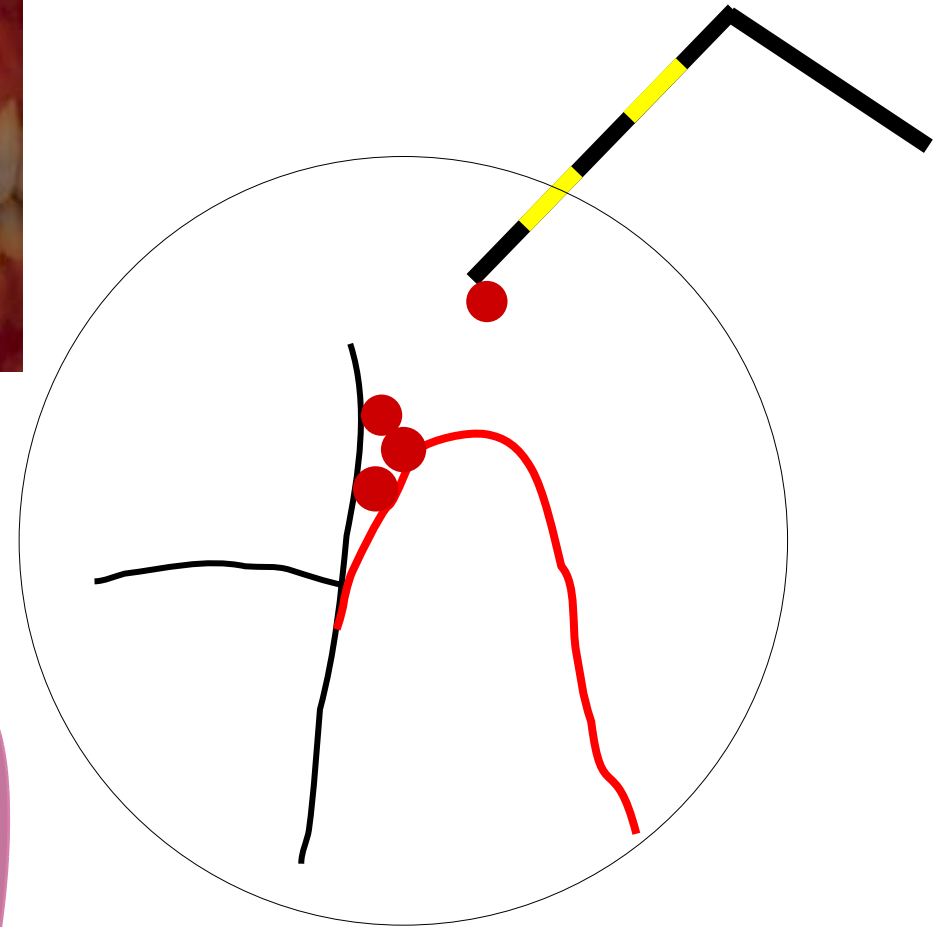
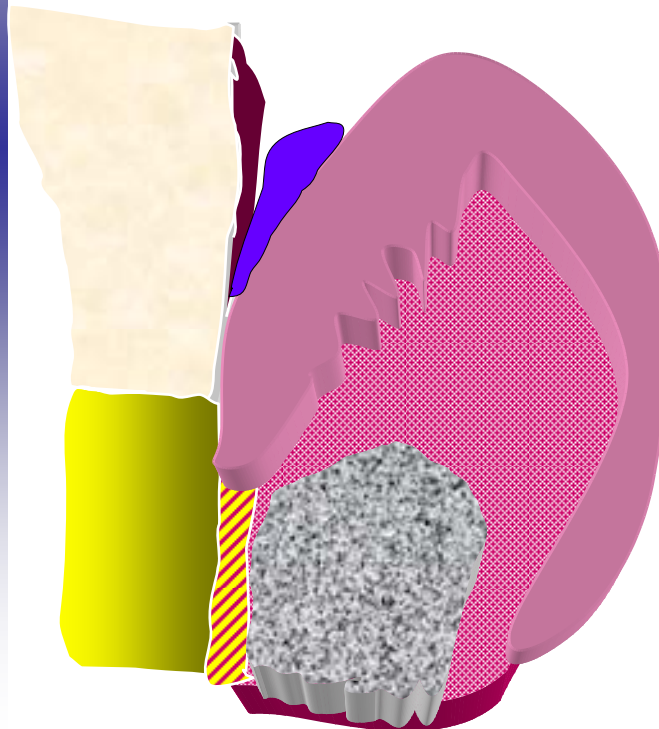
Probing depth: gingivitis



**PD
=4mm**

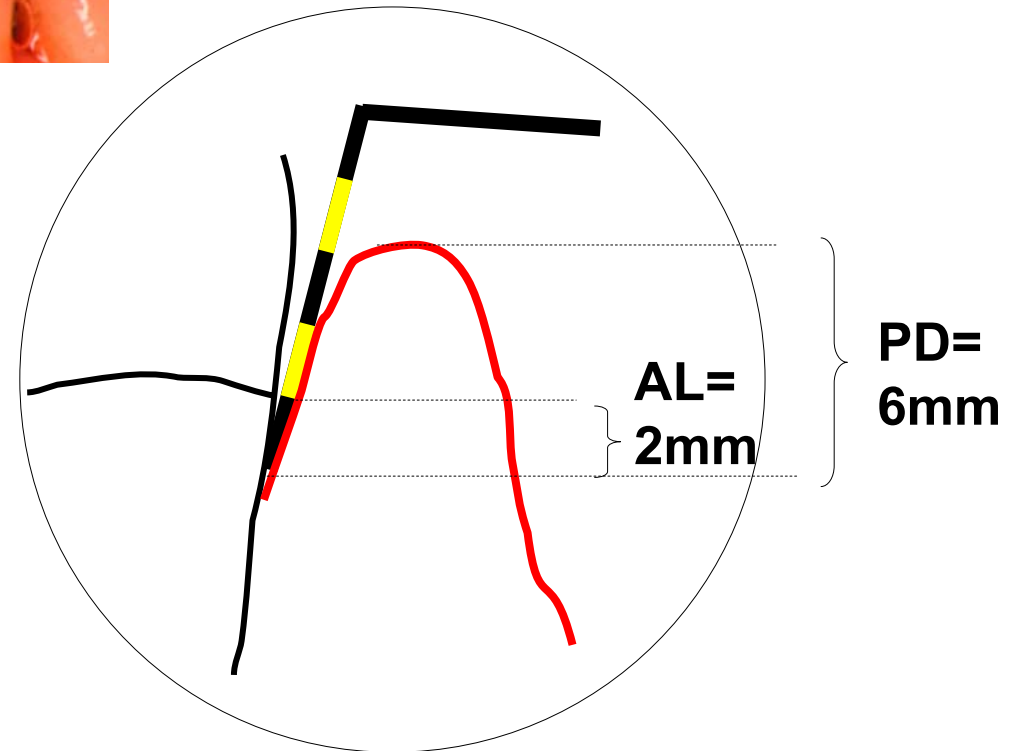
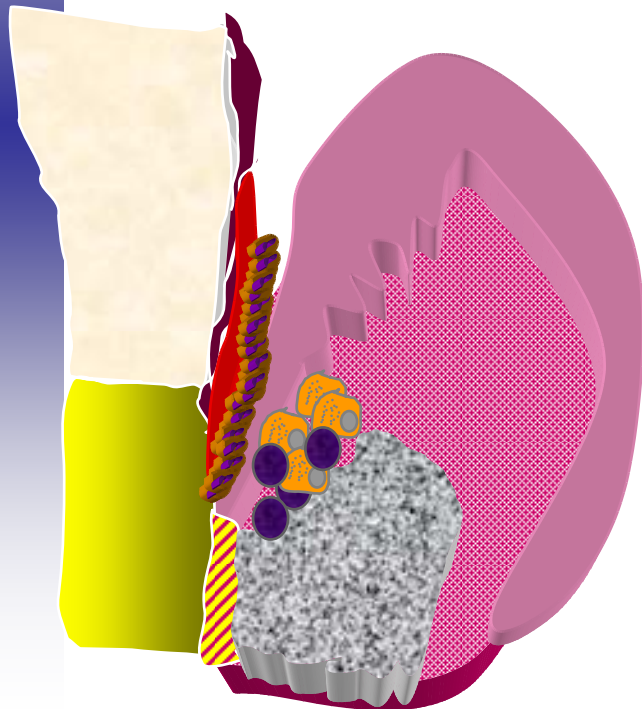


