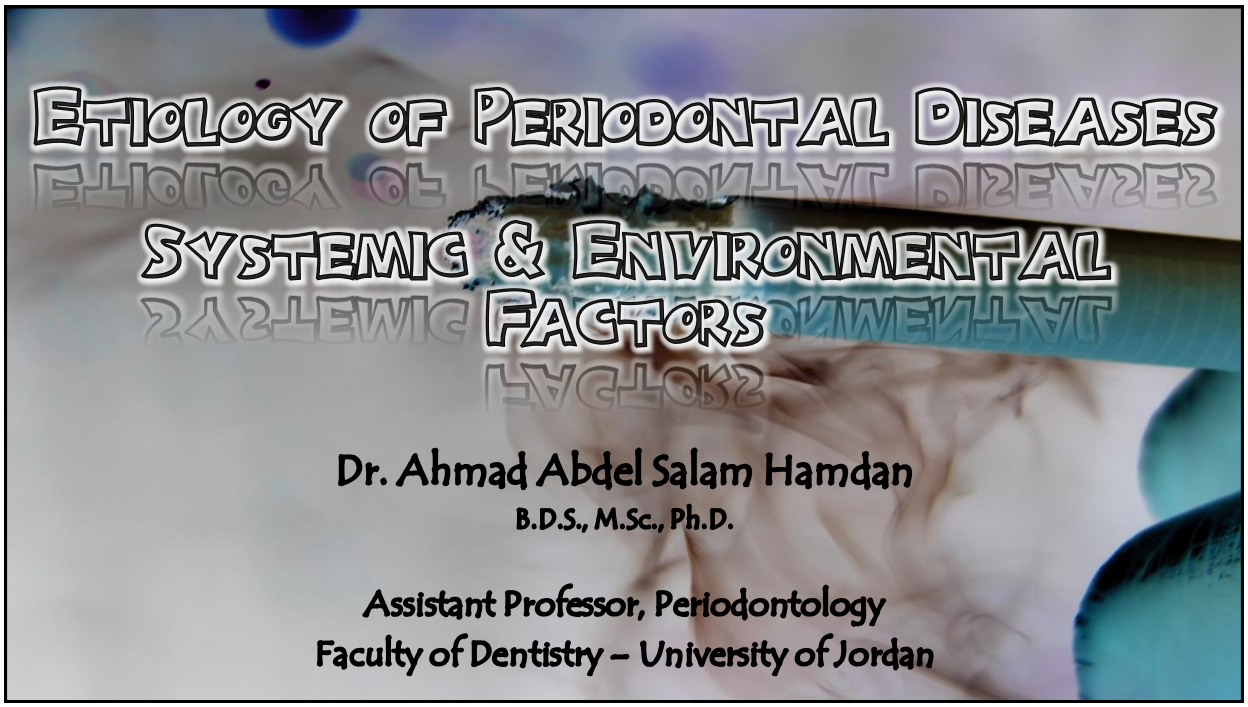
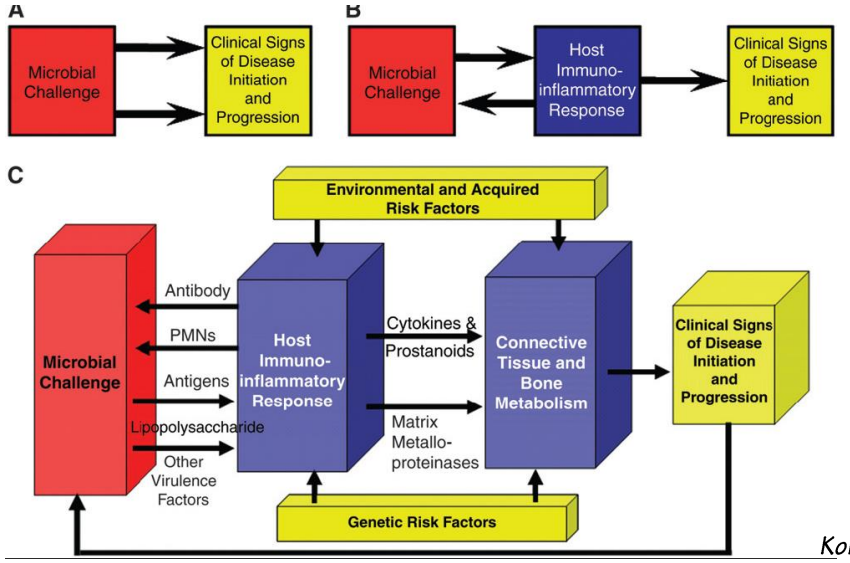


Dr. Ahmad Abdel Salam Hamdan
B.D.S., M.Sc., Ph.D.

