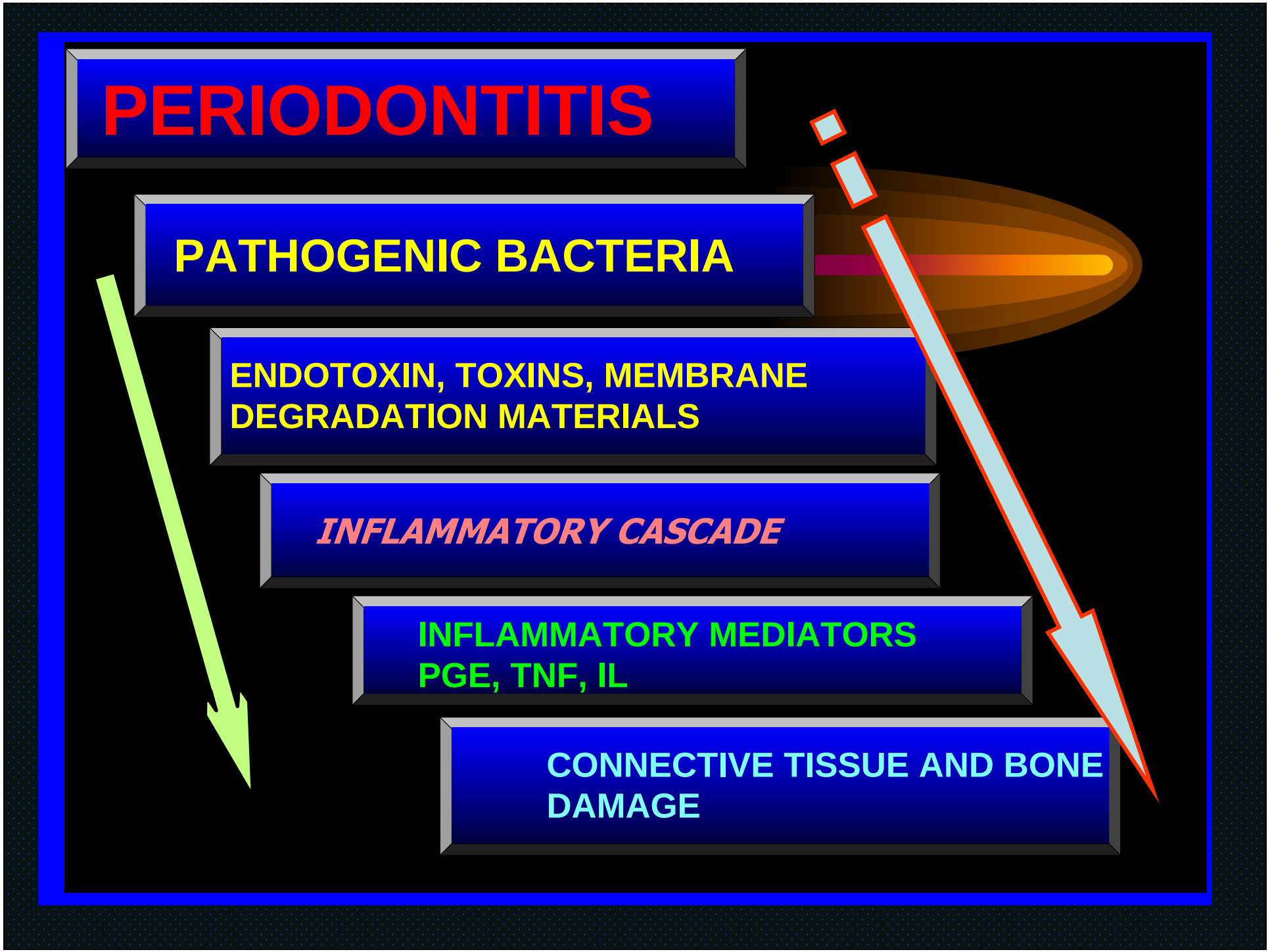
Dr. István Gera

Periorodtal pocket as a risk factor in the etiology of systemic diseases

Semmelweis University, Department of Periodontology , Budapest


PERIODONTITIS
PATHOGENIC BACTERIA
ENDOTOXIN, TOXINS, MEMBRANE DEGRADATION MATERIALS
INFLAMMATORY CASCADE
INFLAMMATORY MEDIATORS PGE, TNF, IL
CONNECTIVE TISSUE AND BONE DAMAGE

PERIODONTITIS AND SYSTEMIC DISEASES

PRETERM BIRTH

CORONARY HEART DISEASE

THROMBOEMBOLC DISEASES
- MYOCARDIAL INFARCT
- STROKE

TYPE I DIABETES
TYPE II DIABETES

Pregnancy effects

THE CONNECTION BETWEEN PREGNANCY AND PERIODONTAL-GINGIVAL DISEASES HAS LONG BEEN KNOWN

THE EFFECT OF PREGNANCY

-PREGNANCY GINGIVITIS -

BUT THE CONNECTION BETWEEN THE PREGNANT WOMENS' PERIODONTAL CONDITION AND THE BIRTH WEIGHT OR THE INCIDENCE OF PREMATURE DELIVERY HAS JUST RECENTLY BEEN STUDIED

Galloway as early as 1931 indicated that Gram negative bacteria from the periodontal pocket might have negative effects on pregnancy outcome

The periodontal state of mothers with preterm low birth weight (PLBW) and age matched controls

THE WORTH PERIODONTAL STATE	NORMAL BIRTH BETWEEN THE AGE 16-44	PRETERM LOW BIRTH WEIGHT AGE 16-44
HEALTHY PERIODONTIUM	27	0
MILD GINGIVITIS	14	1
SEVERE GINGIVITIS	30	12
SHALLOW POCKET	26	38
DEEP POCKET	3	49

The East London Study of Maternal Chronic Periodontal Disease and Preterm Low Birth Weight Infants: Study Design and Prevalence Data by ***Davenport E.S. & Co. Annales of Periodontology 3: 213-221 1997***

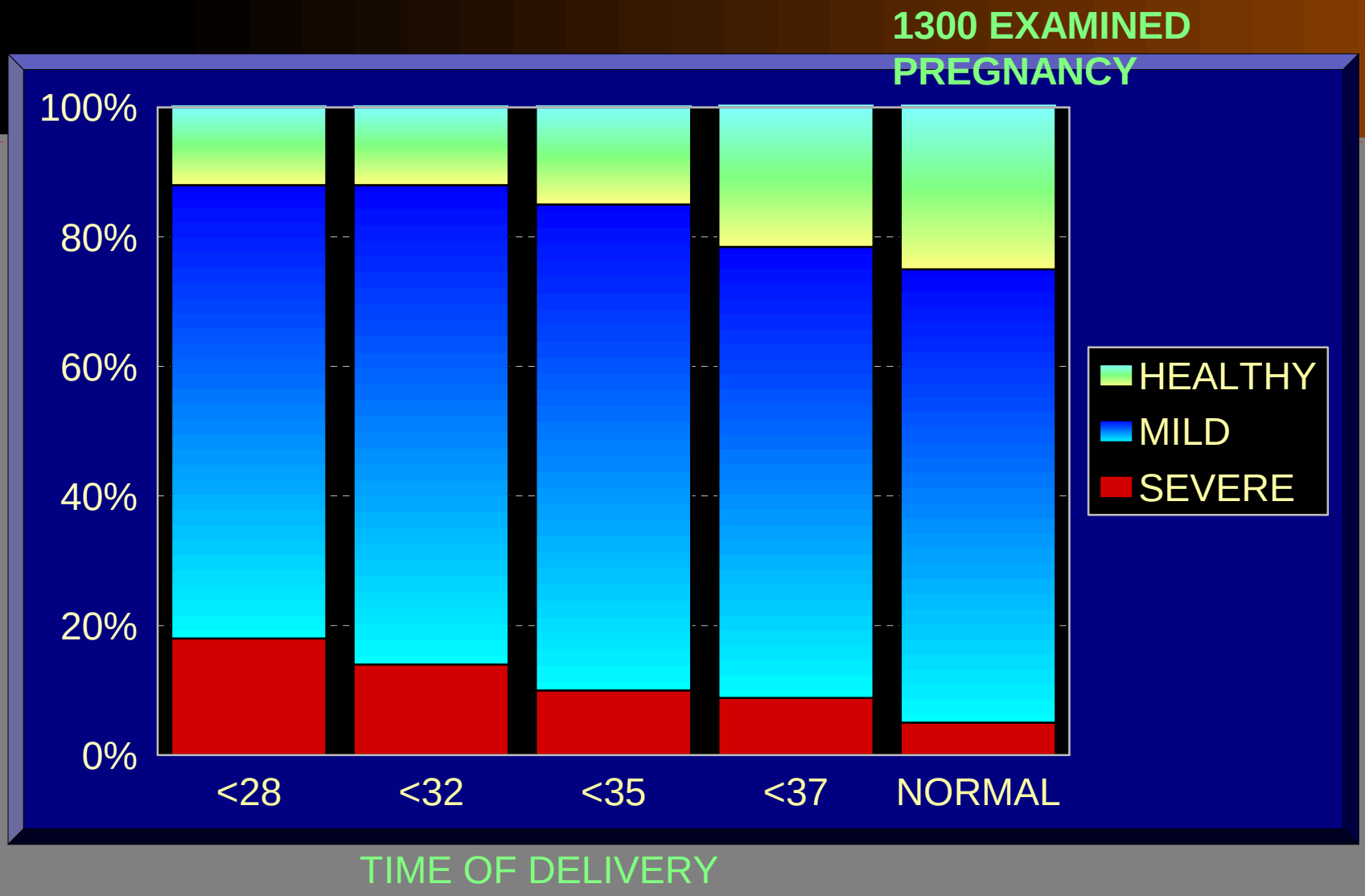
The periodontal state of women with preterm low birth weight (PLBW) and age matched controls WHO CPITN INDEX

PLBW vs. NORMAL CONTROLS (THAILAND)

CPITN SCORES	PRTERM	CONTROL	P value
CPITN 0	0,4	1,1	0,001
CPITN 1	5,6	4,9	0,001
CPITN 2	4	3,2	0,01
CPITN 3-4	0,5	0,2	0,1
DMFT	4,8	3,4	0,17

Poor periodontal health of the pregnant woman as a risk factor for low birth weight Dasanayake A.P. Annals of Periodontology 3: 206-212 1997.

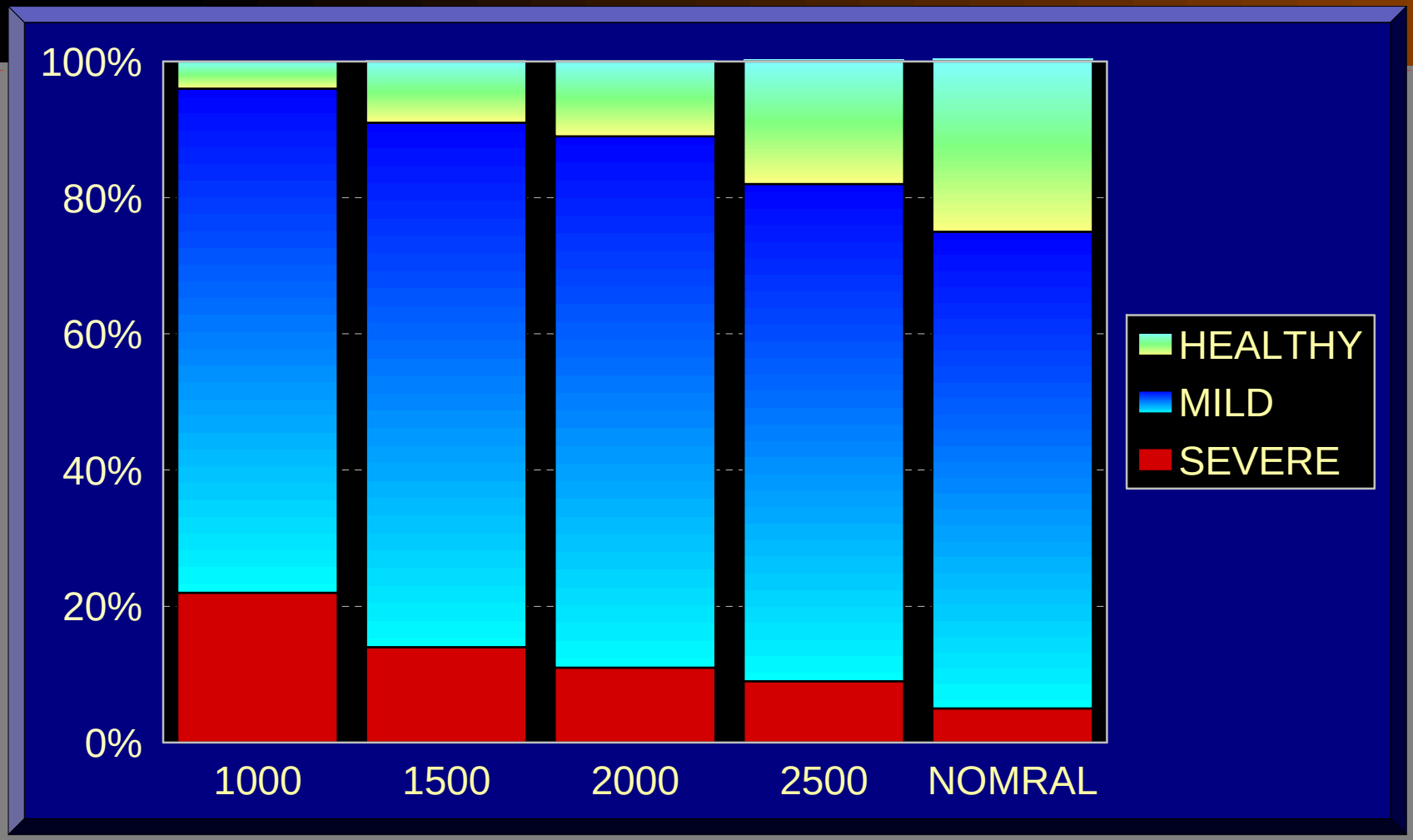
GESTATIONAL AGE AND PERIODONTITIS



Offenbacher S. et al: Maternal periodontitis and Prematurity. Part I: Obstetric outcome of prematurity and growth restriction *Ann Periodontol 2001;6:164-174*

BIRTH WEIGHT AND PERIODONTITIS

1300 EXAMINED PREGNANCY



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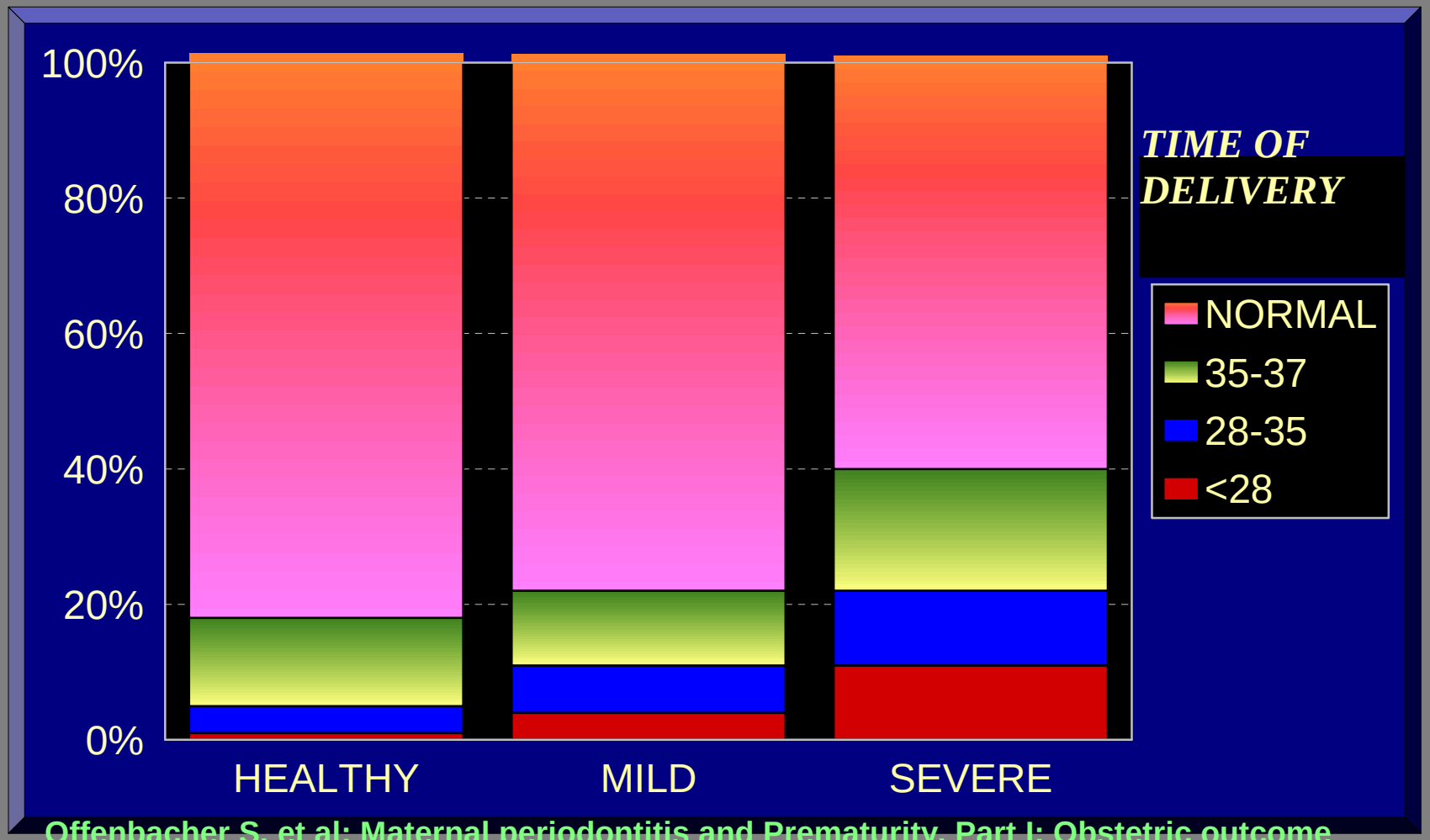
MATERNAL ANTEPARTUM AND PERIODONTAL STATUS