Bleeding on probing: gingivitis

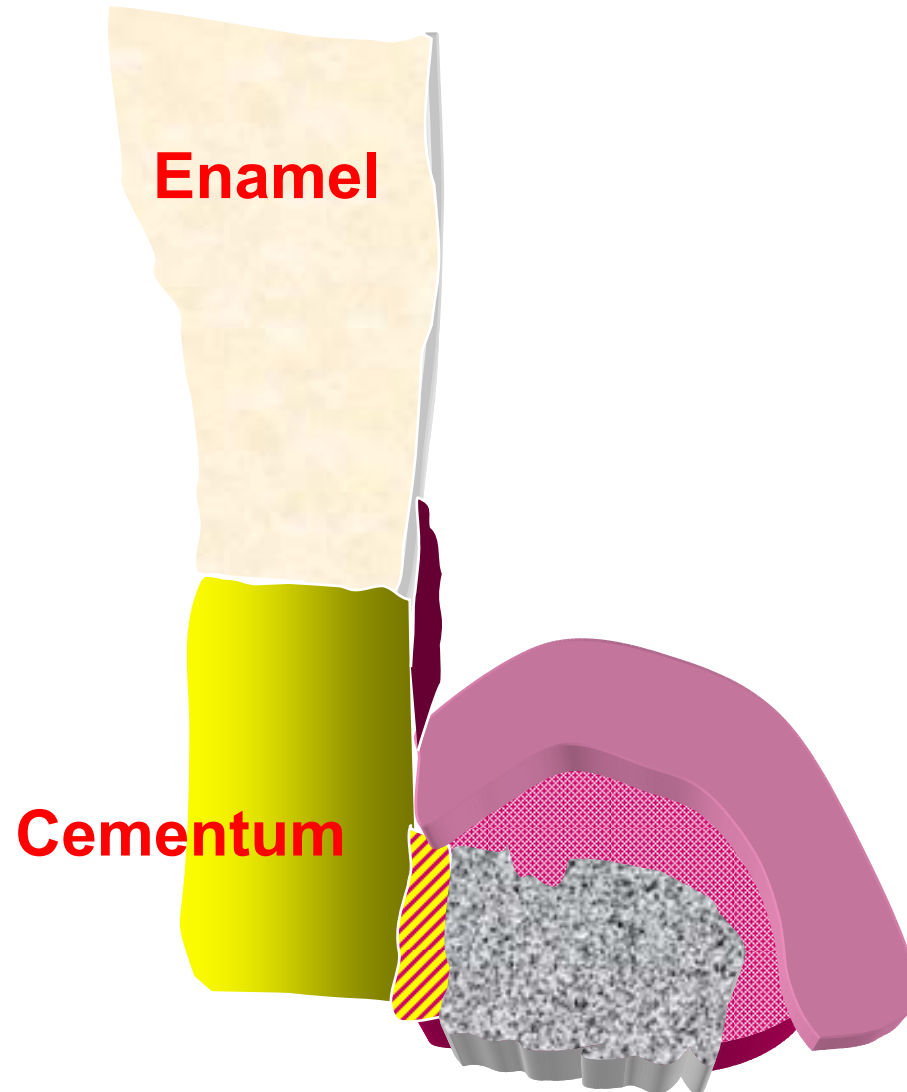


**Bleeding
on probing**

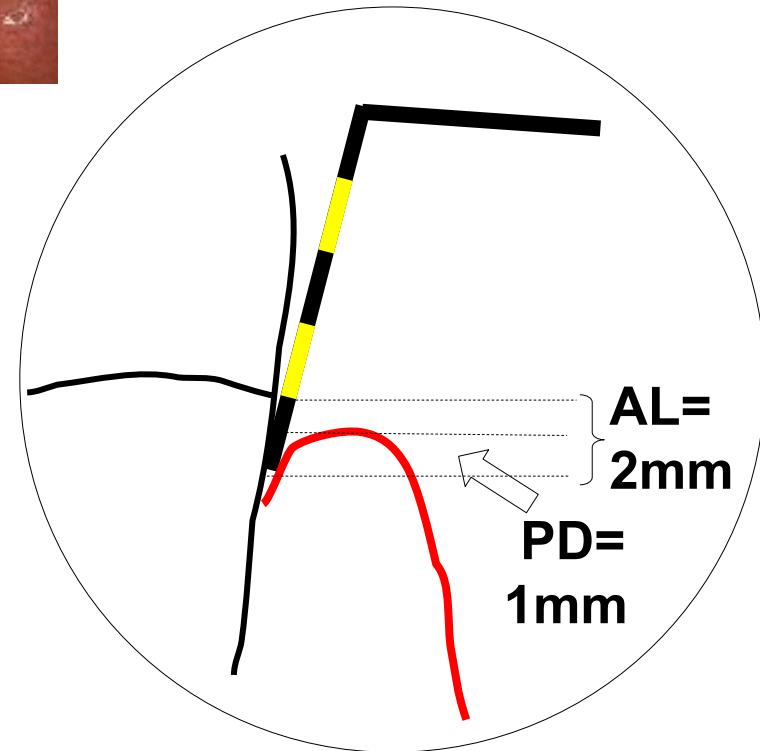
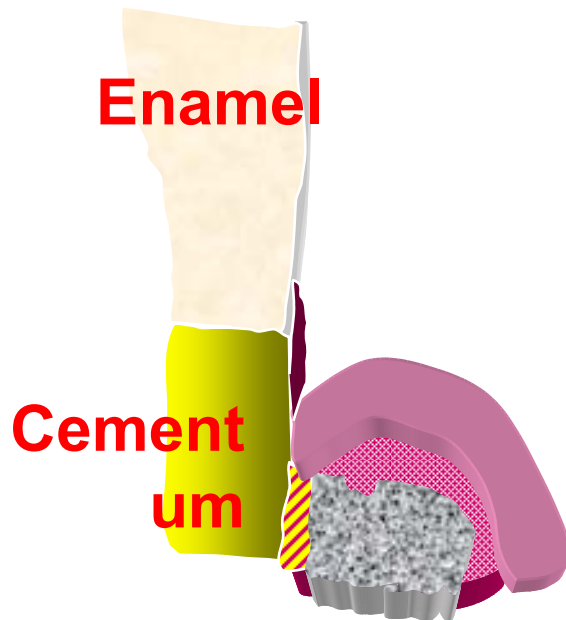
Probing depth (PD) and attachment level (AL): periodontitis



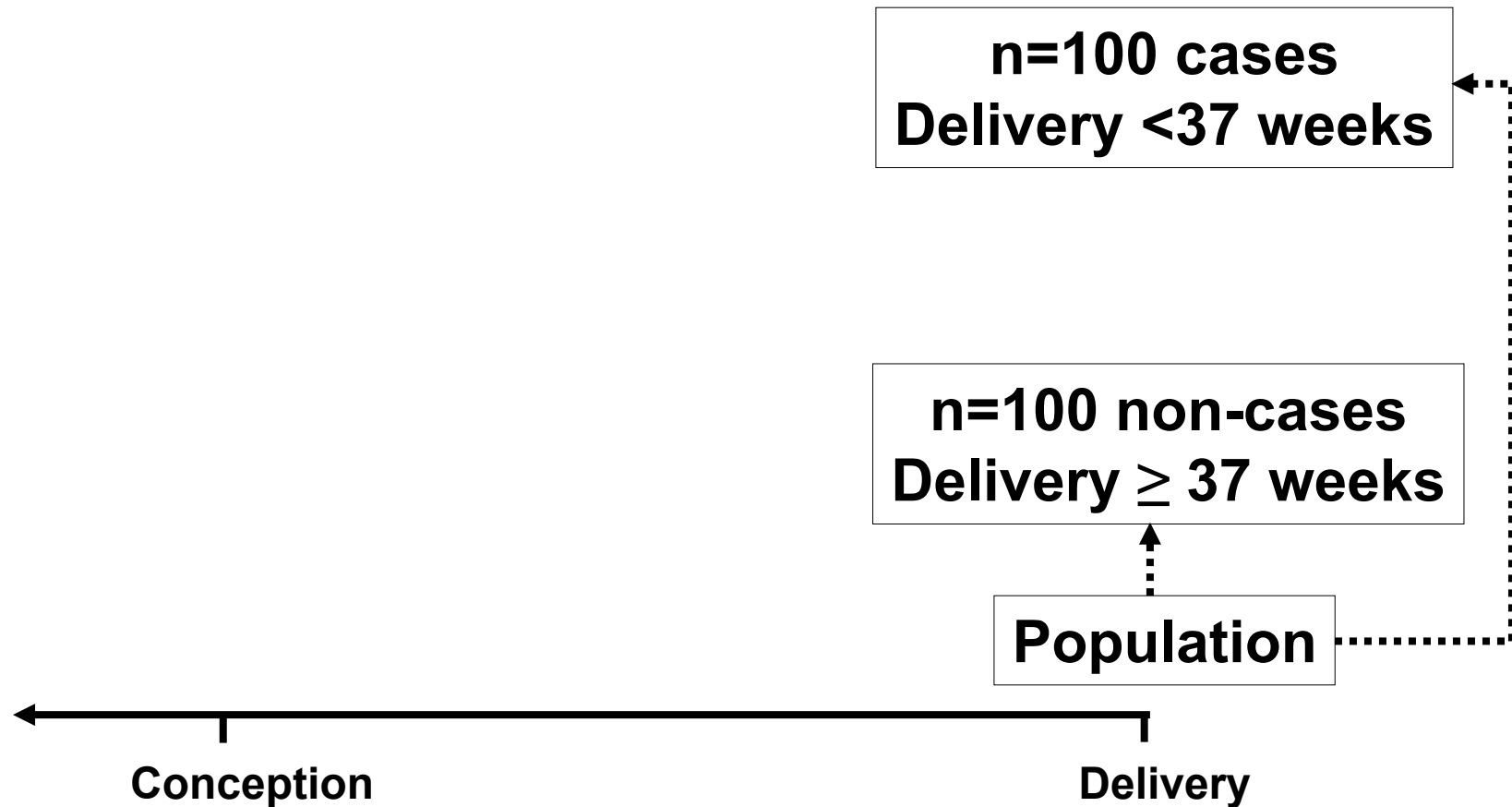
“Scars” of periodontitis



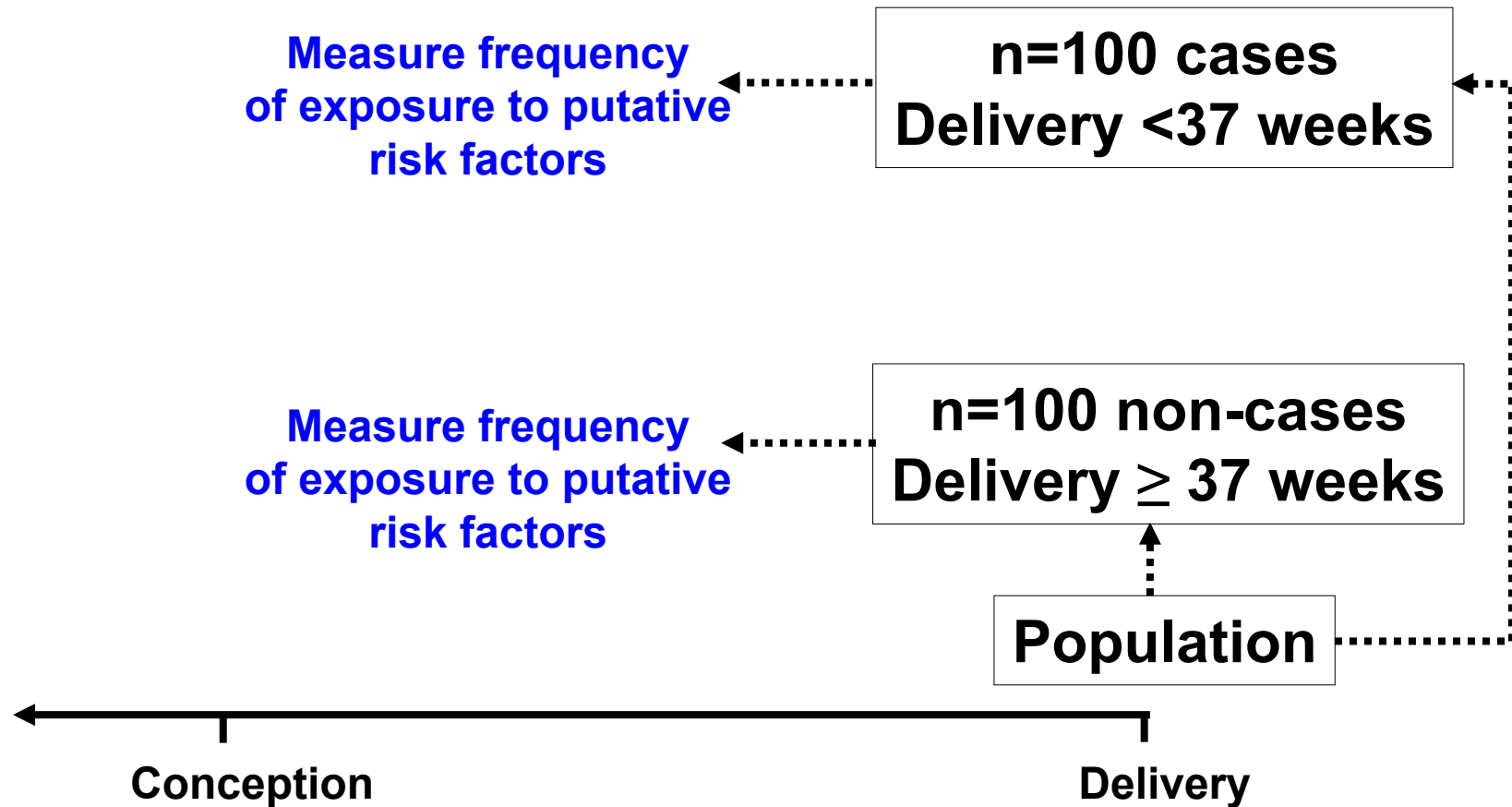
Clinical measurement of “scars”