1300 EXAMINED PREGNANCY



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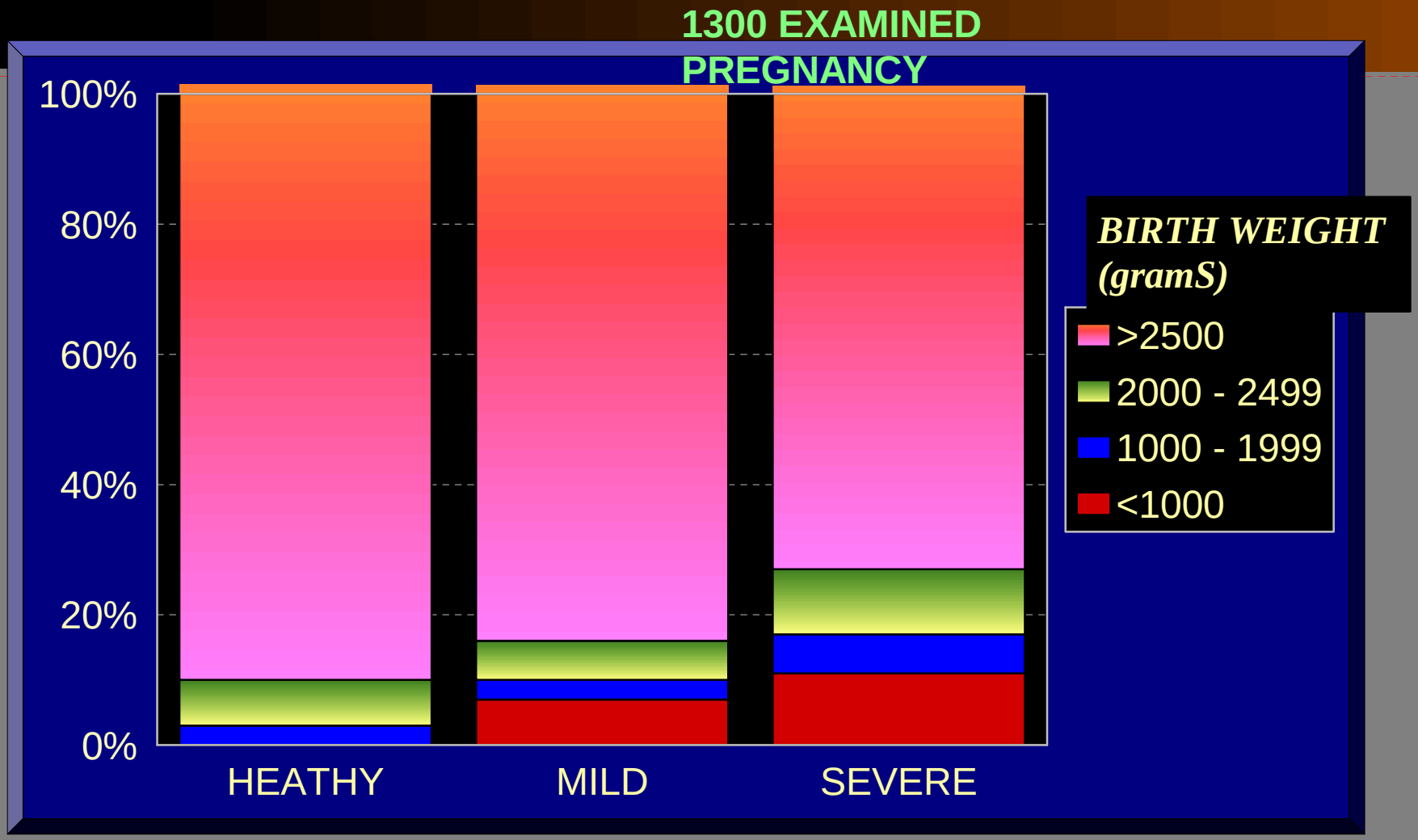


Offenbacher S. et al: Maternal periodontitis and Prematurity. Part I: Obstetric outcome of prematurity and growth restriction *Ann Periodontol 2001;6:164-174*

The periodontopathogenic microorganisms in the gingival sulcus of mothers with preterm low birth weight (PLBW) and age matched controls

BIRTH WEIGHT	B. forsythus	P. gingivalis	AA.	T. denticola
NORMAL	0,10 ± 0,11	0,0 ± 0,0	0,0 ± 0,0	0,30 ± 0,16
PLBW	0,96 ± 0,15	0,26 ± 0,09	0,15 ± 0,07	1,67 ± 0,24

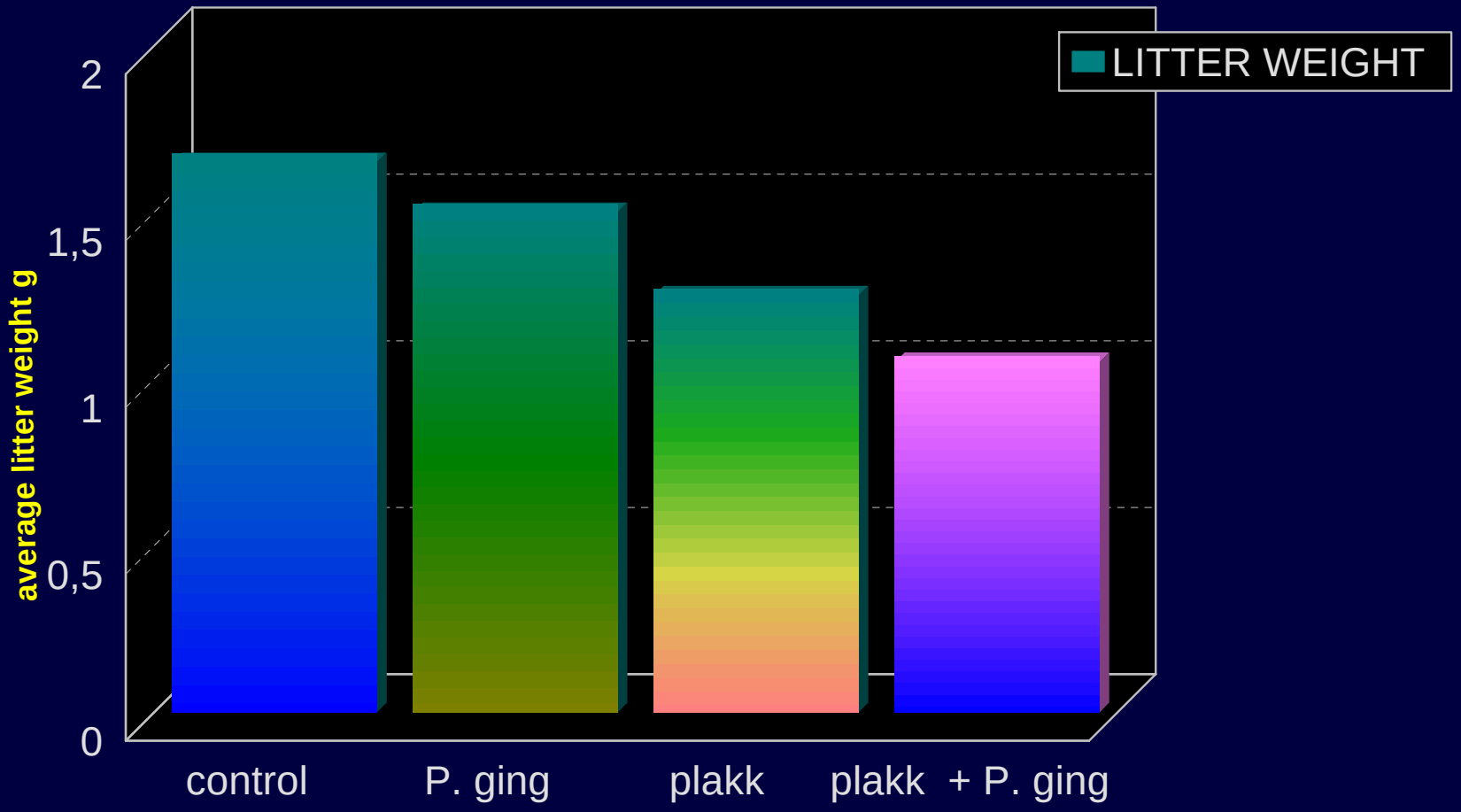
Potential pathogenic mechanisms of periodontitis associated pregnancy complications
Offenbacher S. et al. *Annales of Periodontology 3: 233-2501997*

PRETERM LOW BIRTH WEIGHT MOTHER'S AND THE CONTROL MOTHER'S GINGIVAL SULCUS PGE2 és IL-1*B* *CONCENTRATION*

BIRTH WEIGHT	SULCUS PGE2 ng/ml ± SE	SULCUS IL-1B ng/ml ± SE
NORMAL	62,6 ± 10,2	720 ± 105,2
PLBW	131,4 ± 21,8	1217 ± 281,3

Potential pathogenic mechanisms of periodontitis associated pregnancy complications
Offenbacher S. et al. *Annales of Periodontology 3: 233-2501997*

THE EFFECT OF EXPERIMENTAL PERIODONTITIS ON THE AVERAGE LITTER WEIGHT OF GOLDEN HAMSTERS



Effects of E. Coli and P. gingivalis lipopolysaccharide on pregnancy outcome in golden hamster by Collins & al. *Infect Immun 1994; 62: 4652-4655*

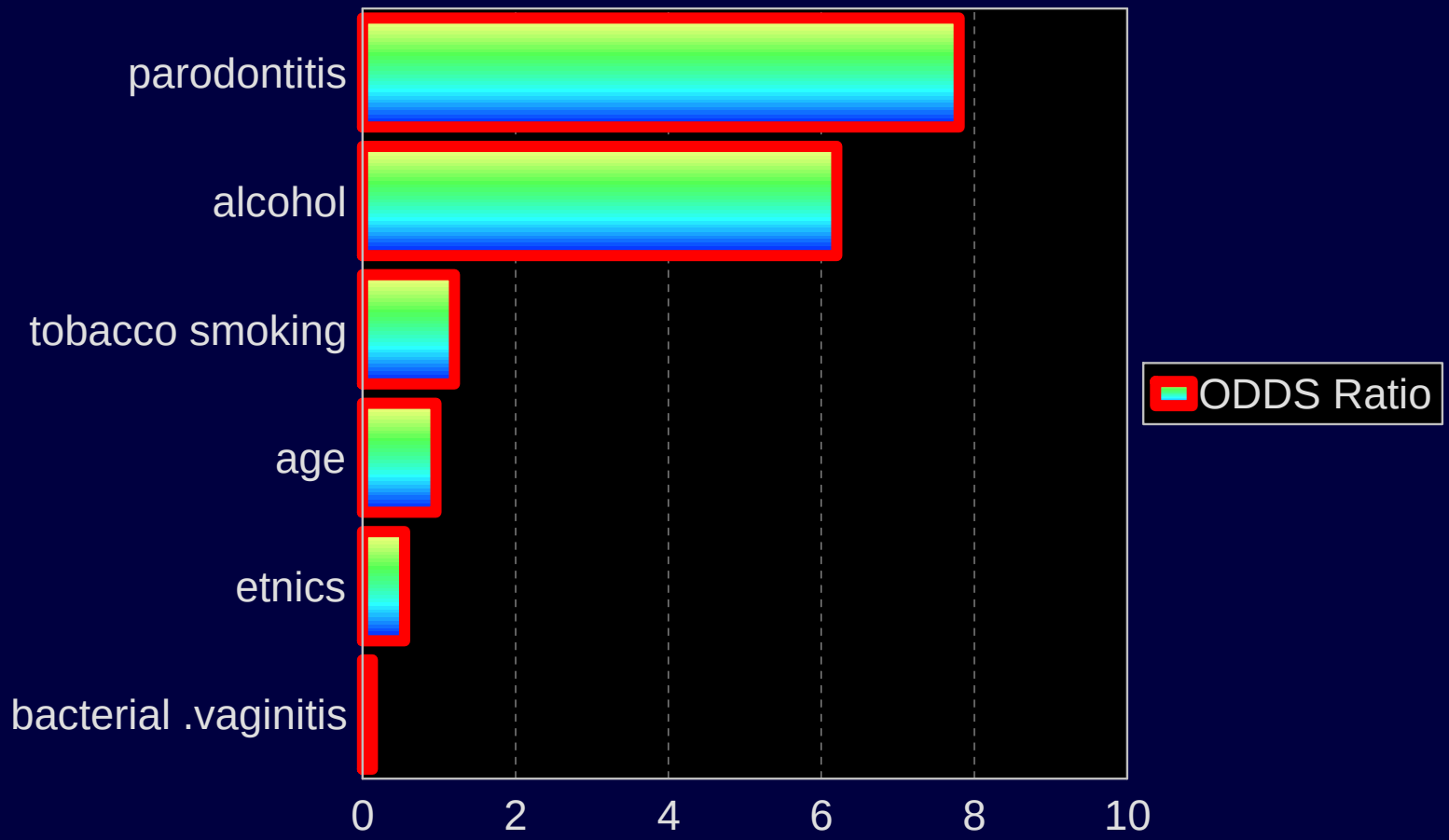
THE PERIODONTAL TREATMENT'S EFFECT ON THE INCIDENCE OF PLBW

390 pregnant women - 195 treated before week 22
195 non treated

	TREATED	NON TREATED
PLBW	1,8%	10,2%
NORMAL	98,2%	89,2%

Lopez NJ et al.: Periodontal therapy reduces the risk of preterm low birth weight *J Dent Res. 2001;80:188 (Abstr-1223)*

DIFFERENT RISK FACTORS IN THE ETIOLOGY OF PRETERM LOW BIRTH WEIGHT



Periodontal disease as a possible risk factor for preterm low birth weight
Offenbacher et al. J. Periodontoll 1996; (suppl) 67: 1003-1113

conclusion

sulcus PGE2 level is significantly higher in PLBW mothers than in normal controls

There is a negative correlation between the sulcus PGE2 level and the birth weight of the newborn babies

Bacterioides forsythus, Porphyromonas gingivalis, Actinobacillus actinomycetemcomitans and Treponema denticola were much more frequently occuring in the gingival sulcus of PLBW mothers than in normal controls

During normal pregnancy the amniotic PGE concentration is steadily increasing till reaches the threshold that will initiate the labor and finally the delivery

The ascending urogenital infection will locally increase the amniotic PGE concentration that can lead to preterm labor

F. nucleatum **can frequently be detected from amniotic fluid and that seldom originates from the vagina .**

Many times the vaginal bacterial culture is negative while the amniotic culture is positive for F. nucleatum

As *F. nucleatum is the most common member of the periodontal pocket it can be assumed the those bacteria can hematologically spread and infect the amnion* .

The blood samples taken from 60 new born babies' umbilical cord 23,3% was positive for anti *C.rectus, P.gingivalis, E.corrodens, A.a. and Veilonella parvula* IgM antibodies

As maternal IgM cannot pas the placental barrier, this antibody should originate from the fetus produced against the bacteria or bacterial antigens infecting the fetus

Pregnant women suffering with periodontitis might produce high antibody titer against *Porphyromonas gingivalis, T. forsythia, Prevotella intermedia* originating from periodontal pockets. Others produce low antibody against peridontopathogenic bacteria – in those women the bacterial infection can easily spread

In those cases antibodies against maternal periodontopathogenic bacteria can be detected from the umbilical cord of the fetus.

In those pregnant women who does not produce high anti peridontopathogenic antibodies the incidence of preterm low weight birth was 66.7%-

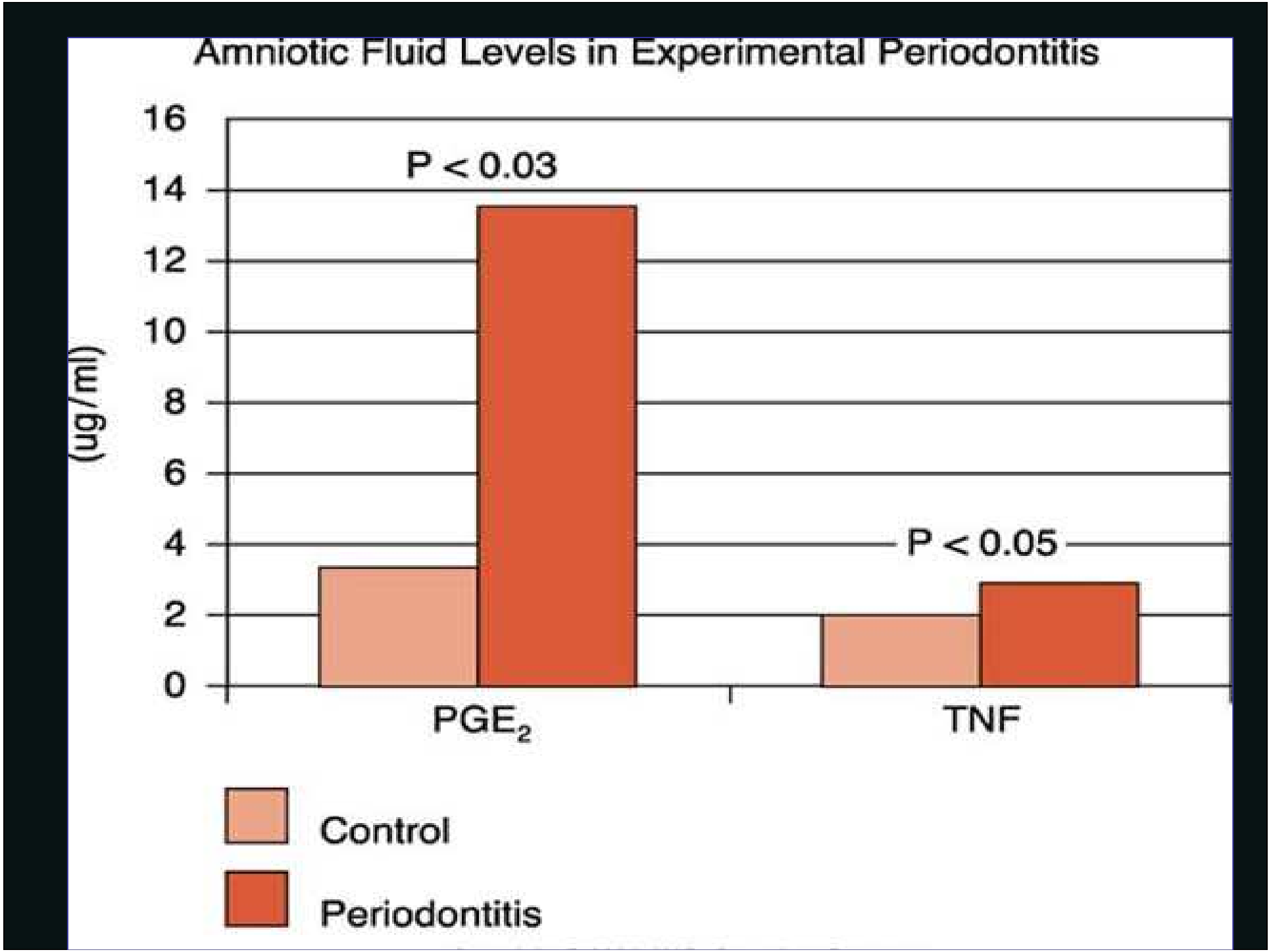
The putative pathomechanism of preterm low weight birth