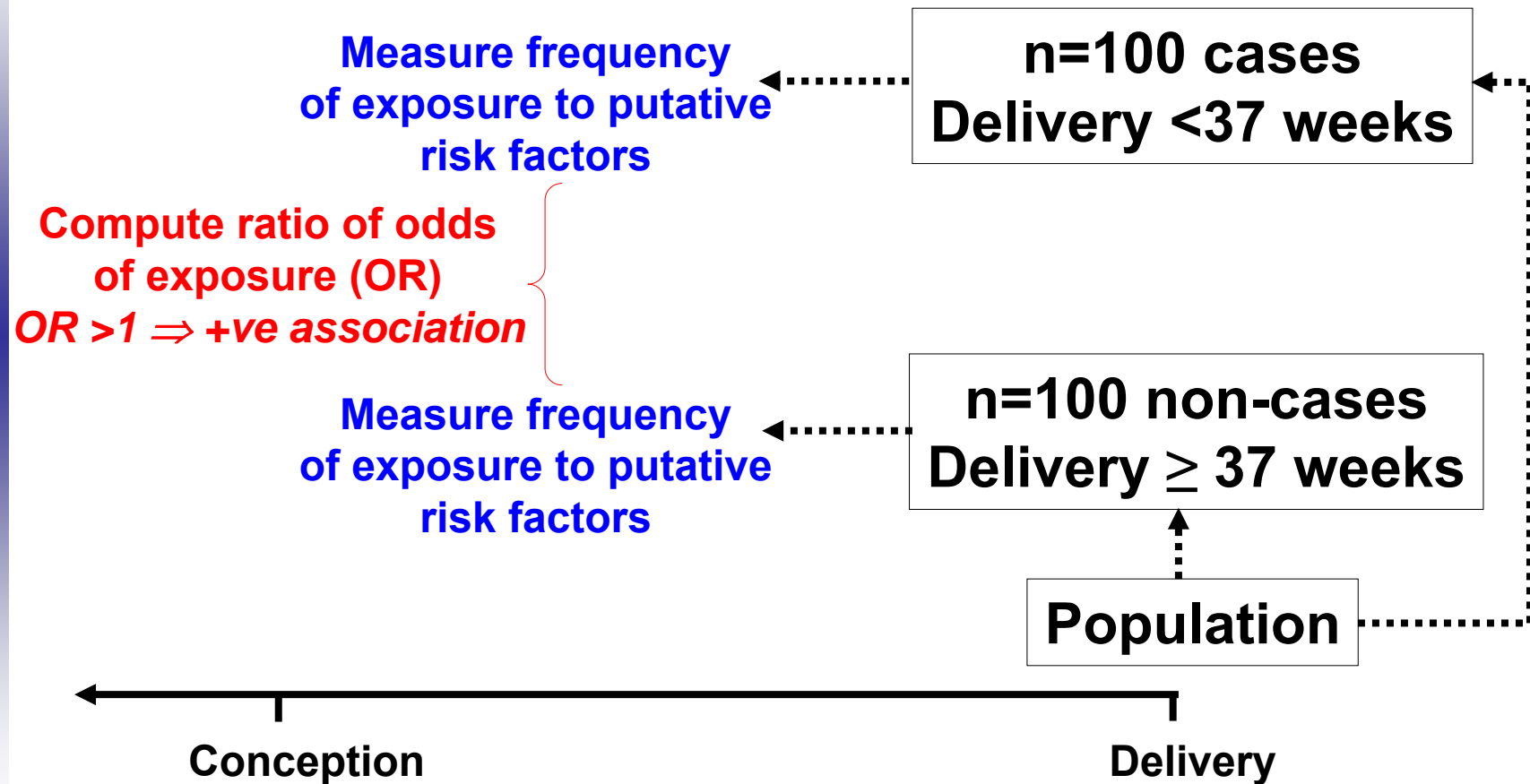
Case-control study design



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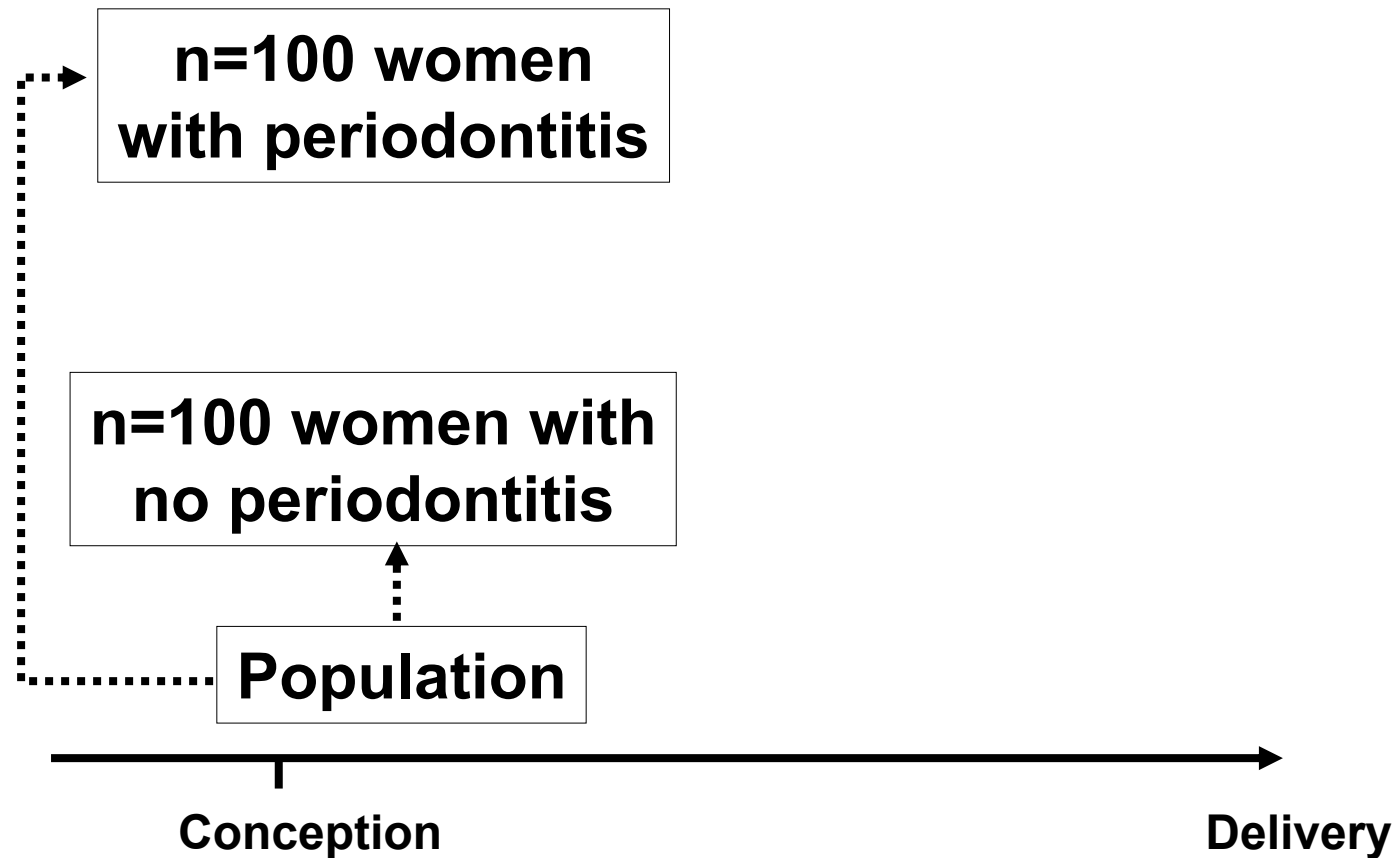


Summary of case-control studies

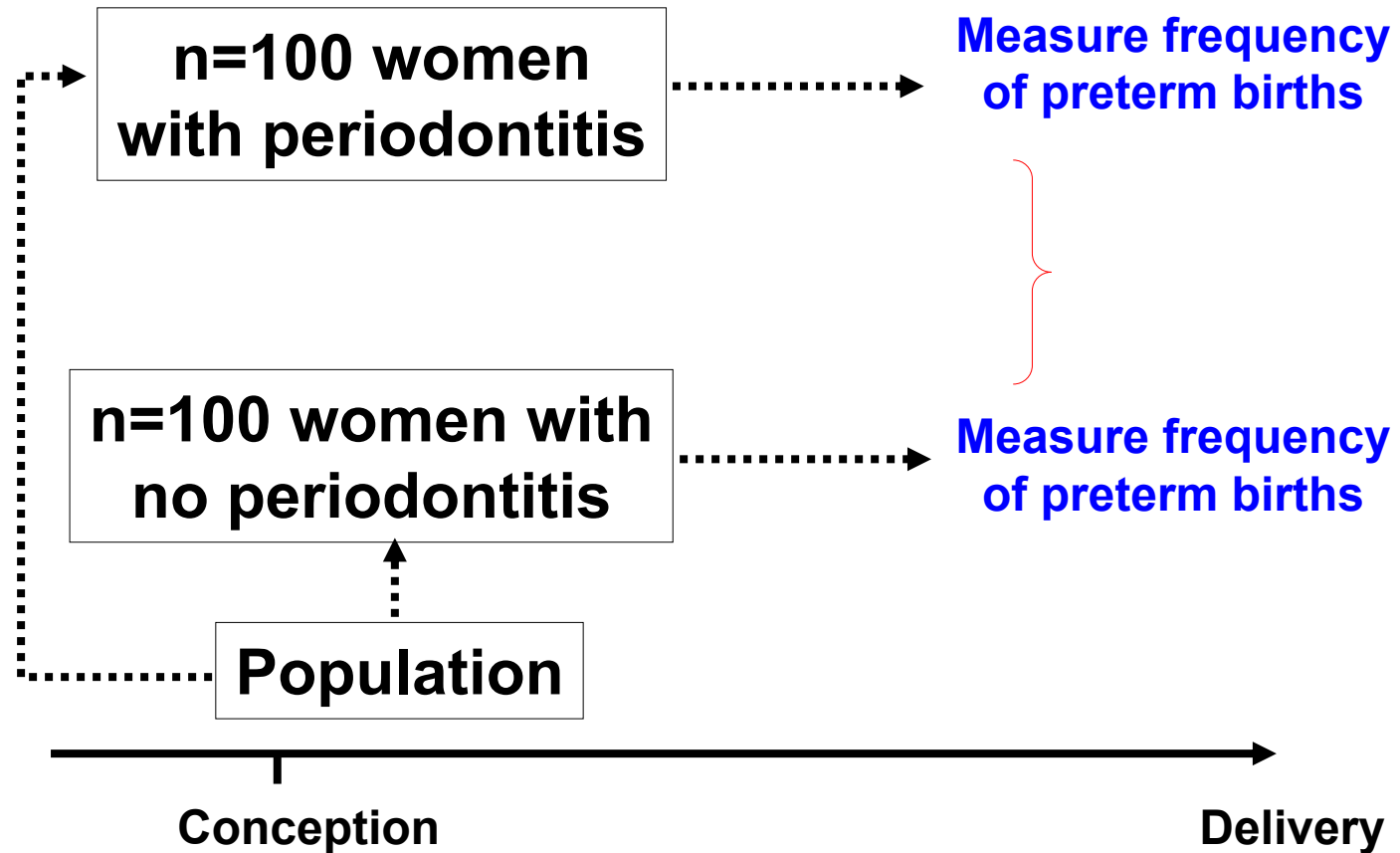
1. 124 pregnant or postpartum mothers in North Carolina (60% African American)
 - ▶ Odds of PTLBW significantly greater (OR=7.9) for women with extensive attachment loss
2. 743 postpartum mothers in East London (51% Bengali)
 - ▶ Odds of PTLBW lower (OR=0.8) for women with deep probing depth
3. 95 postpartum mothers, Birmingham, Alabama (55% African American)
 - ▶ Odds of spontaneous preterm birth greater (OR = 3.2) for women with attachment loss >5mm
4. 203 postpartum mothers, New York City, (61% Hispanic)
 - ▶ Odds of preterm birth greater (OR=2.7) for women with extensive attachment loss