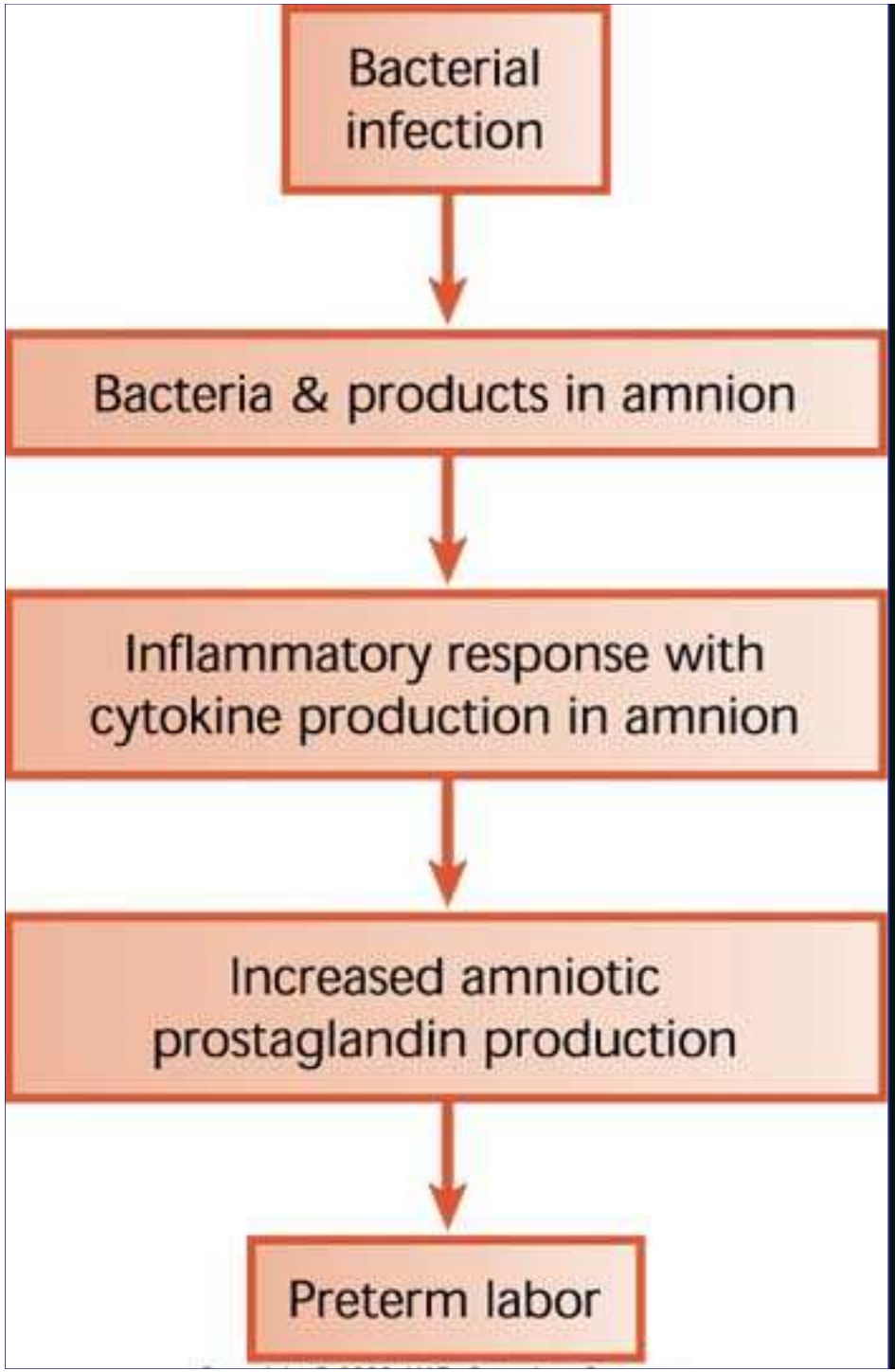
Inflammatory cytokines (PGE2,TNFa,IL-1 IL- 6) can enter into the systemic blood circulation and get into the womb and the placenta .

Cytokines will enhance the local PGE production in the placenta

If the local PGE2 level reaches a certain threshold the labor will start independent of the origin of the high PGE concentration

The LPS can also increase the local PGE production in the womb-

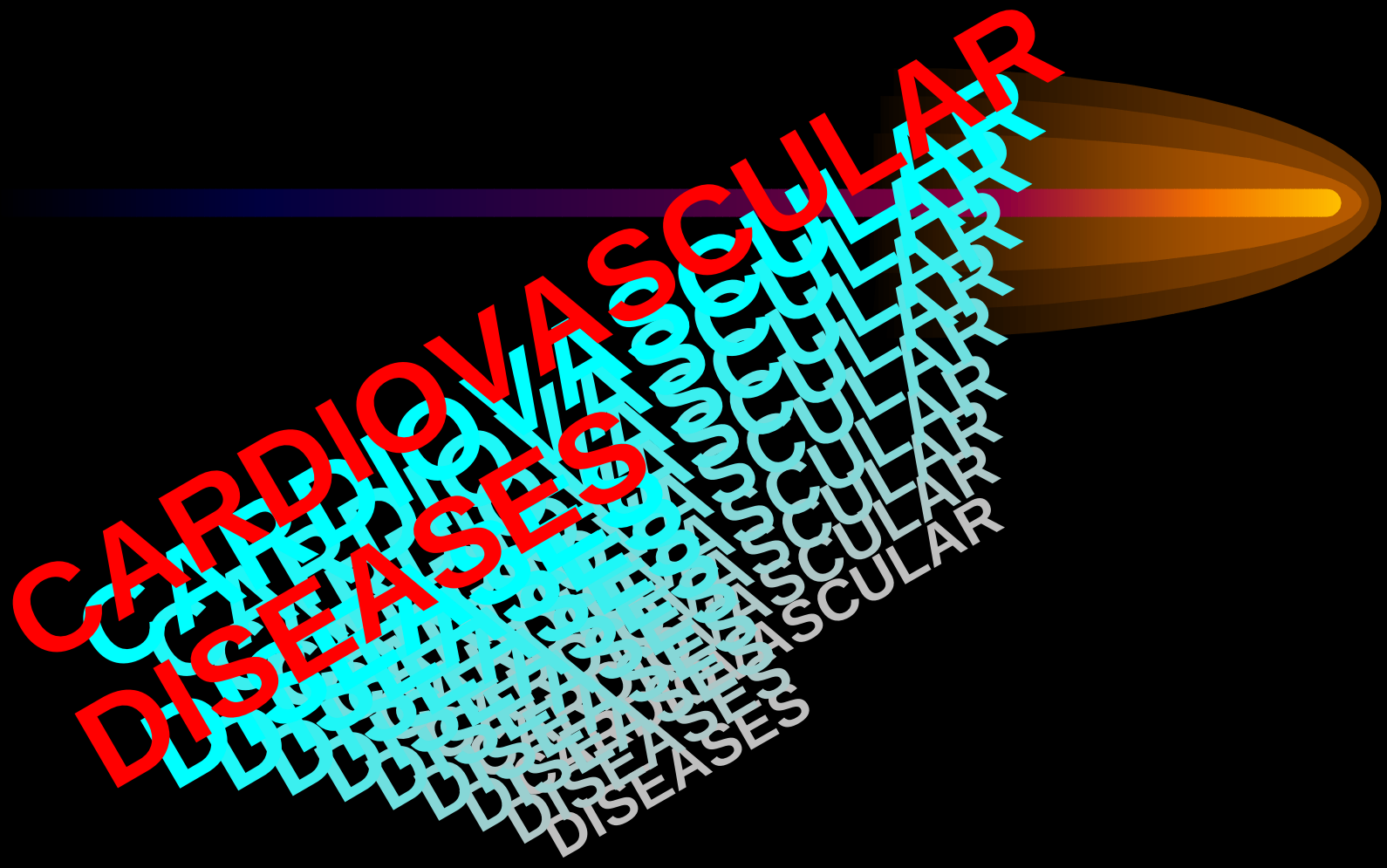

Amniotic Fluid Levels in Experimental Periodontitis
16
14
12
10
8
6
4
2
0
(ug/ml)
P < 0.03
P < 0.05
PGE2
TNF
Control
Periodontitis


Bacterial infection
Bacteria & products in amnion
Inflammatory response with cytokine production in amnion
Increased amniotic prostaglandin production
Preterm labor

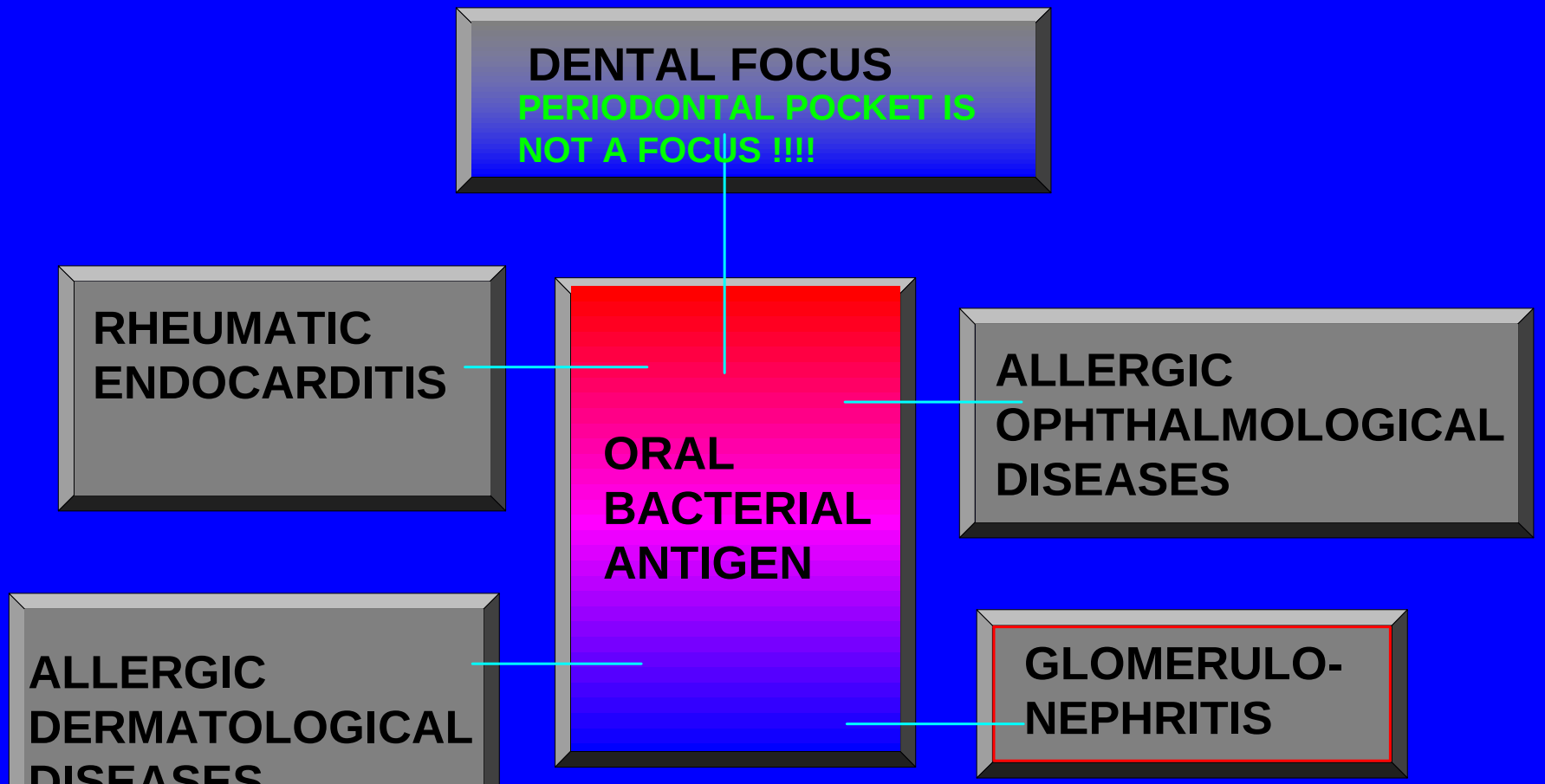
CONCLUSION

THE POOR PERIODONTAL CONDITION OF PREGNANT WOMEN IS AN INDEPENDENT RISK FACTOR FOR PRETEMR LOW BIRTH WEIGHT
(PLBW - < 2500 g, < 37 week)

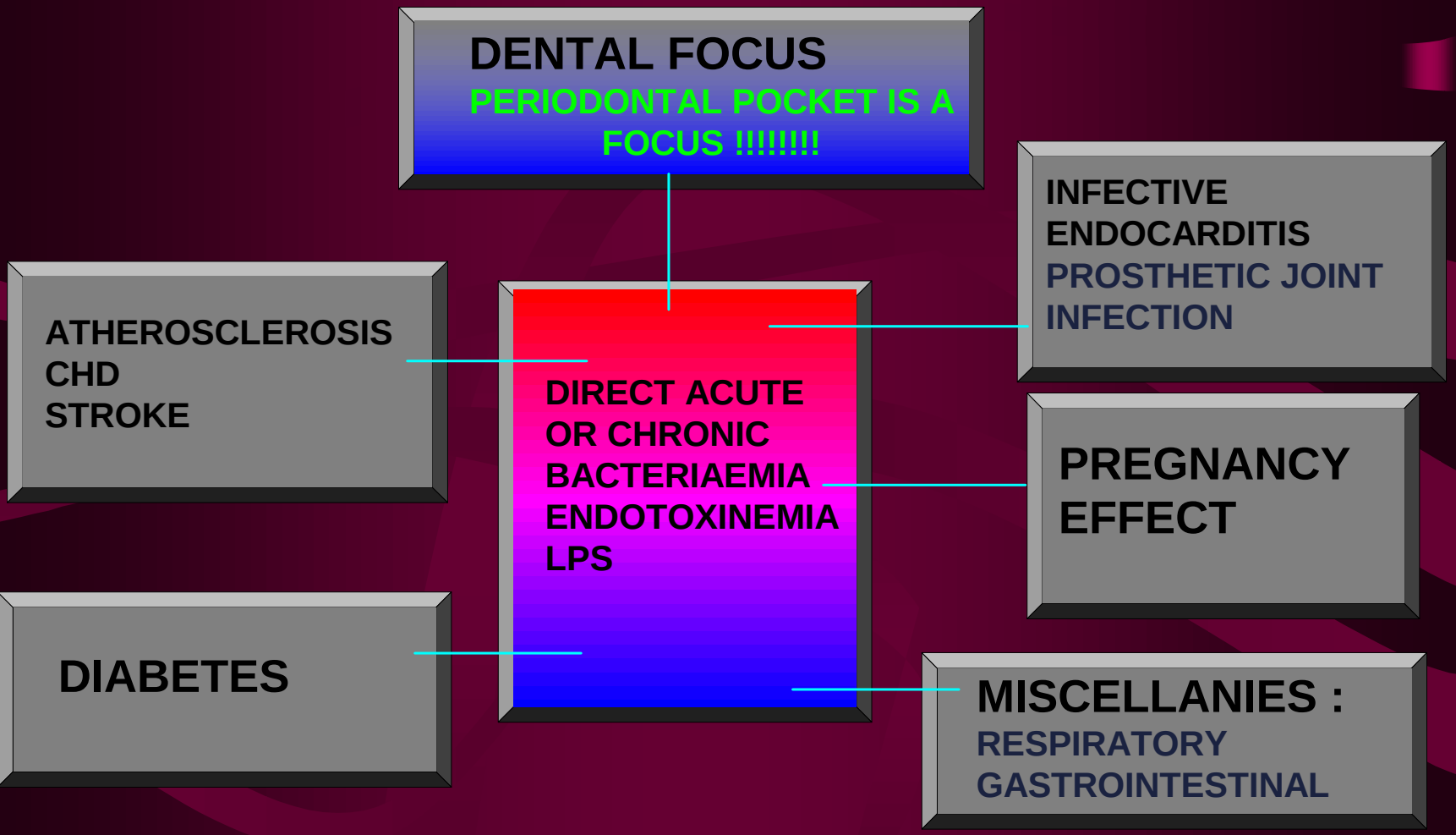
Poor periodontal health of the pregnant woman as a risk factor for low birth weight Dasanayake A.P. Annals of Periodontology 3: 206-212 1997.


CARDIOVASCULAR
DISEASES

CLASSIC DENTAL FOCAL THEORY



PRESENT FOCAL THEORY



Position Paper : Periodontal disease as a potential risk factor for systemic diseases J Periodontol 1998; 69: 841-850.

- Mattila KJ, Valle MS, Neiminen MS, Valtonen VV, Hietantemi KL: Dental infections and coronary atherosclerosis. Atherosclerosis 103, 205, 1993.

- Mattila KJ, Nieminen MS, Valtonen VV. Association between dental health and acute myocardial infarctuion. Br Med J 1989; 298:779-782.

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- Paunio K, Impivaara O, Tiekso J, Maki J: Missing teeth and ischaemic heart disease in men aged 45- 64 years. Eur Heart J 14, 54. 1993

- Loesche WJ: Periodontal disease as a risk factor for heart disease. Compendium 25, 976. 1994.

THE CORRELATION BETWEEN THE ATHEROSCLEROSIS (THE INCIDENCE OF CORONARY HEART DISEASES) AND PERIODONTAL CONDITION

RELATIVE ODDS RATIO

STUDY	CORRELATION	(ODDS RATIO)
Matilla -Finland	total dentition / heart attack	1,3
Matilla - Finland	total dentition / atherosclerosis	1,4
Matilla-Finland	total dentition / CHD incidence	1,2
DeStefano - USA	plaque, periodontium / lethal CHD	1,7
Beck - USA	periodontal bone level/new CHD	1,5
Beck - USA	periodontal bone level/ lethal CHD	1,9
Beck - USA	periodontal bone level/ stroke	2,7
Joshipura - Japan	missing teeth / CHD	1,7

National Health and Nutrition Examination Survey

14 years follow-up study
10.000 participants

Conclusion:

subjects with severe periodontal condition had 25% more chance to develop ischemic heart disease than their age matched counterparts with normal periodontium

44 119 male subjects having no heart condition at baseline were followed up for 6 years

THE RELETIVE ODDS RATIO WAS 1.4 HIGHER FOR THOSE WHO HAD 0-10 NATURAL TEETH AT BASELINE THAN THOSE WHO HAD 25 HATURAL TEETH

Normative Aging Study VA Hospitals Boston USA

1147 men, 18 years follow-up

207 developed ischemic heart disease
59 died of heart attack
40 men had stroke

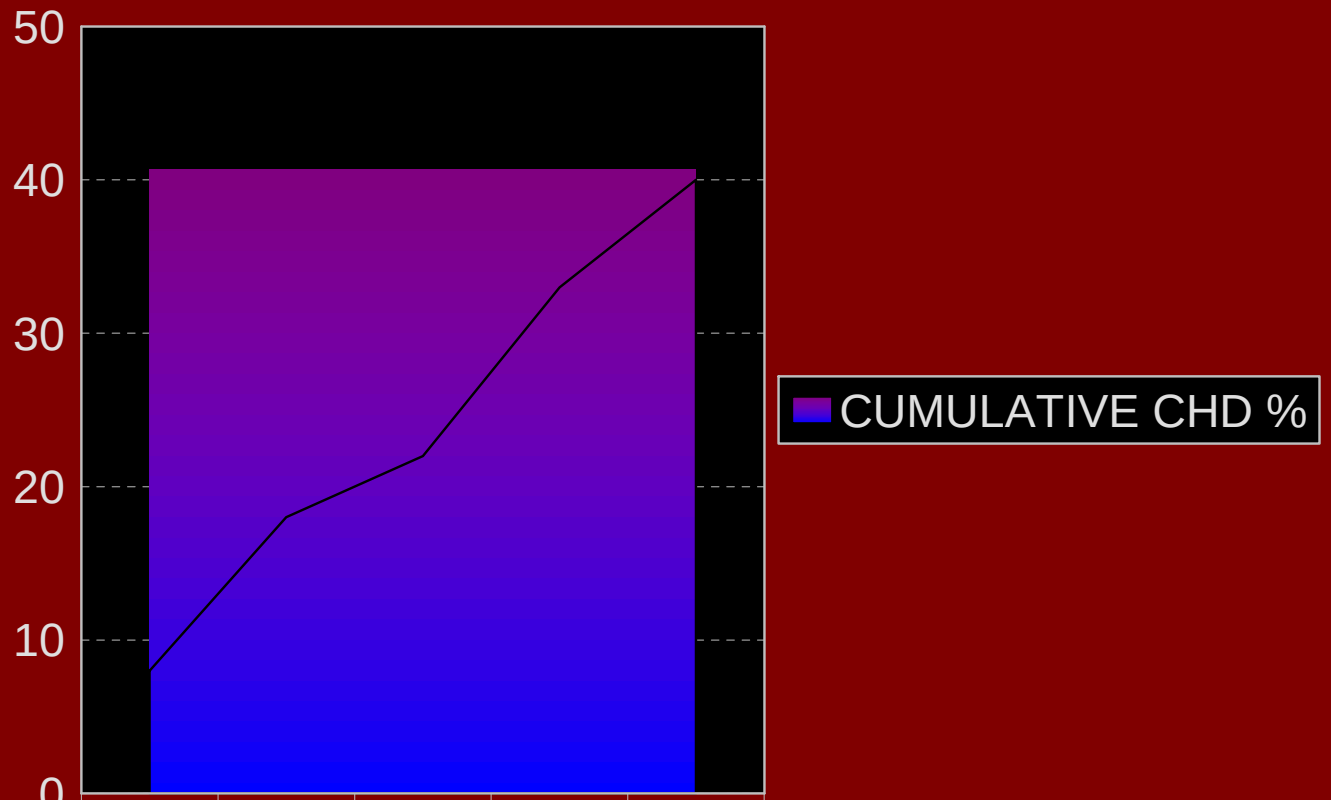
periodontitis as a relative risk factor

- coronary diseases ------ 1,5
- lethal coronary diseases ------ 1.9
- stroke ------ 2,8

Beck et al. Periodontal disease and cardiovascular disease J. Periodontol 1996; 67(suppl) 1123-1137

THE CORRELATION BETWEEN THE PERIODONTAL BONE LOSS AND THE CUMULATIVE PREVALENCE OF CHD

18 YEARS FOLLOW-UP

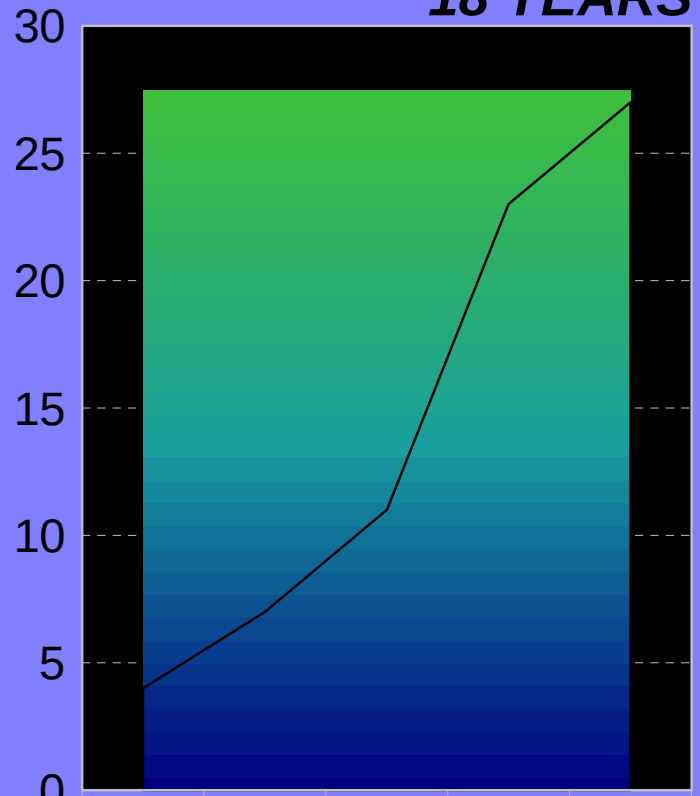


	0	20%	40%	60%	80%
CUMULATIVE CHD %	8	18	22	33	40

Beck JD. et al.: Periodontal disease and cardiovascular disease ***J. Periodontol 1996; 67(suppl): 1123-1137***

THE CORRELATION BETWEEN THE PERIODONTAL BONE LOSS AND THE CUMULATIVE PREVALENCE OF LETHAL CHD

18 YEARS FOLLOW-UP



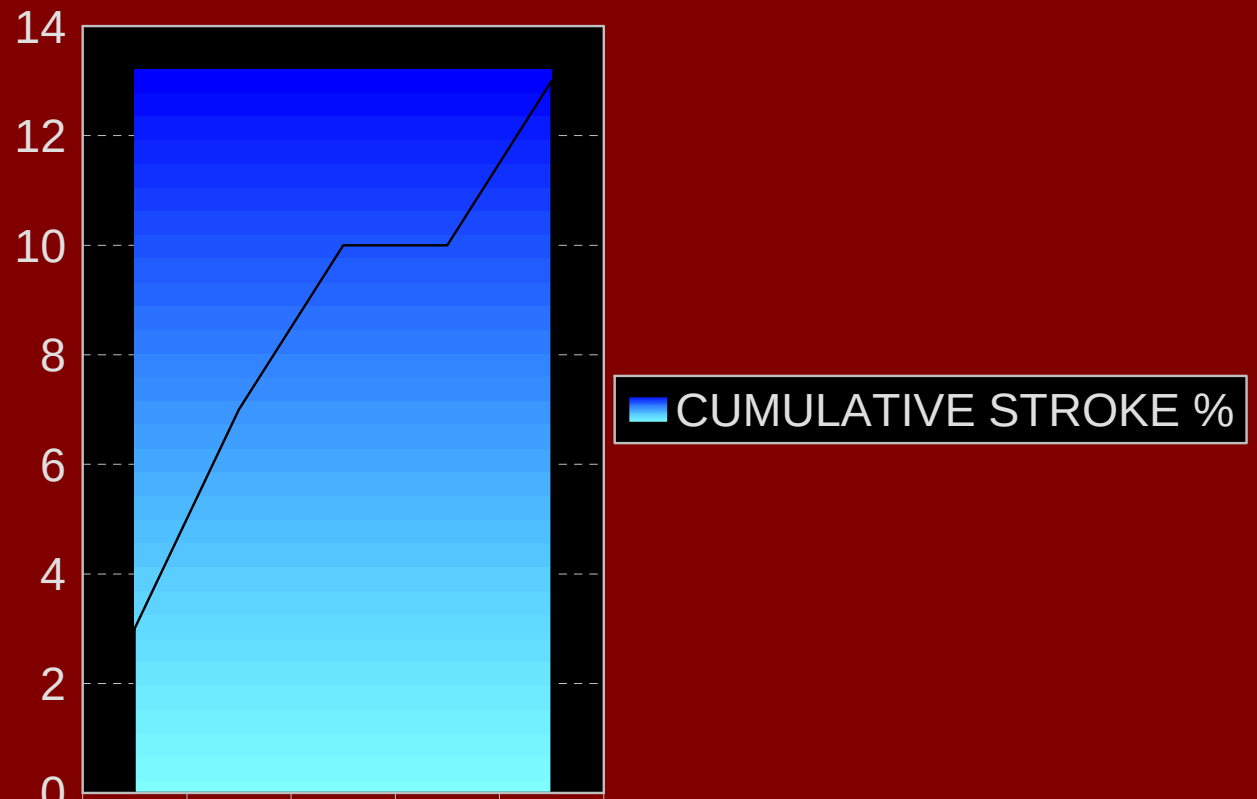
	0	20%	40%	60%	80%
CUM. LETHAL CHD	4	7	11	23	27

average bone loss

Beck JD. et al.: Periodontal disease and cardiovascular disease J. Periodontol 1996; 67(suppl): 1123-1137

THE CORRELATION BETWEEN THE PERIODONTAL BONE LOSS AND THE CUMULATIVE PREVALENCE OF STROKE

18 YEARS FOLLOW-UP

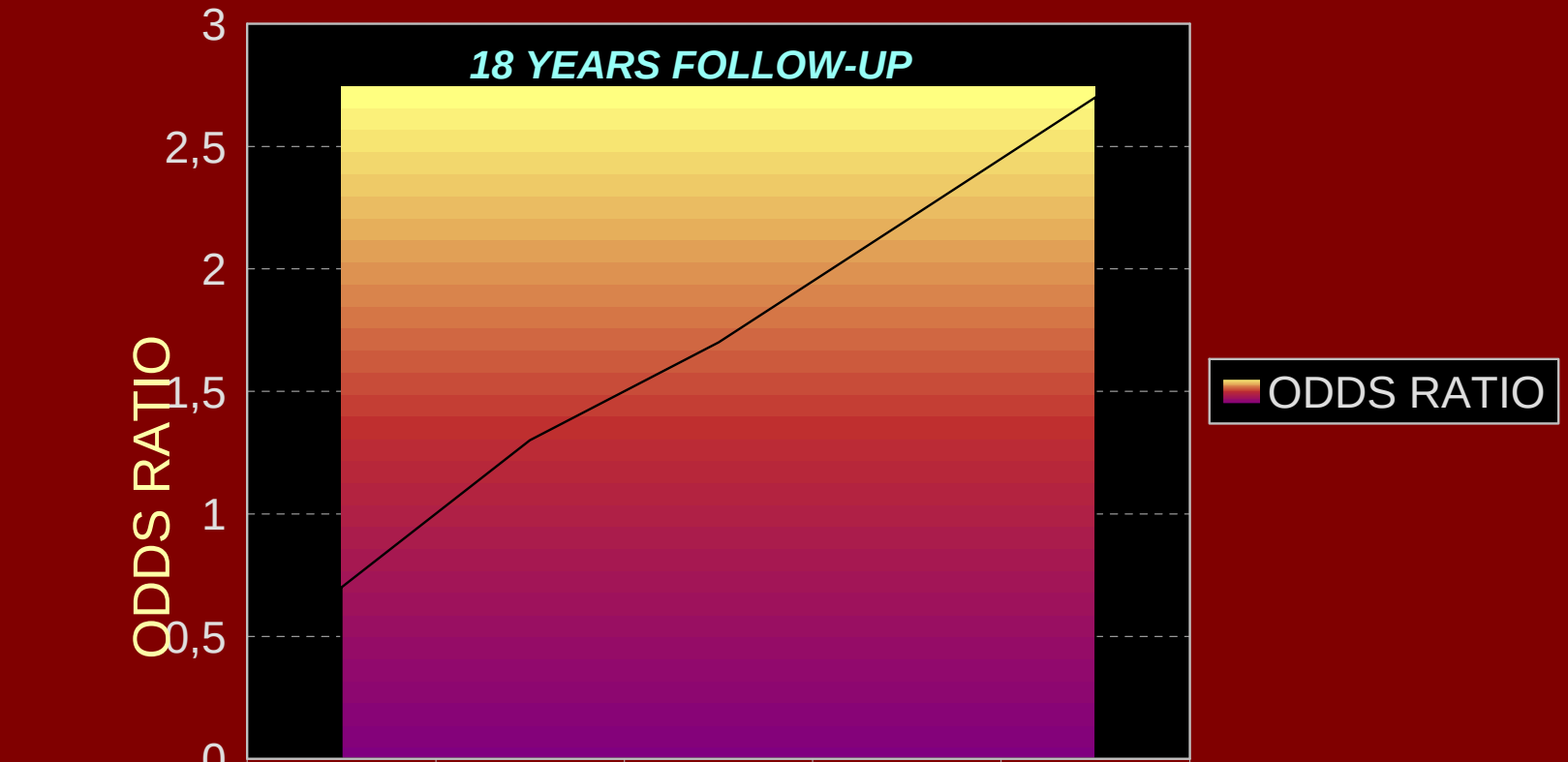


	0	20%	40%	60%	80%
CUMULATIVE STROKE %	3	7	10	10	13

average bone loss

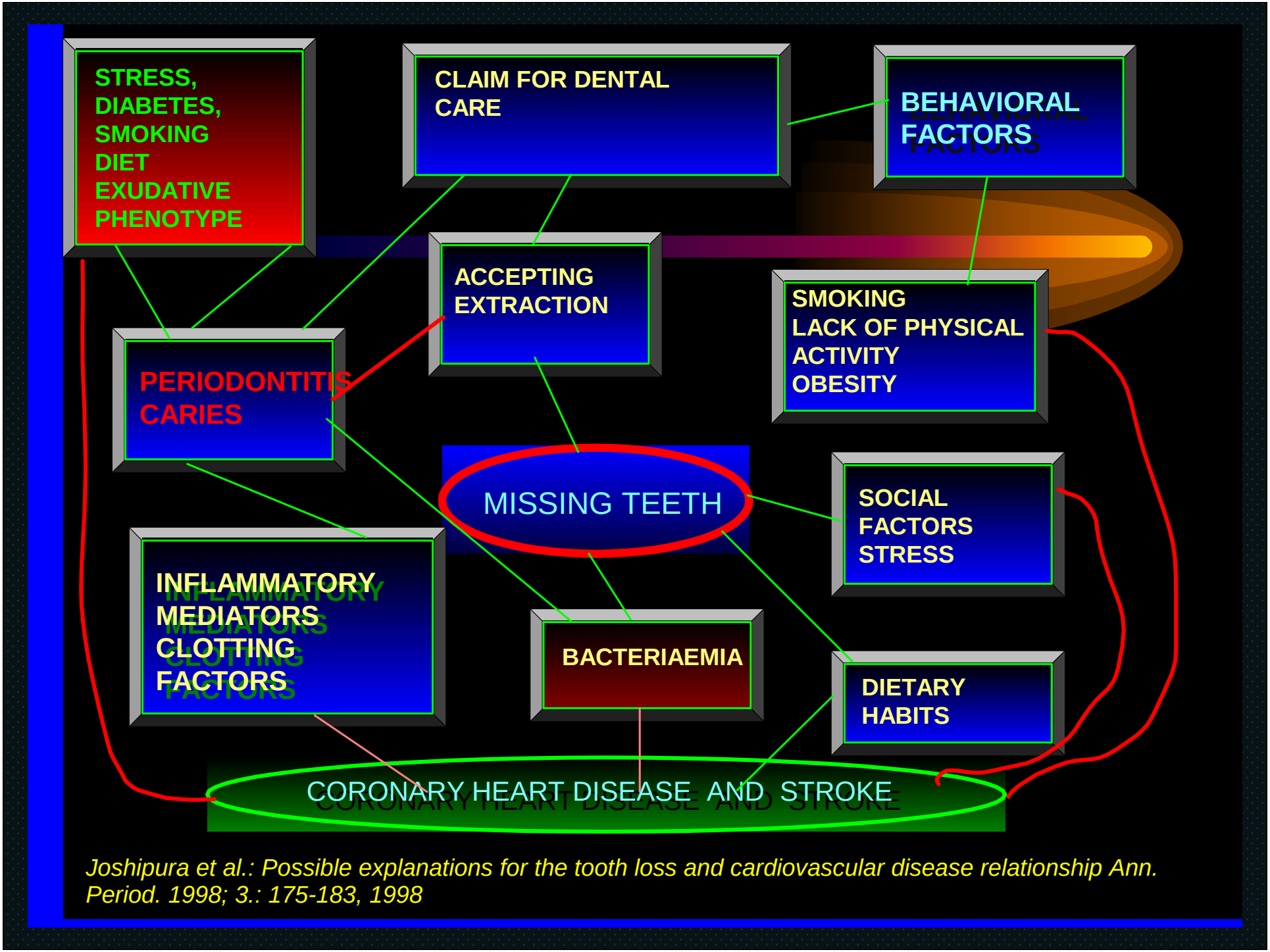
Beck JD. et al.: Periodontal disease and cardiovascular disease ***J. Periodontol 1996; 67(suppl): 1123-1137***

THE CORRELATION BETWEEN THE NO OF TEETH WITH MORE THAN 20% ALVEOLAR BONE LOSS AND THE CUMULATIVE PREVALENCE OF CHD



	1-2	3-5	6-10	11-20	20 <
ODDS RATIO	**0,7**	**1,3**	**1,7**	**2,2**	**2,7**

Beck JD. et al.: Periodontal disease and cardiovascular disease J. Periodontol 1996; 67(suppl): 1123-1137



Joshipura et al.: Possible explanations for the tooth loss and cardiovascular disease relationship Ann. Period. 1998; 3.: 175-183, 1998

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Beck - USA	periodontal bone level/ lethal CHD	1,9
Beck - USA	periodontal bone level/ stroke	2,7
Joshipura - Japan	missing teeth / CHD	1,7

PUBLICATION	EXPOSITION	VASCULAR EFFECT	ASSOCIATION
DeStefano et al 1993/ USA	Russell PI	CHD/ lethal CHD	Sign. +
Hujoel et al 2000.2001 /USA	Gingivitis, Russell PI	CHD/ lethal CHD	negatíve
Wu et al 2000/ USA	Gingivitis,missing tooth , deep pocket	Ischemic stroke	Gingivitis – Pocket sign. +
Hujoel et al 2002/USA	Russell PI gingivitis	Halálos CHD, kórházban kezelt CHD	negatíve
Howel et al 2001/USA	periodontitis survey	Halálos CHD, kórházban kezelt CHD	negatíve
Joshipura et al 1996/ USA	periodontitis survey	Halálos CHD, vagy nem halálos infarctus	Gingivitis negatíve Parodontitis +
Joshipura et al 2003 USA	Numer of teeth periodontitis survey	Ischemias stroke	Sign. +
Beck 1996/USA	Periodontal bone level	New CHD, lethal CHD, stroke	Sign. +

PUBLICATION	EXPOSITION	VASCULAR EFFECT	ASSOCIATION
Mendez et al 1998/ USA	Total bone loss	Periferial atherosclerosis	Sign. +
Morrison et al 1999/Canada	Gingivitis, Periodontitis	lethal CHD, stroke	Sign. +
Mattila et al 1995/ Finland	TDI	New MI or lethal CHD	Sign. +
Touminen et al 2003/ Finland	CPITN, PPD, caries	Lethal CHD,	negatíve
Janson et al 2001/ Sweden	10%< bone loss	Lethal CHD,	Sign. +
Ajwani et al 2003/Finland	CPITN 4mm< pocket	Lethal CHD,	Sign. +

subgingival bacterial biofilm

gram negative bacterial deposits
endotoxine - LPS
high concentration of
inflammatory mediators
TNF-alpha, IL-1beta, PGE_2

BACTERIAEMIA OCCURRED IN 55% OF INDIVIDUALS WITH SEVERE PERIODONTITIS AFTER PARAFFIN CHEWING

Murray M & Moonsnick F.: Incidence of bacteriemia in patients with dental plaque ***J. Lab Clin Med 1941; 26: 801-802.***

In case of a generalized 5 mm pocket depth around teeth the subgingival bacterial flora communicates through an approx. 70-80 cm^2 open wound surface with the systemic circulation

BACTERIAEMIA

EVEN WITH RELATIVELY SOUND PERIODONTIUM A TRANSIENT BACTERIAEMIA CAN OCCUR DURING CHEWING, TOOTHBRUSHING, FLOSSING

Silver JG et al.: Experimental transient bacteraemias in human subjects with varying degrees of plaque accumulation and gingival inflammation. J Clin Periodontol 1977;4: 92-99.