1. Offenbacher S et al, J Periodontol, 1996
2. Davenport ES et al, J Dent Res, 1996
3. Goepfert AR et al, Obstet Gynecol, 2004
4. Jarjoura K et al, Am J Obs Gyn, 2005

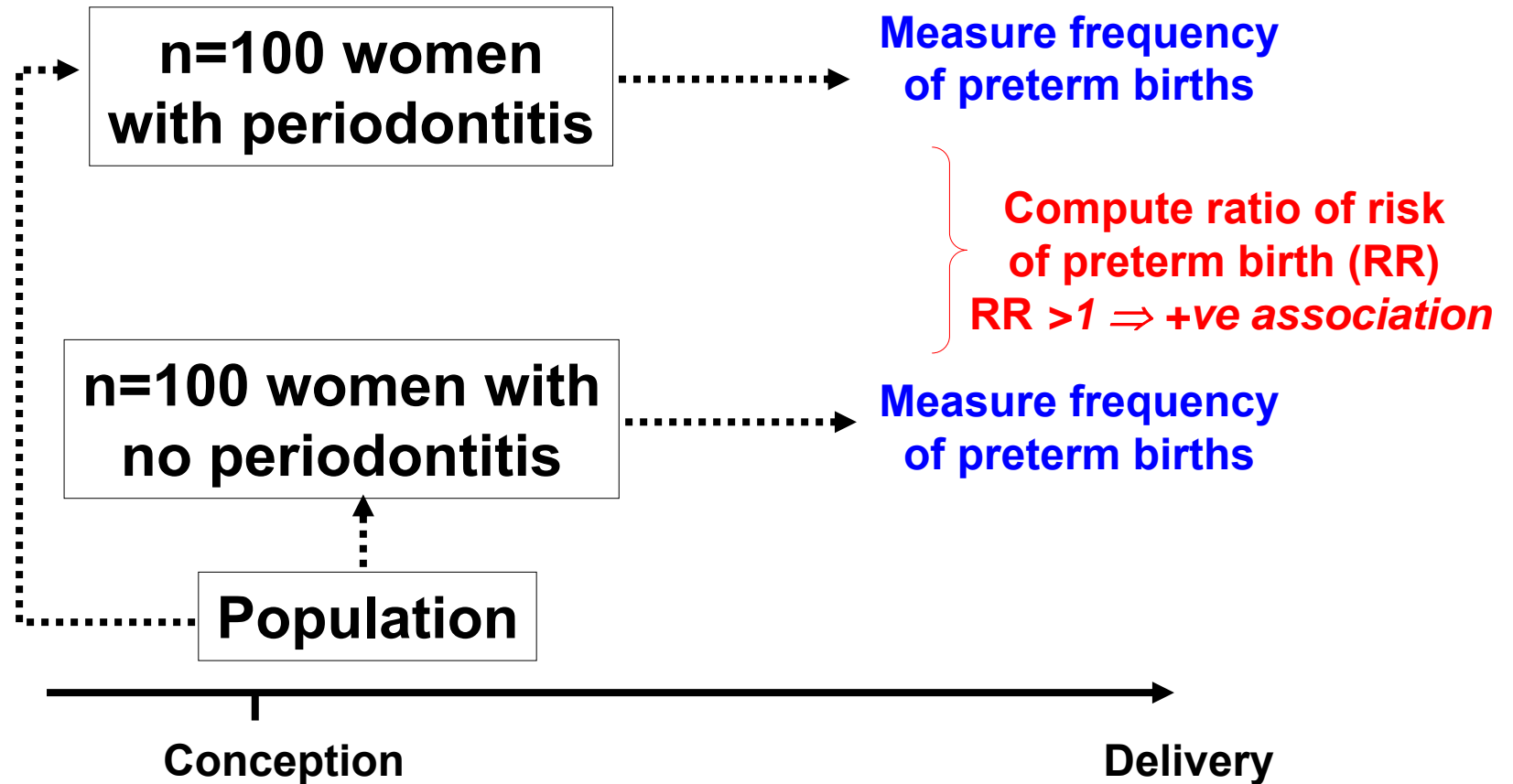
Prospective cohort study design



Prospective cohort study design



Prospective cohort study design

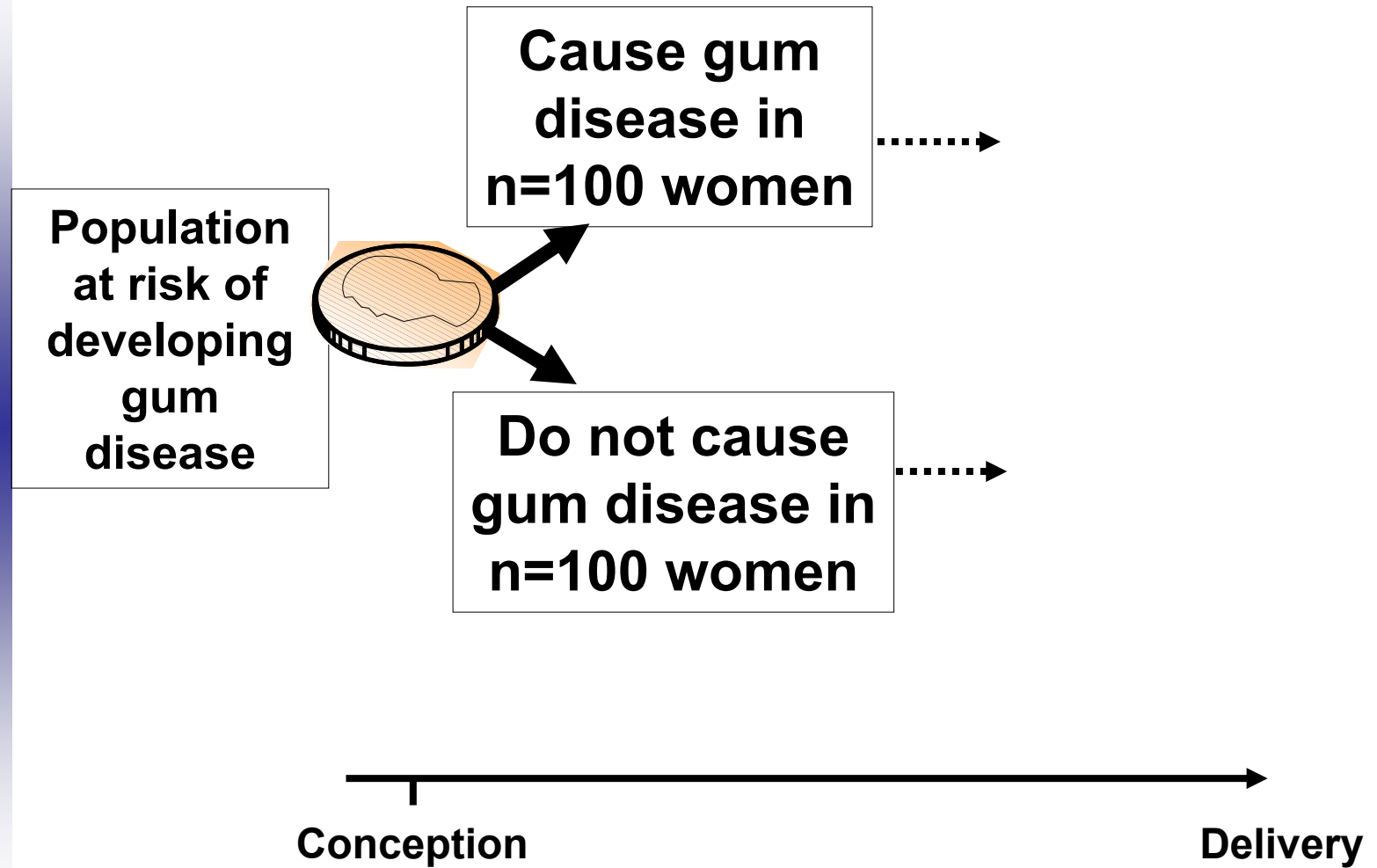


Summary of prospective cohort studies

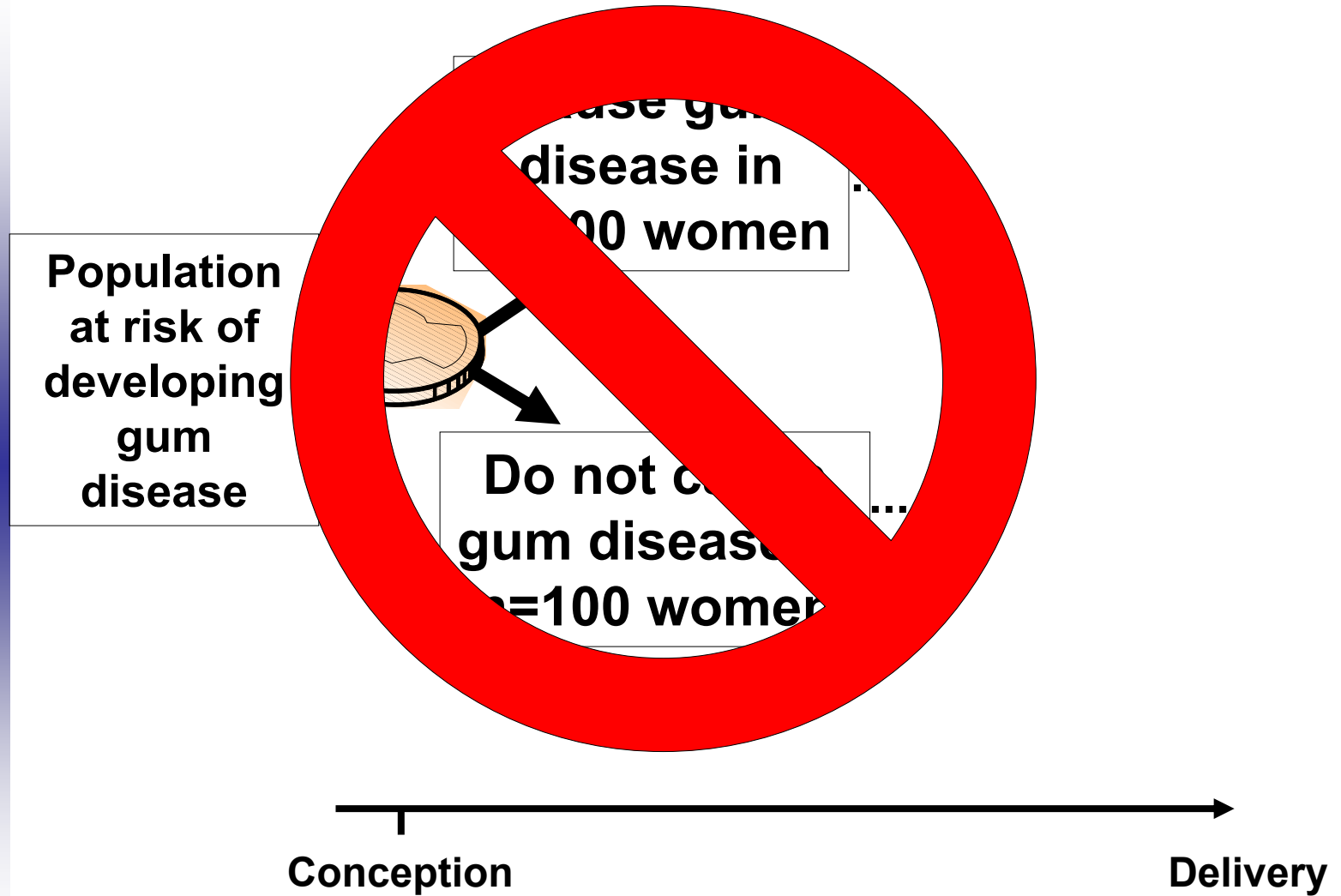
1. 1,115 pregnant women recruited at <26 weeks gestation, North Carolina (51% black)
 - ▶ Risk of preeclampsia greater (OR=2.4) for women with extensive periodontal pocketing at prenatal visit
2. Pregnant women recruited at 2nd semester, Birmingham, Alabama
 - ▶ Greater risk of LBW for women with elevated serum concentration of IgG to periodontal pathogen (*P.gingivalis*)
3. 1,313 pregnant women recruited at 21-24 weeks gestation, Birmingham, Alabama (83% African American)
 - ▶ Risk of preterm delivery (relative risk = 4.4) among women with severe or generalized attachment loss
4. 3,738 pregnant women recruited at 12 weeks gestation, Central London (62% white)
 - ▶ No association between periodontal indices and risk of low birthweight, preterm or extreme preterm birth

1. Bogess KA et al, Obstet Gynecol, 2003
2. Dasanayake AP et al, J Periodontol, 2001
3. Jeffcoat MK et al, J Am. Dent. Assoc., 2001
4. Moore S et al, British Dent J, 2004