BACTERIAEMIA

IN SEVERE DESTRUCTIVE PERIODONTITIS THE BACTERIAL INVASION HAS BEEN PROVEN IN THE DENTAL LITERATURE

Allenspach-Petrzilka GE, Guggenheim B. Bacterial invasion of the periodontium: an important factor in the pathogenesis of periodontitis? J Clin Periodontol 1983;10:609-617.

infective endocarditis

IE

THE MOST COMMONE CAUSE OF IE IS
Streptococcus sanguis, that is very common in dental plaque even in healthy periodontal condition
Many times there were isolated from patients with IE
Gram - negative periodontopathogenic strains:
- Actinobacillus actinomycetemcomitans,
- Eikenella corrodens,
- Fusobacterium nucleatum
- Capnocytophaga strains

Geraci JE, Wilson JR. Symposium on infective endocarditis III. Endocarditis due to Gram-negative bacteria. Report of 56 cases. Mayo Clinic Proc. 1982;57:145-148.

- Mattila KJ, Valle MS, Neiminen MS, Valtonen VV, Hietantemi KL: Dental infections and coronary atherosclerosis. Atherosclerosis 103, 205, 1993.

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-

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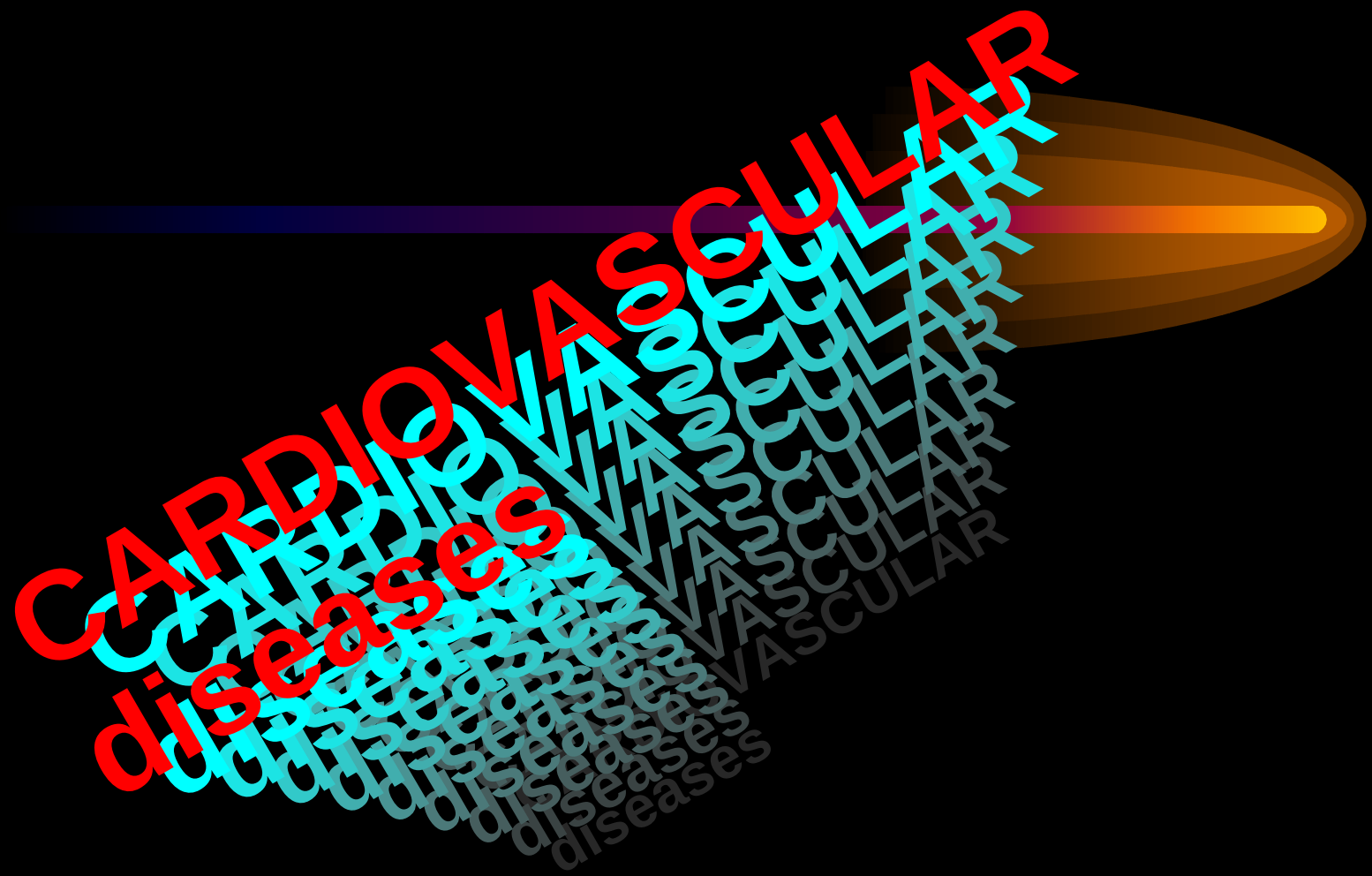
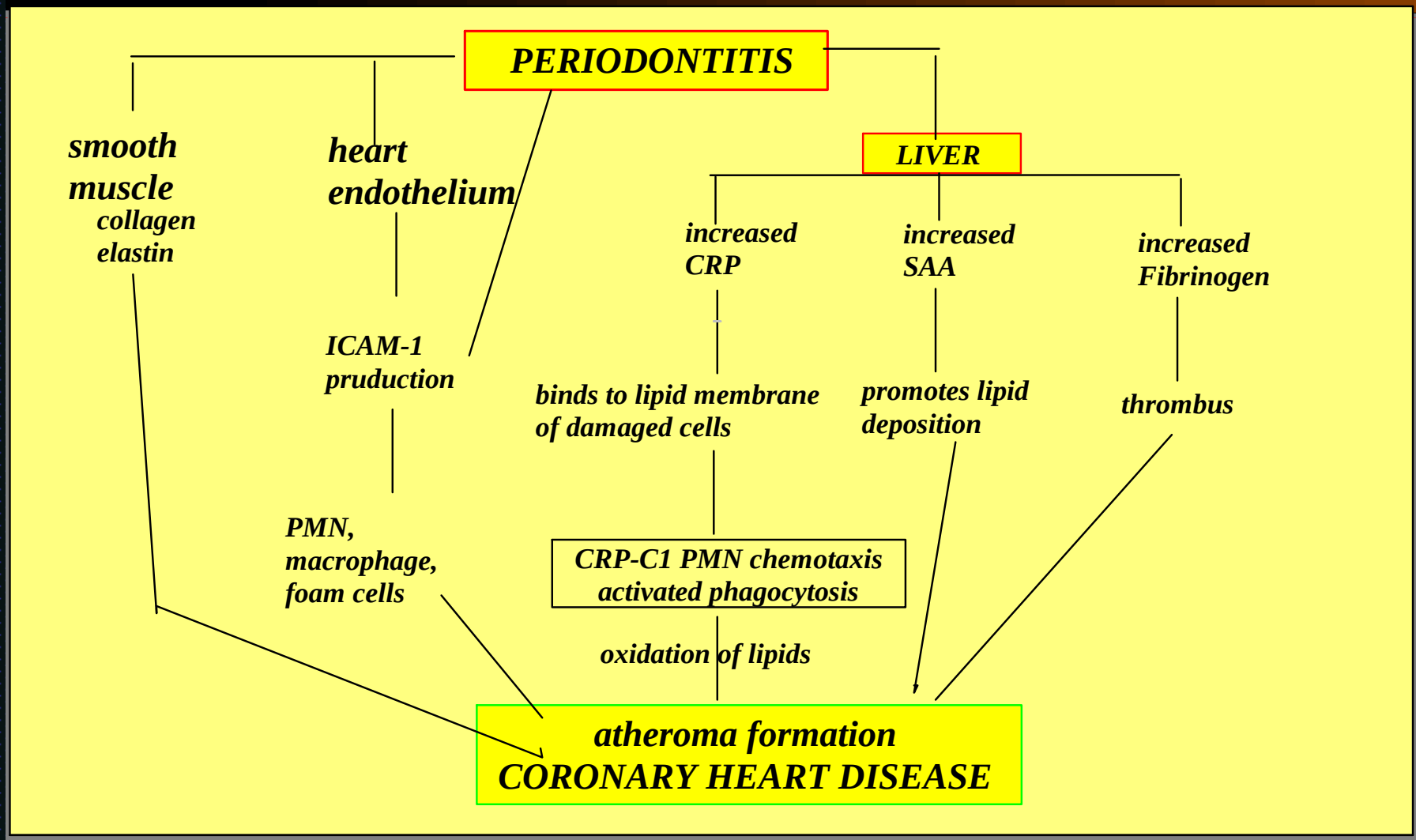
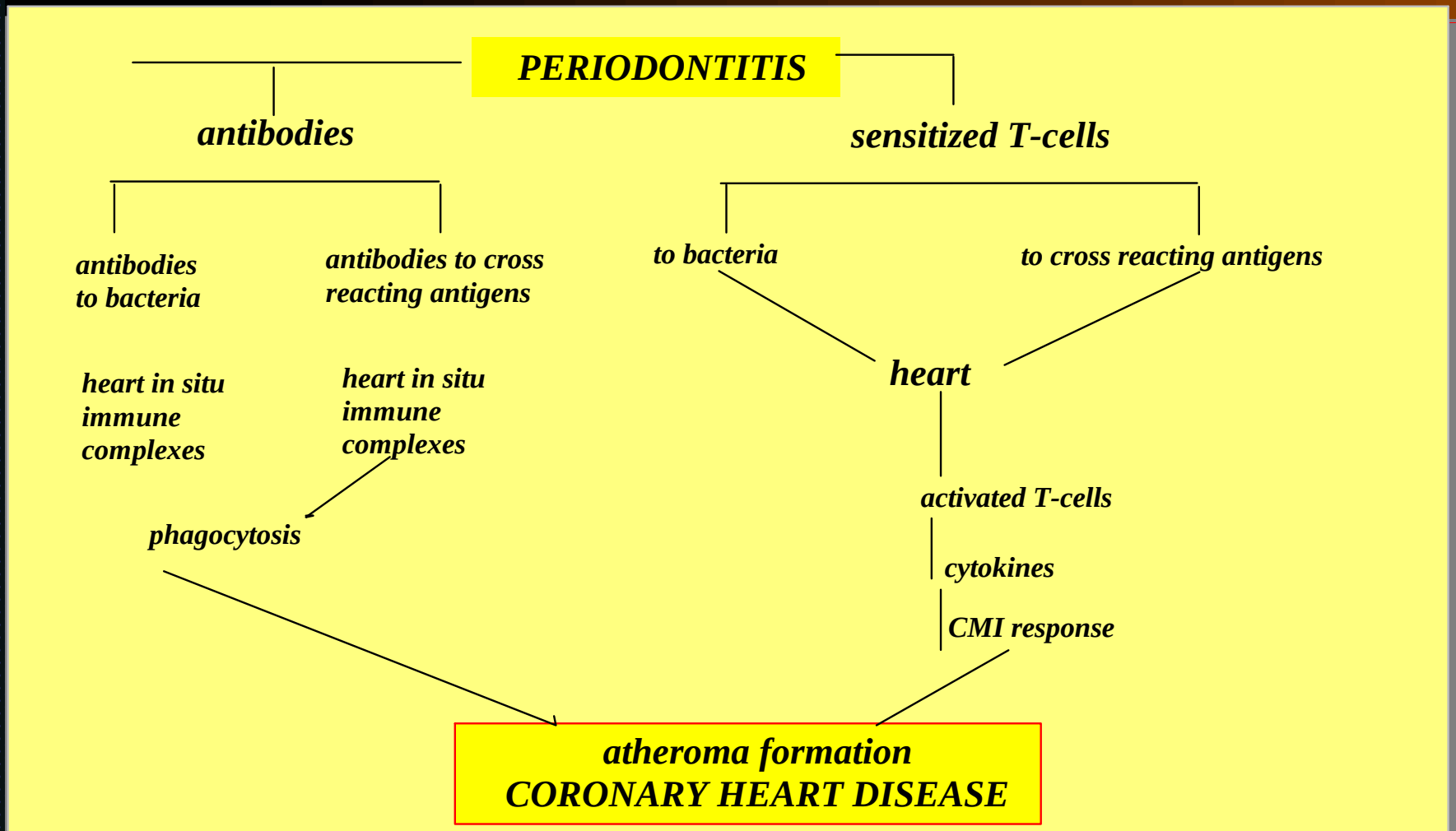

CARDIOVASCULAR
diseases

INFLAMMATORY MEDIATORS AND ITS RELATION TO CORONARY HEART DISEASES



IMMUNE RESPONSE TO LINK TO PERIODONTAL DISEASE AND CORONARY HEART DISEASE



GILA RIVER INDIAN RESERVATION STUDY

1440 AMERICAN NON-SMOKING MALE INDIANS WERE FOLLOWED-UP FOR 15 YEARS
STRONG POSITIVE CORRELATION BETWEEN PERIODONTAL STATE AND INCIDENCE OF CARDIOVASCULAR DISEASES

THE INCIDENCE OF CORONARY HEART DISESE WAS 168%- HIGHER AMONG THOSE WHO HAD SEVERE PERIODONTAL DISEASE AT BASELINE

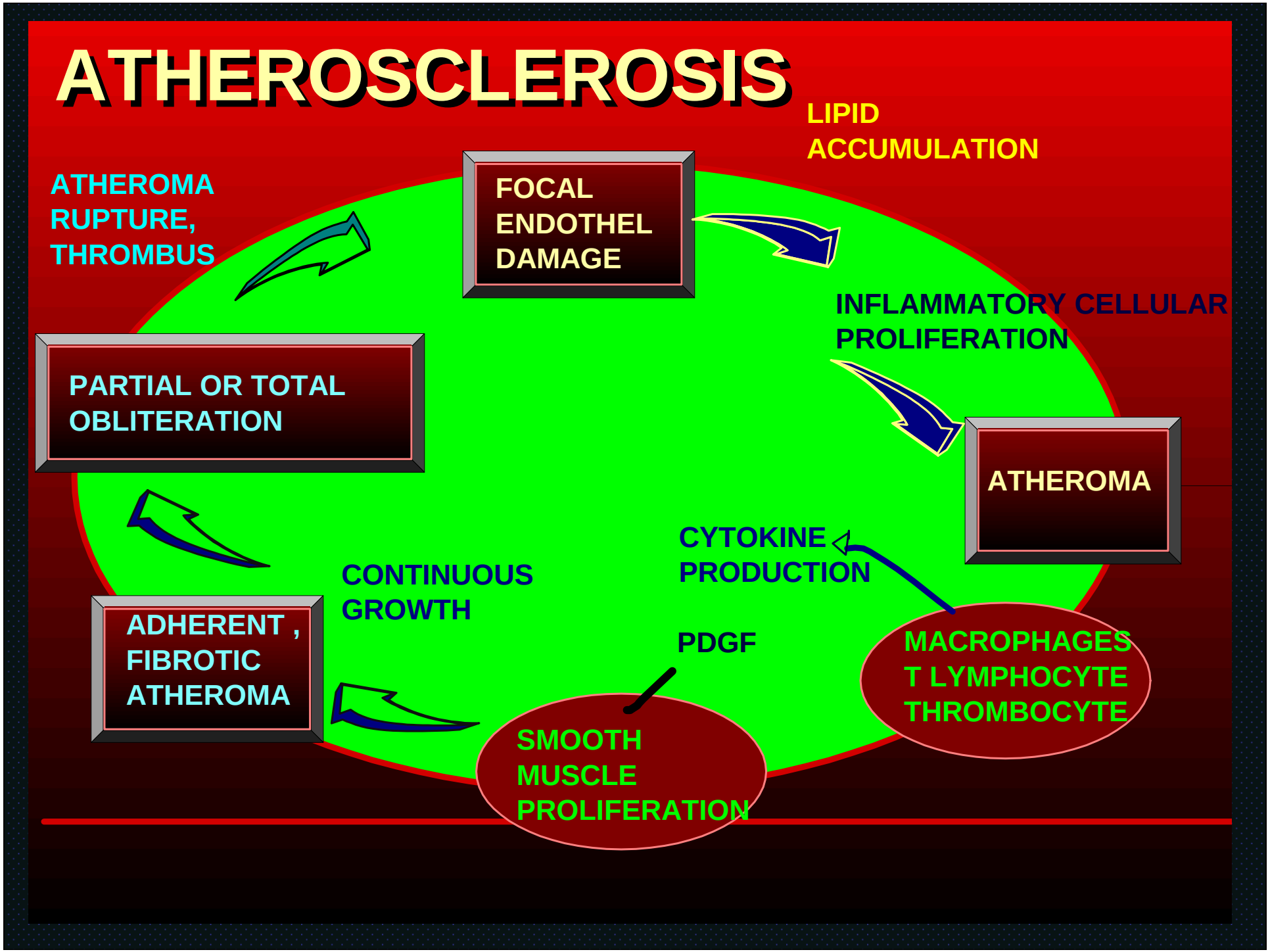
Genco RJ: . Periodontal disease and risk for myocardial infarction and cardiovascular disease ***Cardiovasc Rev Rep 1998: March 34-40***

Experimental periodontitis in monkeys significantly increased serum (LPS), CRP and IL-8 concentration

elevated serum cholesterin, triglycerid and lipoprotein level

increased risk for atherosclerosis

Ebersole et al.: Systemic manifestations of periodontitis in non-human primate J Periodontal Res. 1999;34: 358-362


ATHEROSCLEROSIS
LIPID ACCUMULATION
FOCAL ENDOTHEL DAMAGE
INFLAMMATORY CELLULAR PROLIFERATION
ATHEROMA
CYTOKINE PRODUCTION
MACROPHAGES T LYMPHOCYTE THROMBOCYTE
PDGF
SMOOTH MUSCLE PROLIFERATION
CONTINUOUS GROWTH
ADHERENT , FIBROTIC ATHEROMA
PARTIAL OR TOTAL OBLITERATION
ATHEROMA RUPTURE, THROMBUS

RISK FACTORS FOR CARDIOVASCULAR DISEASES

- ELEVATED LDL CHOLESTEROL > 160mg/dL
- LOWER HDL CHOLESTEROL < 35mg/dL
- SMOKING
- OBESITY > 30% OVERWEIGHT
- MALE GENDER
- DIABETES MELLITUS
- ELEVATED HOMOCYSTEIN LEVEL

Smoking is a serious risk factors in the etiology of cardiovascular and cardiorespiratoric diseases

It is also an important risk factor in the development of periodontitis

consequently the significantly higher incidence of cardiovascular diseases among heavy smokers can be attributed to a complex effect

Haber, J. et al: Evidence for cigarette smoking as a major risk factor for periodontitis. J. Periodontol 64, 16. 1993.