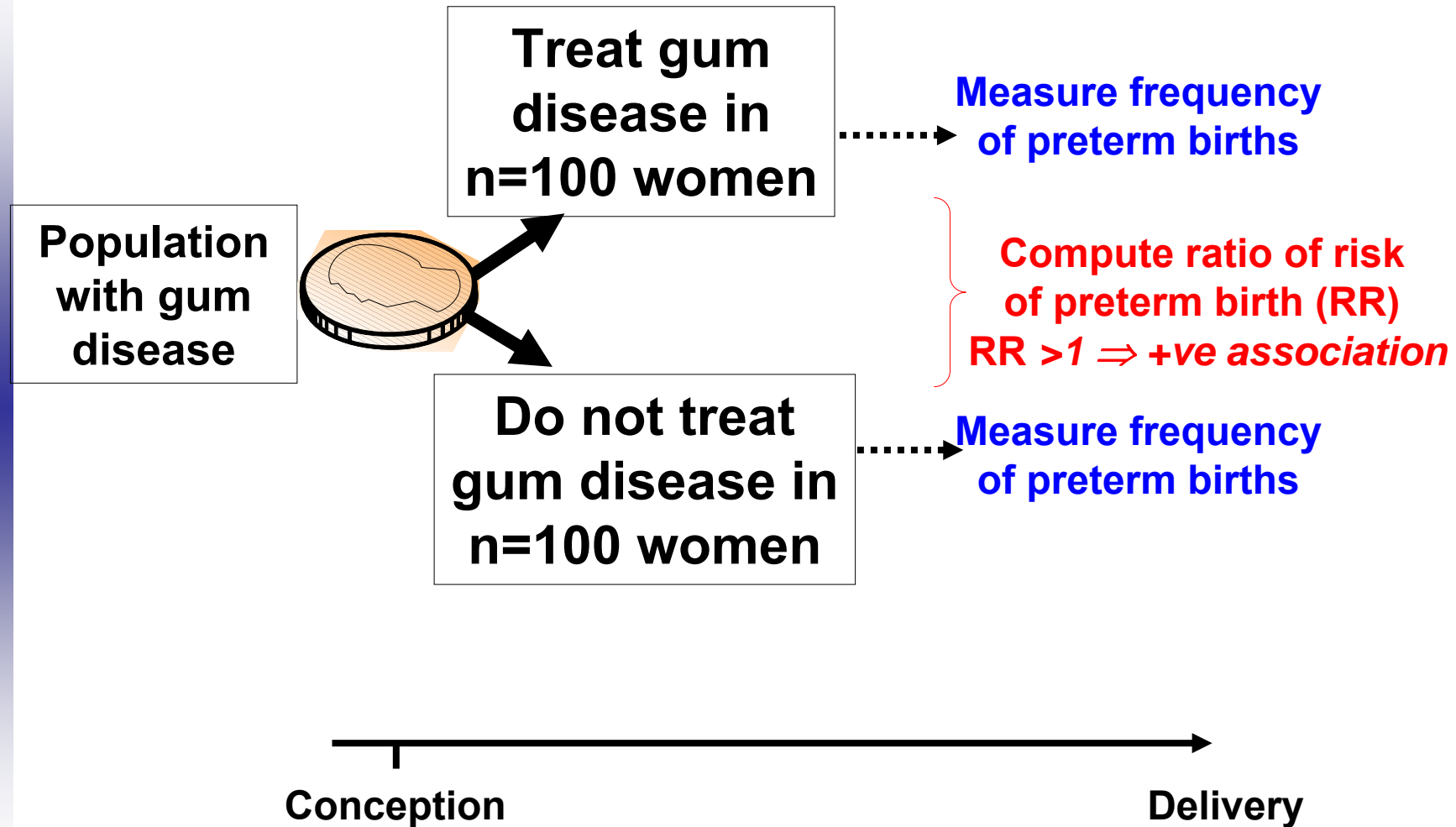
Evidence from experimental studies



Unethical randomized trial study design



Study design for randomized design of periodontal therapy



Summary of experimental studies

1. **RCT among 351 women <28 weeks gestation attending for routine prenatal care, Santiago, Chile**
 - ▶ assigned at random to receive mechanical cleaning (scaling, root planing) and home-use chlorhexidine mouthrinse every 2-3 weeks until birth *versus* no treatment
 - ▶ PTLBW incidence=1.8% in experimental group vs. 10.1% control group
2. **RCT among 366 women 21-25 weeks gestation in Birmingham, Alabama (85% African American)**
 - ▶ assigned at random to: a) supragingival cleaning + placebo capsule; b) scaling+root planing + placebo capsule; c) scaling+ root planing + metronidazole
 - ▶ incidence of PTB:
 - a) Control (supragingival scaling+placebo): 8.9%
 - b) Scaling/root planing + placebo: 4.1%
 - c) Scaling/root planing + metronidazole: 12.5%

1. Lopez NJ et al, J Periodontol, 2002. Dasanayake AP et al, J Periodontol, 2001
2. Jeffcoat MK et al, J Periodontol, 2003

Jeffcoat MK et al, J Periodontol, 2003

Results: % of preterm births <37 weeks

- a) Control (supragingival scaling+placebo): 8.9%
- b) Scaling/root planing + placebo: 4.1%
- c) Scaling/root planing + metronidazole: 12.5%
- Untreated reference group: 12.7%

- “The reason for the decrease in efficacy ($P=0.02$) with the addition of metronidazole to the SRP group is not known.”
- An NIH study conducted concurrently found higher rate of preterm birth in metronidazole vs. placebo among asymptomatic women with *Trichomonas vaginalis*
- “It was beyond the scope of this study to address the potential mechanisms of PTB and periodontitis.”

Restricted inferences that can be drawn from RCTs of therapy

- **Even with ideal RCT design, interpretations will be flawed if:**
 - **Chronic periodontitis is treated during 2nd trimester, but elevated risk of preterm birth is caused by 1st trimester periodontitis**
 - **Treatments for experimental and control groups are equally effective in eliminating periodontal infection**
 - **Treatment for experimental group is effective in controlling a component of periodontitis etiology that does not cause PTB**

What should be done in the absence of definitive evidence?

“All scientific work is incomplete – whether it be observational or experimental. All scientific work is liable to be upset or modified by advancing knowledge. That does not confer upon us a freedom to ignore the knowledge we already have or to postpone the action that it appears to demand at a given time.”

Hill, AB. The environment and disease: association or causation. Proc R Soc Med, 1965; 58:295-300

What should be done in the absence of definitive evidence?

- Preventive periodontal care and most therapeutic periodontal care has few, if any risks, and is relatively cheap
 - And it will certainly improve oral health
- Timely dental care is at least as justifiable as other low-cost behaviours speculated to be beneficial and known to produce little or no harm
 - a glass of red wine or a few squares of chocolate to reduce risk of ischemic heart disease

Conclusions

- Based on observational studies, evidence for no effect is equally as strong as evidence of causal effect
 - Maybe different susceptibility among population groups?
- Evidence from Chilean intervention study shows very strong protective effect of repeated mechanical cleaning
 - But unintelligible evidence from US intervention study
- Intervention studies will provide evidence of causation only under restricted assumptions
- Greater knowledge of biological mechanisms is needed to know if those assumptions apply
- In the meantime, despite imperfect knowledge, timely dental care is at least as justifiable as recommendations such as “a glass of red wine” to prevent ischemic heart disease
 - and it will improve oral health