Coultschin J et al: Association of smoking with periodontal treatment needs. J Periodontol 61, 364. 1990.

MORE THAN 100 YEARS AGO SIR WILLIAM OSLER HYPOTHESIZED THE INFECTIOUS ORIGIN OF CARDIOVASCULAR DISEASES

THAT TIME THERE WAS NO SCIENTIFIC EVIDENCE TO SUPPORT THIS HYPOTHESIS

ARE CARDIOVASCULAR DISEASE INFECTIOUS DISEASES ??!!

THE FIRST EVIDENCE WAS :

CYTOMEGALOVIRUS INFECTION
IN IMMUNOLOGICALLY COMPROMISED
INDIVIDUALS LED TO SEVER
CARDIOVASCULAR ATHEROSCLEROSIS

ARE CARDIOVASCULAR DISEASE INFECTIOUS DISEASES ??!!

- POSITIVE CORRELATION BETWEEN PEPTIC ULCER AND THE INCIDENCE OF CORONARY HEART DISEASES
- ***HELICOBACTER PYLORI*** INFECTION IN STOMACH ULCERS CAN BE RESPONSIBLE FOR THE INCIDENCE OF CORONARY HEART DISEASE

ARE CARDIOVASCULAR DISEASE INFECTIOUS DISEASES ??!!

CHLAMYDIA PNEUMONIAE ***INFECTION CORRELATED WITH THE INCREASED INCIDENCE OF CORONARY HEART DISEASE***

ARE CARDIOVASCULAR DISEASE INFECTIOUS DISEASES ??!!

BY CAMPYLOBACTER PNEUMONIAE *INFECTION*
ATHEROMA WAS EXPERIMENTALLY DEVELOPED
IN RABBITS

ARE CARDIOVASCULAR DISEASE INFECTIOUS DISEASES ??!!

POSSIBLE MECHANISMS

- **BACTERIAL THROMBUS HYPOTHESIS**

  STREPTOCOCCUS SANGUIS
  PORPHYROMONAS GINGIVALIS
  PLATELET-AGGREGATION-ASSOCIATED-PROTEIN (PAAP)
  A SURFACE COLLAGEN-LIKE PROTEIN THAT FACILITATES PLATELET AGGREGATION AND FINALLY THROMBUS FORMATION

Herzberg MC et al. The platelet as en inflammatory cell in periodontal disease: interactions with Porphyromonas gingivalis. *Molecular Pathogenesis of Periodontal disease 1994: 247-255*

ARE CARDIOVASCULAR DISEASE INFECTIOUS DISEASES ??!!

POSSIBLE MECHANISMS

- **BACTERIAL THROMBUS HYPOTHESIS**

  STREPTOCOCCUS SANGUIS GIVEN INTRAVENOUSLY CAUSED HEART ATTACK AND FINALLY DEATH IN RABBITS

Herzberg MC et al. Effects of oral flora on platelets: possible consequences in cardiovascular disease J Periodontol 1996;67: 1138-1142

ARE CARDIOVASCULAR DISEASE INFECTIOUS DISEASES ??!!

POSSIBLE MECHANISMS

- **BACTERIAL THROMBUS HYPOTHESIS**

  50 carotis atheroma examined

CMV
H. PYLORI
CLAMIDIA PNEUMONIAE
P. GINGIVALIS
PREVOTELLA INTERMEDIA
A. ACTINOMYCETEMCOMITANS
were detected by DNAPOLYMERAZ CHAIN REACTION

72% CONTAINED AT LEAST ONE PERIODONTOPATHOGENIC PLAQUE BACTERIAL STRAIN

Haraszthy VI et al: Identification of pathogens in atheromatous plaques J. *Dent Res. 77: 1998*

ARE CARDIOVASCULAR DISEASE INFECTIOUS DISEASES ??!!

POSSIBLE MECHANISMS

- **INFLAMMATORY MEDIATORS**
  - **C REACTIVE PROTEINS - (CRP)**

NORMAL CONTROL : 1.14 ug/ml
PERIODONTITIS + CORONARY H DISEASE: 8.70 ug/ml

EFFECTIVE PERIODONTAL TREATMENT DECREASED SERUM CRP LEVEL BY 65%

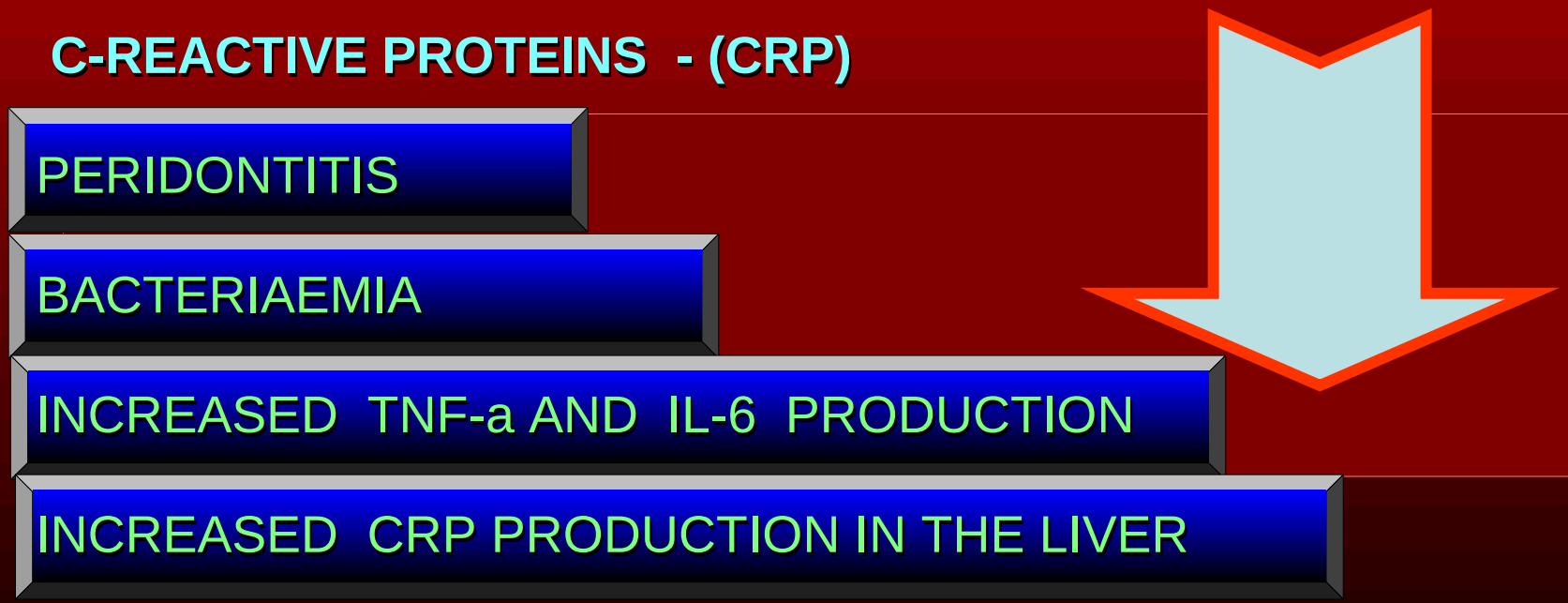
Genco et al : Overview of risk factors for periodontal disease and implications for diabetes and cardiovascular disease *Compendium of Continuing Education in Dentistry 2000:*

ARE CARDIOVASCULAR DISEASE INFECTIOUS DISEASES ??!!

POSSIBLE MECHANISMS

- **INFLAMMATORY MEDIATORS**

C-REACTIVE PROTEINS - (CRP)



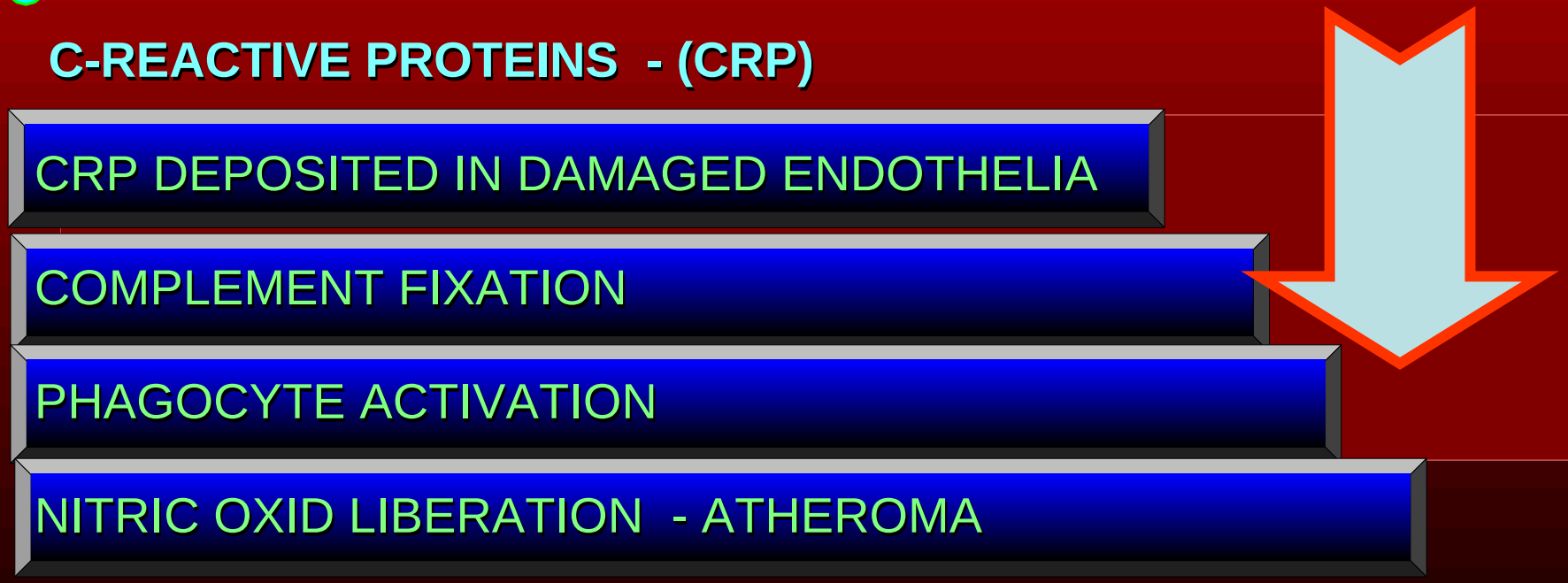
Genco et al : Overview of risk factors for periodontal disease and implications for diabetes and cardiovascular disease*Compendium of Continuing Education in Dentistry 2000:*

ARE CARDIOVASCULAR DISEASE INFECTIOUS DISEASES ??!!

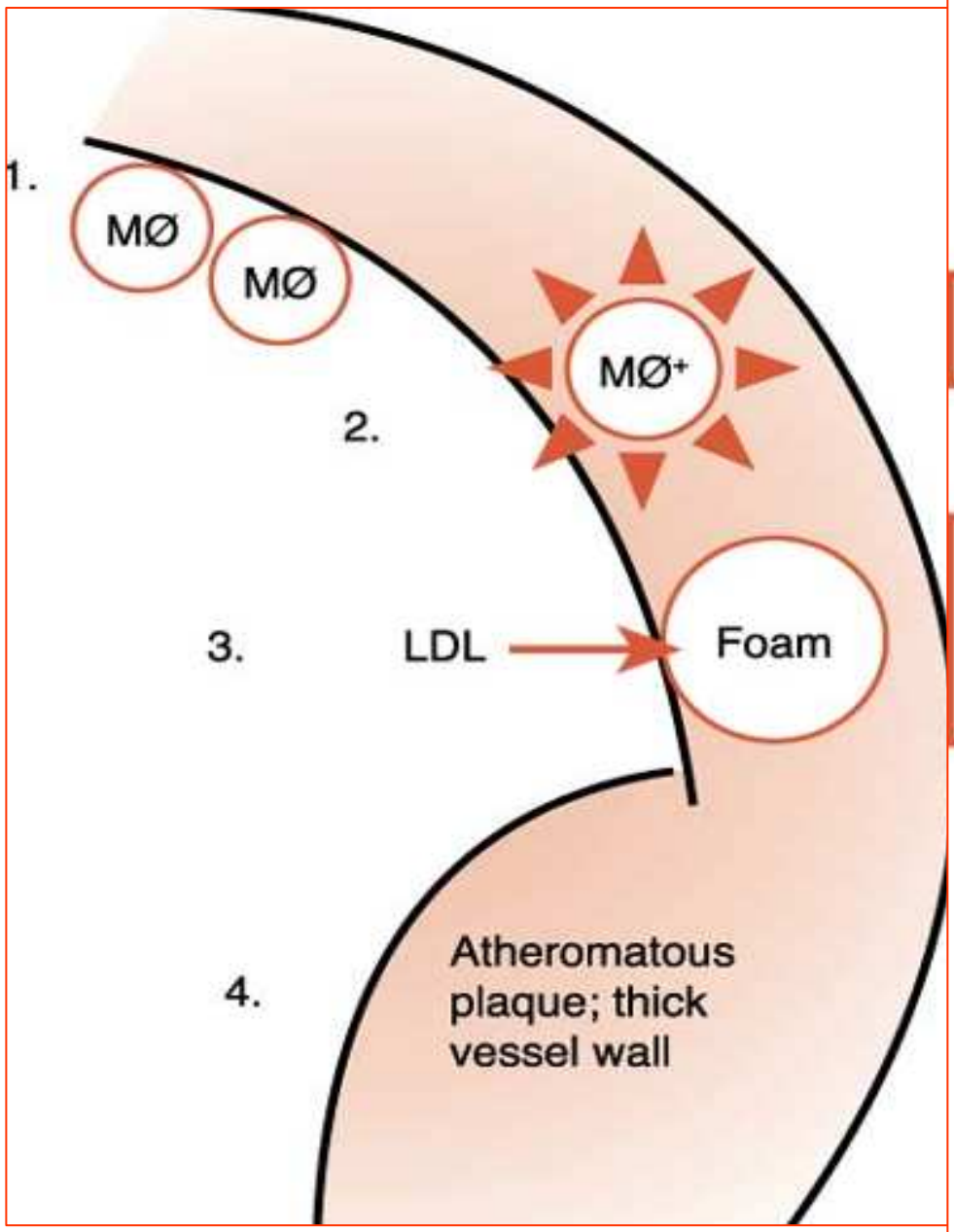
POSSIBLE MECHANISMS

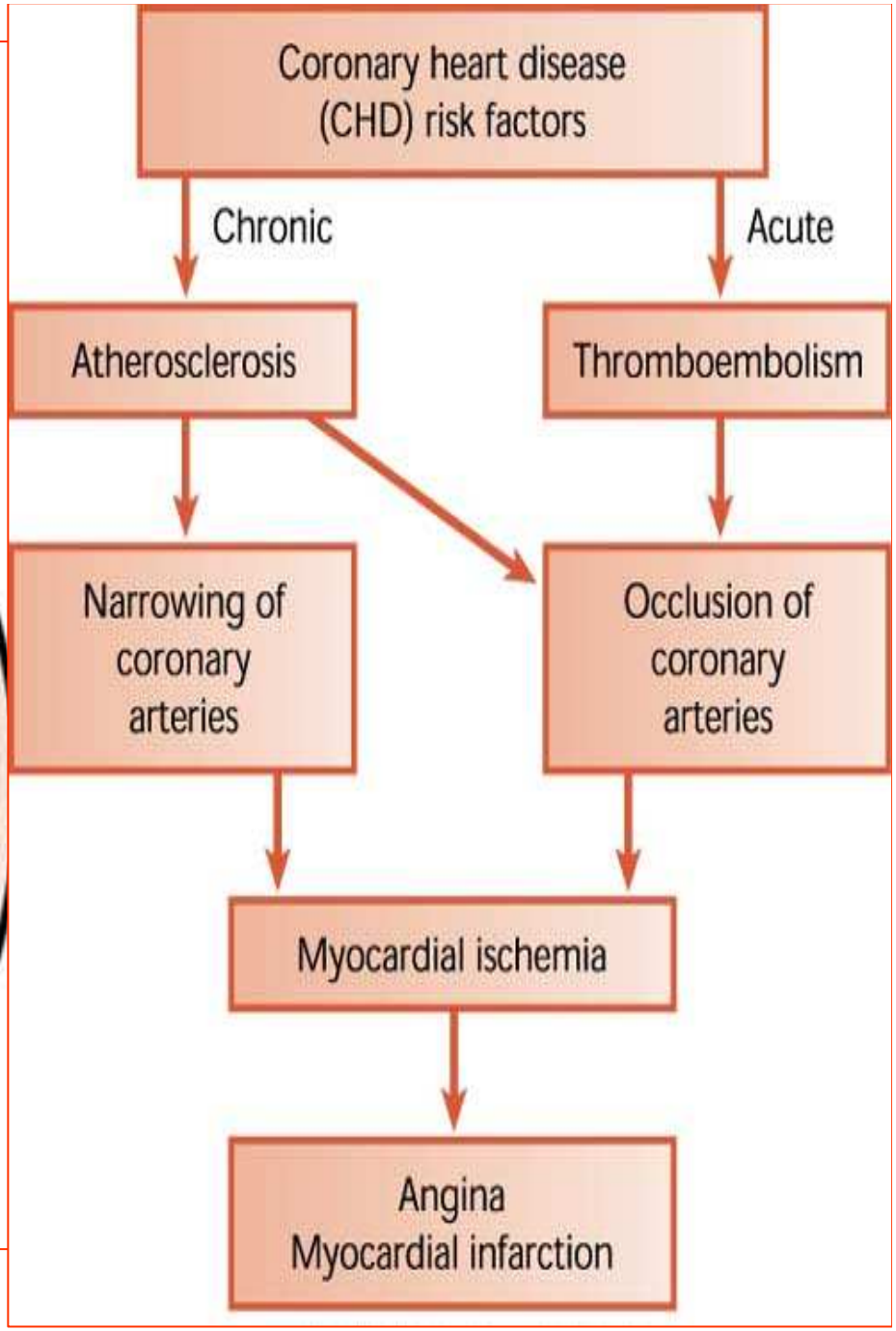
- **INFLAMMATORY MEDIATORS**

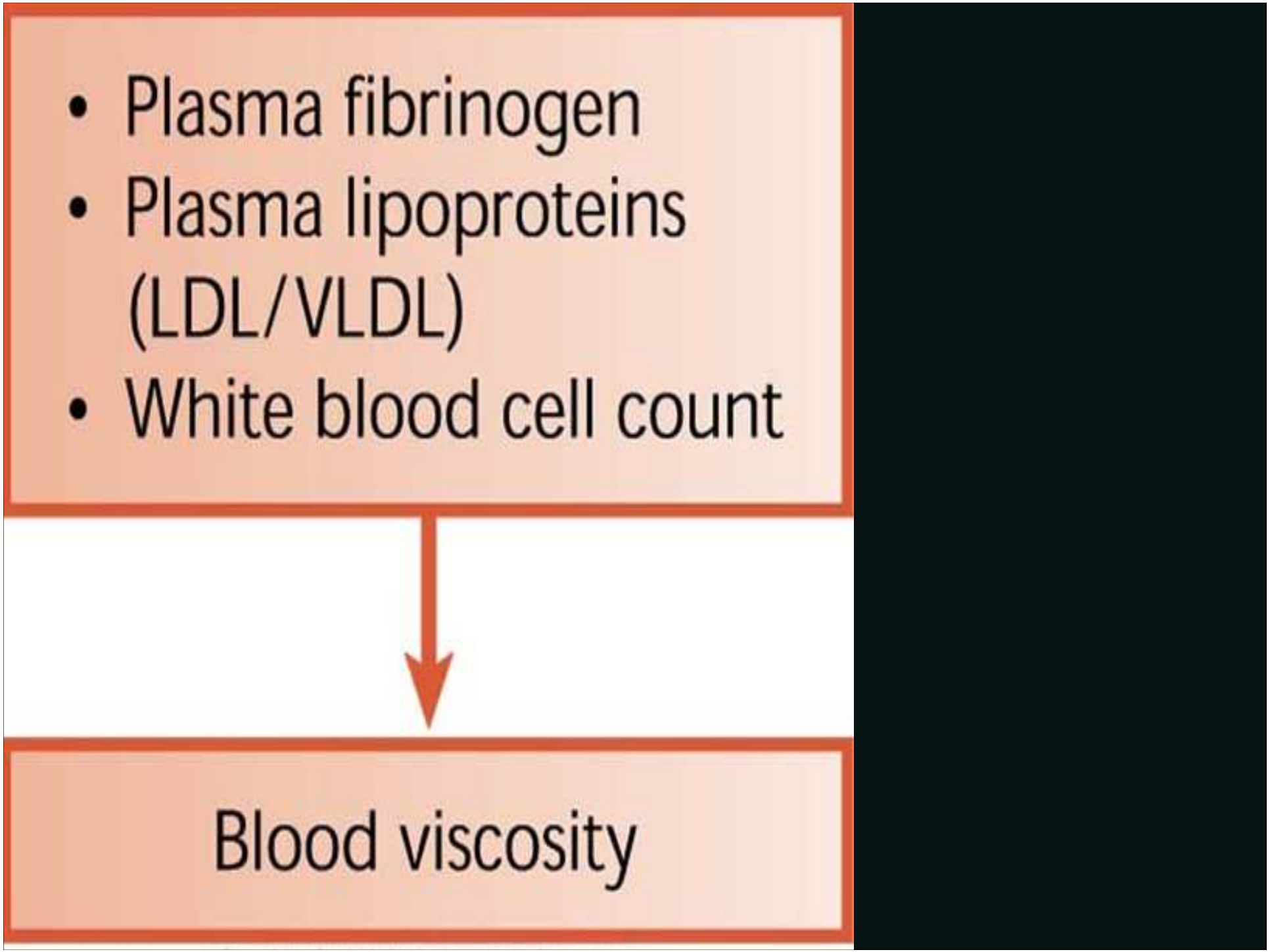
C-REACTIVE PROTEINS - (CRP)

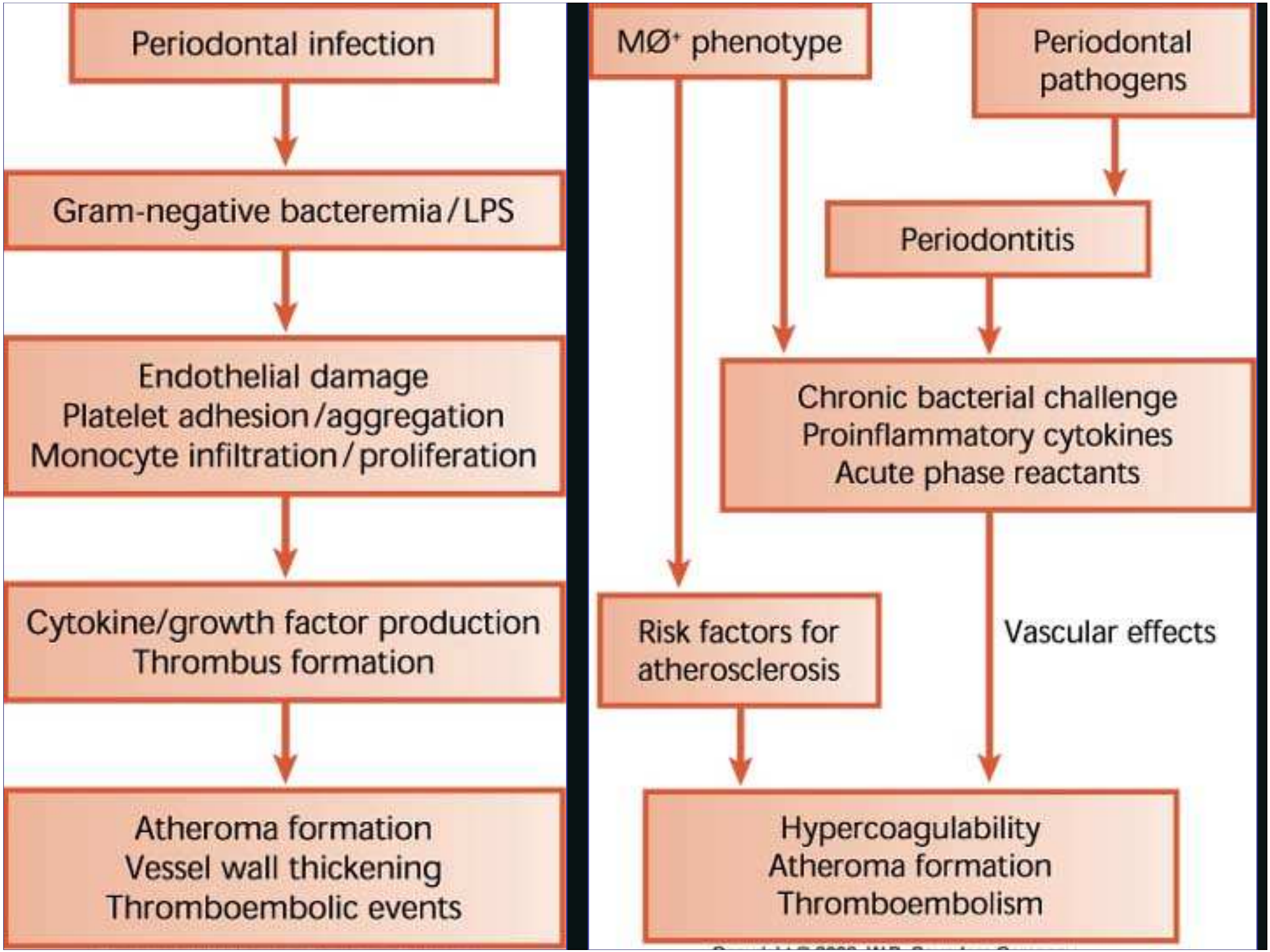


Genco et al : Overview of risk factors for periodontal disease and implications for diabetes and cardiovascular disease*Compendium of Continuing Education in Dentistry 2000:*


1.
MØ
MØ
MØ+
2.
3.
LDL
Foam
4.
Atheromatous plaque; thick vessel wall


Coronary heart disease (CHD) risk factors
Chronic
Acute
Atherosclerosis
Thromboembolism
Narrowing of coronary arteries
Occlusion of coronary arteries
Myocardial ischemia
Angina
Myocardial infarction


• Plasma fibrinogen
• Plasma lipoproteins (LDL/VLDL)
• White blood cell count
Blood viscosity


Periodontal infection
Gram-negative bacteremia / LPS
Endothelial damage
Platelet adhesion / aggregation
Monocyte infiltration / proliferation
Cytokine/growth factor production
Thrombus formation
Atheroma formation
Vessel wall thickening
Thromboembolic events
MØ+ phenotype
Periodontal pathogens
Periodontitis
Chronic bacterial challenge
Proinflammatory cytokines
Acute phase reactants
Risk factors for atherosclerosis
Vascular effects
Hypercoagulability
Atheroma formation
Thromboembolism

CAUSE OF BACTERIAL ENDOCARDITIS

BASED ON THE STATISTICS OF 450 PUBLICATIONS

95%PROBABILITY	%
DENTAL TREATMENT	**7,5% (5,5-9,4)**
DENTAL AND PERIODONTAL INFECTIONS	**7,6% (5,2-9,6)**
MEDICAL TREATMENT	14,5% (12,5-17,8)
EXTRAORAL INFECTIONS	15,5% (13,5-16,5)
INTRAVENOUS DRUG	4,5% (2,3-6,8)
UNKNOWN	52,5% (48,0-54,1)

Drangshot MT: A New Causal Model of Dental Diseases Associated With Endocarditis J. Periodontol, Annales of Periodontology 3:1. 185-196

SYSTEMIC RISK FACTORS FOR IE

alcoholism
intravenous drugs
chronic heamodyalisis
immuno suppression
diabetes

THE INDICATION OF ANTIBIOTIC PROPHYLAXIS BEFORE SCALING

GENERALLY 15% OF ALL KNOWN INFECTIVE ENDOCARDITIS CASES ARE PRECEDED BY INVASIVE DENTAL TREATMENT ONE MONTHS PRIOR TO THE INCIDENCE OF IE

BESIDES TOOTH EXTRACTION THE HIGHEST RISK IS IMPOSED BY SUBGINGIVAL SCALING AND CURETTAGE AND INTRALIGAMENTAL ANAESTHESIA

THE DESTRUCTIVE PERIODONTITIS IS A SERIOUS RISK FACTOR FOR CERTAIN HIGHLY SUSCEPTIBLE INDIVIDUALS (HIGH RISK GROUP)

It is very important to anticipate the invasion of the plaque bacteria and to prevent they entering into the systemic circulation.

If it is should occur the attachment of circulating bacteria onto endothelium or endocardium must be blocked by antibiotics

It is even more important to maintain excellent oral hygiene in high risk individuals than just to provide antibiotic prophylaxis during invasive therapy.

Periodontitis is caused by plaque bacteria

In dental plaque more than 500 bacterial strains were detected by culturing or DNA PCR

One gram dental plaque contains $2x10^{11}$ bacteria

GibbonsRJ, van Houte J. Bacterial adherence and formation of dental plaques. Beachey EH. Ed. Bacterail Adherence. London: Chapman and Hall Ltd. 1980: 62-104.

CARDIOLOGICAL CONDITIONS REQUIRING ANTIBIOTIC PROPHYLAXIS BEFORE INVASIVE DENTAL TREATMENT:

HIGH RISK GROUPS

- ARTIFICIAL VALVE (mechanical or biological)
- PAST IE IN MEDICAL HISTORY
- COMPLEX CARDIAC DEVELOPMENTAL DISORDERS
- SYSTEMIC PULMONARY SHUNT
- CARDIAC VALVE CORRECTING OPEN HEART SURGERY

Dajani et al. Prevention of bacterial endocarditis Recommendations by the American Heart Association Circulation 1997;96:358-366

CARDIOLOGICAL CONDITIONS REQUIRING ANTIBIOTIC PROPHYLAXIS BEFORE INVASIVE DENTAL TREATMENT:

MEDIUM RISK GROUP

- RHEUMATOID FEVER
- KAWASAKI DISEASE
- AUTÓIMMUNE COLLAGEN DISEASES (SLE)
- HEART VALVE FUNCTIONAL DISORDERS
- ANY PATIENT AFTER OPEN HEART SURGERY

Dajani et al. Prevention of bacterial endocarditis Recommendations by the American Heart Association Circulation 1997;96:358-366

CARDIOLOGICAL CONDITIONS REQUIRING ANTIBIOTIC PROPHYLAXIS BEFORE INVASIVE DENTAL TREATMENT:

MEDIUM RISK GROUP

- HYPERTROPHIC CARDIOMYOPATHY
- MITRAL VALVE PROLAPS WITH REGURGITATION
- SEVERAL DEVELOPMENTAL DISORDER INFLUENCING THE FUNCTION OF THE VALVES.

Dajani et al. Prevention of bacterial endocarditis Recommendations by the American Heart Association Circulation 1997;96:358-366

CARDIOLOGICAL CONDITIONS REQUIRING NO ANTIBIOTIC PROPHYLAXIS BEFORE INVASIVE DENTAL TREATMENT:

- ATRIAL SEPTUM DEFECT
- SURGICALLY CORRECTED SEPTUM DEFECT
- CORONARY BYPASS OPERATIONS
- MITRAL VALVE PROLAPSE WITHOUT REGURGITATION
- PHYSIOLOGICAL HEART MURMUR
- PAST RHEUMATIC FEVER WITHOUT VALVE DAMAGE AND HEART MURMUR
- PACEMAKER

Dajani et al. Prevention of bacterial endocarditis Recommendations by the American Heart Association Circulation 1997;96:358-366

DENTAL PROCEDURES LEADING TO BACTERIAEMIA

HIGH RISK PROCEDURES

- extraction
- periodontal surgery
- subgingival curettage
- intraligamental anaesthesia
- subgingival scaling
- dentoalveolar surgery
- periodontal probing
- certain endodontal procedures
- supragingival scaling provoking gingival bleeding
- any procedure causing gingival bleeding

Dajani et al. Prevention of bacterial endocarditis Recommendations by the American Heart Association Circulation 1997;96:358-366

DENTAL PROCEDURES LEADING TO BACTERIAEMIA

HIGH RISK PROCEDURES

- intraligamental anaesthesia

Intraligamental anaesthesia causes more frequently bacteriaemia than extraction

Roberts et al. Odontogenic bacteriaemia ind intraligamental analgesia Br Dent J 1992;173:195-200

DENTAL PROCEDURES LEADING TO BACTERIAEMIA

HIGH RISK PROCEDURES

- periodontal pocket diagnostics with probe

IN PATIENTS WITH SEVERE PERIODONTITIS BACTERIAEMIA OCCURED IN 43% OF ALL CASES AFTER POCKET PROBING

Daly et al. Bacteraemia caused by periodontal probing Aust Dent J 1997;42:77-80

DENTAL PROCEDURES LEADING TO BACTERIAEMIA

HIGH RISK PROCEDURES

- periodontal surgery
- subgingival curettage
- subgingival scaling
- periodontal probing

In most of the cases becteriaemia is transient lasting no longer that 15 min but in less severe cases no longer that 2-3 min. The shorter the transient becteriaemia the less the chance to attach bacteria to the damaged endocardium

Dajani et al. Prevention of bacterial endocarditis Recommendations by the American Heart Association Circulation 1997;96:358-366
Mealey BL. Periodontal implications: medically compromised patients Ann Periodontol 1996;1:256-321

DENTAL PROCEDURES CAUSING NO BACTERIAEMIA

low risk procedures

- restorative work without retraction cord
- local anaesthesia
- rubber dam
- suture removal
- orthodontic treatment
- impression without retraction cord
- endodontic therapy without periapical involvement
- supragingival scaling without gingival bleeding
- intraoral radiographs

Dajani et al. Prevention of bacterial endocarditis Recommendations by the American Heart Association Circulation 1997;96:358-366

THROUGH THE LARGE POCKET WALL SURFACE A GREAT AMOUNT OF BACTERIA AND BACTERIAL PRODUCTS CAN ENTER THE BLOOD STREAM AND THIS MIGHT HAVE VERY SERIOUS EFFECTS ON THE CONDITION OF CERTAIN REMOTE ORGANS

EVEN IN CASES OF SEEMINGLY GOOD ORAL HYGIENE A GREAT AMOUNT OF SUPRAGINGIVAL PLAQUE COVERS THE TEETH IN THE GINGIVAL REGIONS CONSEQUENTLY EVERY TIME WE MIGHT BE EXPOSED TO SYSTEMIC BACTERIAL CHALLENGES

A TRANSIENT BACTERIAEMIA CAN BE PROVOKED BY TOOTHBRUSHING, FLOSSING ETC. EVEN IN CASE OF CLINICALLY HEALTHY GINGIVA

THE SEVERITY OF BACTERIAEMIA DEPENDS ON THE POCKET DEPTH AND GINGIVAL INFLAMMATION

Silver JG, Martin AW, McBride BC. Experimental transient bacteraemias in human subjects with varying degrees of plaque accumulation and gingival inflammation. J Clin Periodontol 1977;4: 92-99.

amoxicillin SHOULD BE GIVEN ONE HOUR PRIOR TO INVASIVE DENTAL PROCEDURES

IN CASE OF PENICILLIN ALLERGY 600mg Clindamycin (Dalacin C) IS TO BE GIVEN

This protocol is primarly against *alpha haemolytic streptococcal infections*

Dajani AS, Taubert KA, Wilson W et al. Prevention of bacterial endocarditis. Recommendation by the American Heart Association JAMA 1997; 277: 1794-1801.

The most common cause of IE is *Streptococcus sanguis*, this is the most common and numerous member of the supragingival plaque

This bacteria can easily attach to the sterile thrombotic plaques of the endothelium

Bayliss R, Clarke C, Oakley CM et al. The microbiology and pathogenesis of infective endocarditis Br Heart J 1983; 50: 513-519.
Herzberg MC, Meyer MW. Effects of oral flora on platelets: possible consequences in cardiovascular disease. J Periodontol 1996; 67: 1138-1142.

The second most common cause of IE is *Staphylococcus aureus*, that is the primary cause of the antibiotic resistant nosocomial IE

Bayliss R, Clarke C, Oakley CM et al The microbiology and pathogenesis of infective endocarditis Br Heart J 1983; 50: 513-519.

Many times Gram negative anaerobic bacteria can be cultivated from the haemocultures of patients with IE

and also the so called periodonto- pathogenic microorganisms

Actinobacillus actinomycetemcomitans,
Eikenella corrodens,
Fusobacterium nucleatum
Capnocytophaga subsp .

Geraci JE, Wilson JR. Symposium on infective endocarditis III. Endocarditis due to Gram-negative bacteria. Report of 56 cases. Mayo Clinic Proc. 1982;57:145-148.

if serial treatments are indicated the procedures should be made in 9-14 days intervals to minimize the possibility of the development of antibiotic *resistance*

Dajani AS, Taubert KA, Wilson W et al Prevention of bacterial endocarditis. Recommendation by the American Heart Association JAMA 1997; 277: 1794-1801.

before major cardiac surgery or joint prosthesis surgeries the patients need dental prophylaxis and comprehensive dental and periodontal treatment

following surgery patients also need regular periodontal maintenance care and excellent individual oral hygiene

It is wise to use chlorhexidine rinse before dental treatments to decrease the total bacterial count in the oral cavity
nevertheless no scientific evidence support this statement

Barco CT. Prevention of infective endocarditis: a review of the medical and dental literature J Periodontol 1991;62:510-563

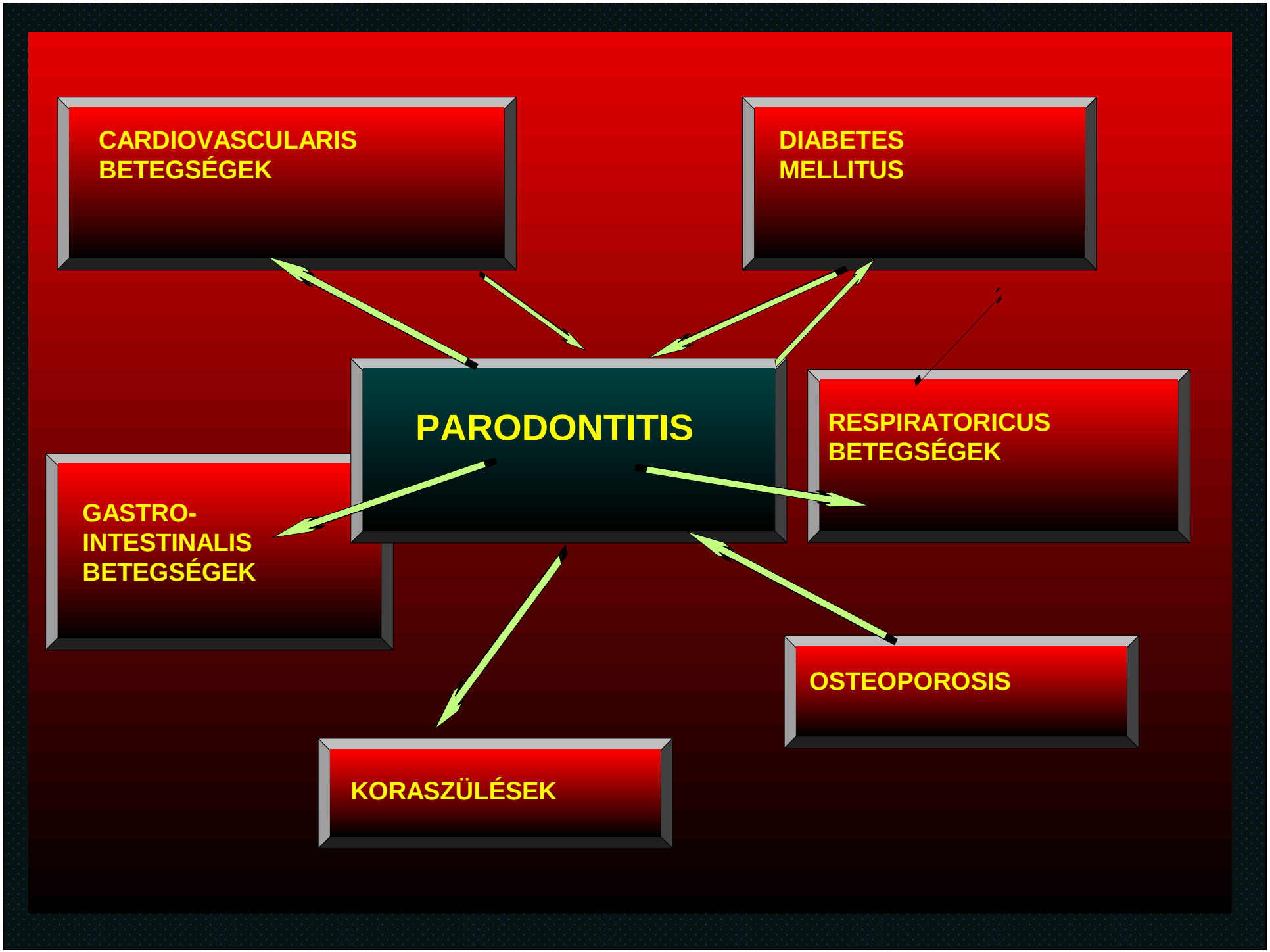
IF A NON PREDICTED GINGIVAL BLEEDING OCCURS DURING DENTAL/ PERIODONTAL PROCEDURES THE ANTIBIOTIC PROPHYLAXIS CAN BE EFFECTIVE WITHIN TWO HOURS

AFTER FOUR HOURS THE ADMINISTERED ANTIBIOTIC CANNOT EFFECTIVELY PROTECT THE SUBJECT

Dajani AS, Taubert KA, Wilson W et al. Prevention of bacterial endocarditis. Recommendation by the American Heart Association JAMA 1997; 277: 1794-1801.

THE ANTIBIOTIC PROPHYLAXIS DECREASES THE RISK TO DEVELOP IE BUT IT TOTALLY CANNOT BE ANTICIPATED

Dajani AS, Taubert KA, Wilson W és mts. Prevention of bacterial endocarditis. Recommendation by the American Heart Association JAMA 1997; 277: 1794-1801.


CARDIOVASCULARIS BETEGSÉGEK
DIABETES MELLITUS
PARODONTITIS
RESPIRATORICUS BETEGSÉGEK
GASTRO-INTESTINALIS BETEGSÉGEK
OSTEOPOROSIS
KORASZÜLÉSEK

THE DEMOGRAPHIC DATA OF NEW PATIENTS ADMITTED TO THE DEPARTMENET OF PERIODONTOLOGY IN 6 MONTHS

GENDER	**MEAN AGE**	NUMBER OF CASES
MALE	43,2	406
FEMALE	45,7	758
TOTAL	44,8	1164

ARTIFICIAL VALVE

	MALE	FEMALE
10-20	0	0
21-40	0	0
41-60	1	2
60 <	0	1
MEAN AGE	57	53
TOTAL	1	3

ENDOCARDITIS

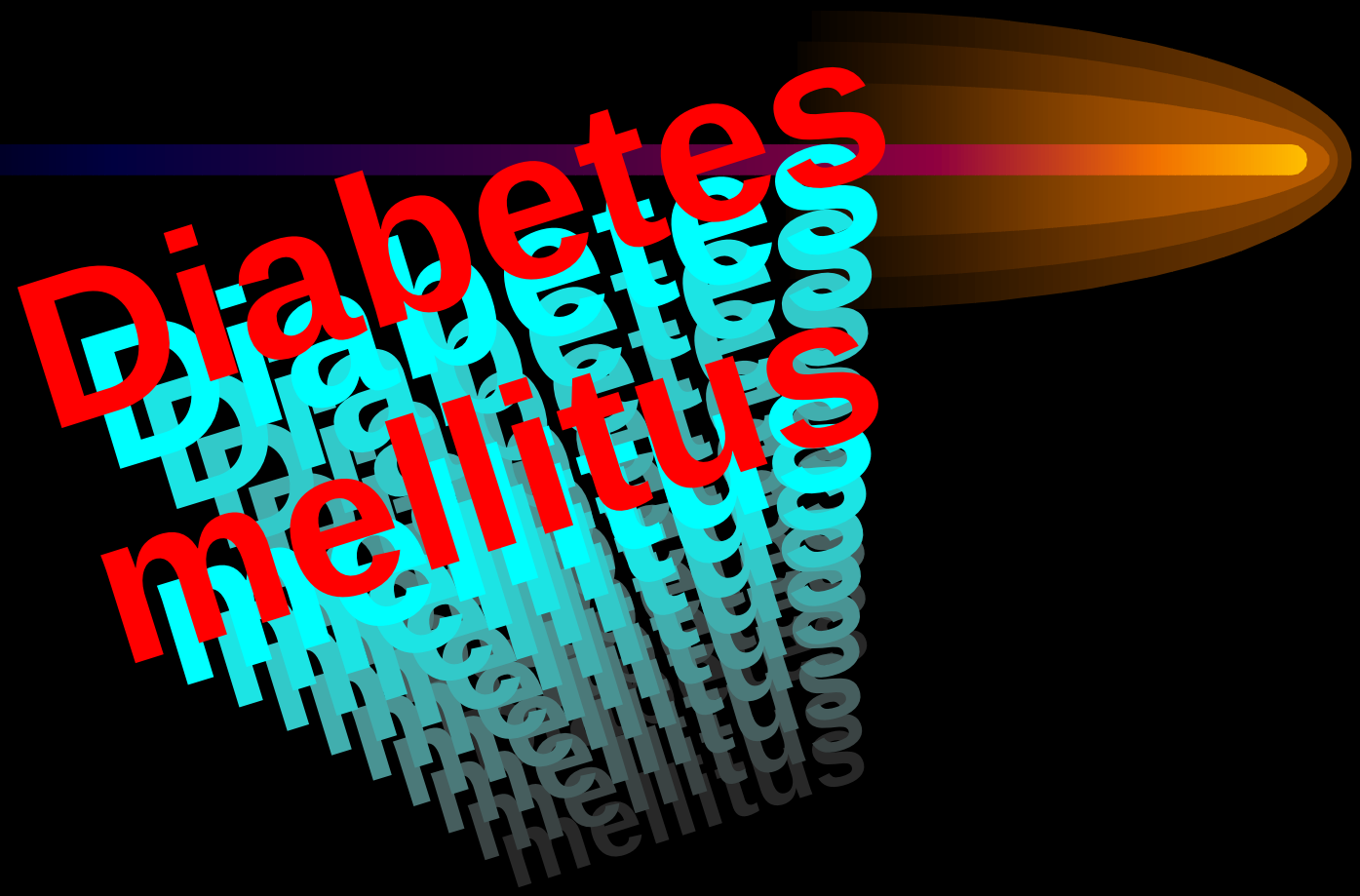
	MALE	FEMALE
10-20	0	0
21-40	0	0
41-60	3	8
60 <	2	0
MEAN AGE	58	48,5
TOTAL	5	8

OPEN HEART SURGERY

	MALE	FEMALE
10-20	0	0
21-40	0	0
41-60	2	3
60 <	1	2
MEAN AGE	63	53
TOTAL	3	5

PACEMAKER

	MA,E	FEMALE
10-20	0	0
21-40	0	0
41-60	0	0
60 <	0	5
MEAN AGE	0	71
TOTAL	0	5


Diabetes
mellitus

Diabetes, especially that of the uncontrolled IDDM is a severe risk factor in the pathogenesis of destructive periodontitis

Also the chronic destructive periodontitis has a major negative effect on the metabolic disorders in diabetes mellitus

Löe H. Periodontal disease. The sixth complication of diabetes mellitus. Diabetes care 1993; 16: 329-334.

Hugoson A, Thorstensson H, Falk H, Kuylensterna J: Periodontal conditions in insulin-dependent diabetics. J Clin Periodontol 16, 215. 1989.

Miller LS, Manwell MA, Newbold D et al. The relationship between reduction in periodontal inflammation and diabetes control: a report of 9 cases. J Periodontol 1992; 63: 343-849.

RHEUMATOID ARTHRITIS ÉS PARODONTITIS

SÚLYOS PARODONTITISBEN SZENVEDŐK KÖRÉBEN 4X NAGYOBB A VALÓSZÍNŰSÉGE ANNAK, HOGY **RA** SZEREPELJEN AZ ANAMNÉZISÜKBEN

Mercado és mts.: Is there a relationship between rheumatoid arthritis and periodontal disease ? *J Clin Periodontol 2000;27: 267-272*

PERIODONTITIS AND SYSTEMIC DISEASES

PRETERM BIRTH

CORONARY HEART DISEASE

THROMBOEMBOLC DISEASES
- MYOCARDIAL INFARCT
- STROKE

TYPE I DIABETES
TYPE II DIABETES

CAUSATIVE FACTORS :

EXCESSIVE PRO-INFLAMMATORY CYTOKINE PRODUCTION IN PERIODONTAL FOCUS

- PROSTAGLANDIN E_2
- TUMOR NECROSIS FACTOR (TNF) alfa
- INTERLEUKIN (IL) - 6

DIRECT BACTERIAEMIA

RHEUMATOID ARTHRITIS AND PERIODONTITIS

PATIENTS WITH RHEUMATOID ARTHRITIS MOSTLY HAVE SEVERE PERIODONTITIS AS WELL

PROBABLE NO CAUSATIVE CORRELATION BETWEEN THE TWO IN BOTH DISEASES THE GENETIC PRO-INFLAMMATORY PHENOTYPE CAN BE ONE OF THE RISK FACTORS

Mercado és mts: Relationship between Rheumatoid Arthritis and Periodontitis *J Periodontol 2001; 72: 779-787*

Periodontitis and type II diabetes mellitus

SEVERE PERIODONTAL INFLAMMATION INCREASES TISSUE INSULIN RESISTANCE

IN PERIODONTITIS THE GRAM-NEGATIVE INFECTION AND CHRONIC ENDOTOXEMIA ELEVATE TISSUE INSULIN RESISTANCE AND WORSENS PATIENTS' METABOLIC CONTROLS

Grossi és mts. Response to periodontal therapy in diabetics and smokers *J Periodontol 1996; 67: 1094-1102*

Periodontitis and type II diabetes mellitus metabolic control

successful comprehensive periodontal therapy and regular periodontal maintenance in patients with type II DM potentiated the effect of anti-hyperglycamic therapy

Stewart et al. The effect of periodontal treatment on glycemic control in patients with type 2 diabetes mellitus *J Clin Periodontol 2001; 28: 306-310*

Iwamoto Y et al: The effect of antimicrobial periodontal treatment on circulating tumor necrosis factor alpha and glycated hemoglobin level in patients with Type 2 diabetes *J. Periodontol 2001;72: 774-778.*

Periodontitis and chronic respiratory diseases

bacteria being responsible for periodontitis might be directly or indirectly risk factors for upper respiratory diseases

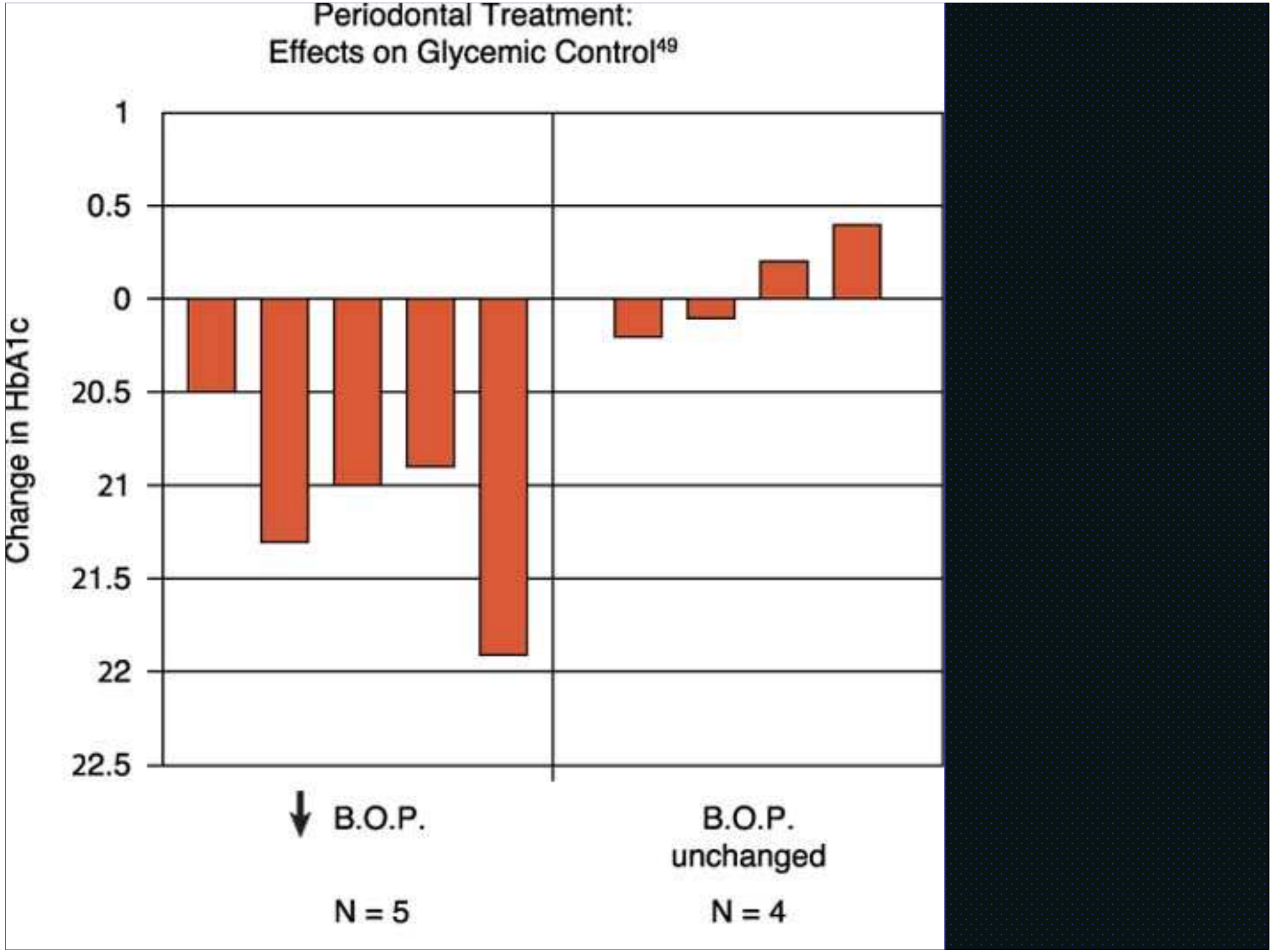
Scannapio FA, et al.: Relationship between periodontal disease and bacterial pneumonia. J. Periodontol 1996; 67(Suppl): 1114 -1122

Scannapio FA, Role of oral bacteria in respiratory infections J. Periodontol 1999; 70: 793-802

Periodontitis and chronic respiratory diseases

The data base of the III. National Health and Nutrition Examination Survey in the USA indicated that the presence of severe periodontitis increased the incidence of upper respiratory diseases by 50%

Scannapio FA, et al.: Potential associations between chronic respiratory disease and periodontal disease: Analysis of National Health and Nutrition Examination Survey III. J. Periodontol 2001; 72: 50 -56.


Periodontal Treatment:
Effects on Glycemic Control[49]
Change in HbA1c
1
0.5
0
20.5
21
21.5
22
22.5
B.O.P.
N = 5
B.O.P.
unchanged
N = 4