Assistant Professor, Periodontology
Faculty of Dentistry – University of Jordan

Introduction

Introduction



Kornman KS, 2008

Introduction

A number of environmental, physical, & psychological factors have the potential to alter periodontal tissue & host immune response, resulting in more severe periodontal disease expression.

Klokkevold PR & Mealey BL

Introduction

- Systemic & Environmental Factors
  - Modifiable
    - **Diabetes Mellitus**
    - **Smoking**
    - **Stress & psychological factors**
  - Non-modifiable
    - **Genetic factors**
    - **Puberty, pregnancy, & the menopause**

Introduction

- They have profound effects on the host
  - Physiological response
  - Vascular system
  - Inflammatory response
  - Immune system
  - Tissue repair

Introduction

They have the potential to modify

- Susceptibility to disease
- Plaque microbiota
- Clinical presentation of periodontal disease
- Disease progression
- Response to treatment

Diabetes Mellitus

Diabetes Mellitus… Types

- Diabetes mellitus type 1
  - Destruction of insulin-producing β cells
  - 10-20% of patients with DM
  - Diagnosis before age of 21 years
- Diabetes mellitus type 2
  - Insulin resistance
  - Reduction in insulin production
  - Onset of symptoms is gradual (after 40 years)

Diabetes Mellitus… Clinical Symptoms

- Hyperglycemia
  - Polyuria
  - Polydipsia
  - Polyphagia
  - Pruritis
  - Weakness
  - Fatigue

Diabetes Mellitus… Complications

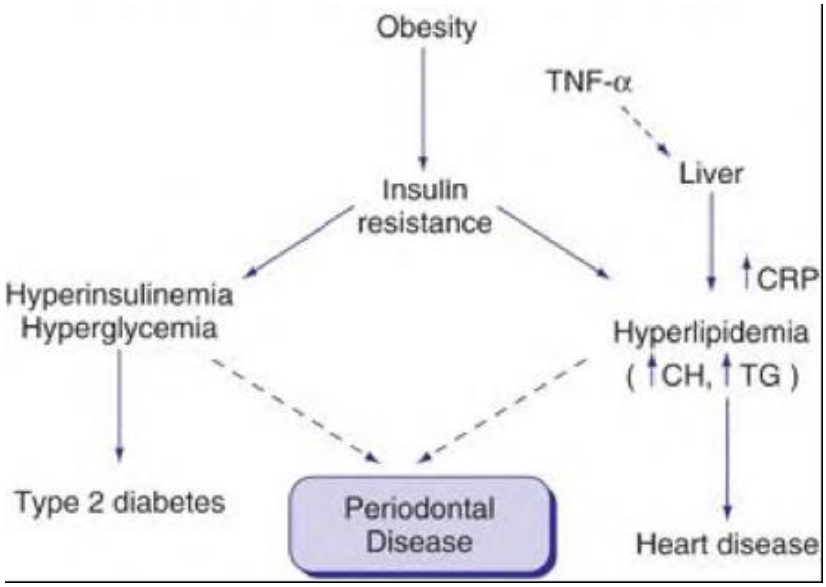
- Retinopathy
- Nephropathy
- Neuropathy
- Macrovascular disease
- Impaired wound healing

Diabetes Mellitus… Oral & Periodontal Effects

- Diminished salivary flow
- Burning mouth or tongue
- Xerostomia (Oral Hypoglycemic Drugs)
- Candidiasis
- Clinical attachment loss

… Association of Periodontal Infection & Diabetic Control

Insulin resistance



Impaired tissue response via immunce cell alterations:

↑ IL-1β, TNF-α by MØ

↑ IL-1β, TNF-α by PMNs

↓ PDGF, TGF-β1, bFGF by macrophages

Periodontitis

(↑ IL-1β, TNF-α)

↑ LDL / TRG

Diabetes

Genetics / High fat diet

Further augmentation of serum lipids

Further impairment of Tissue response

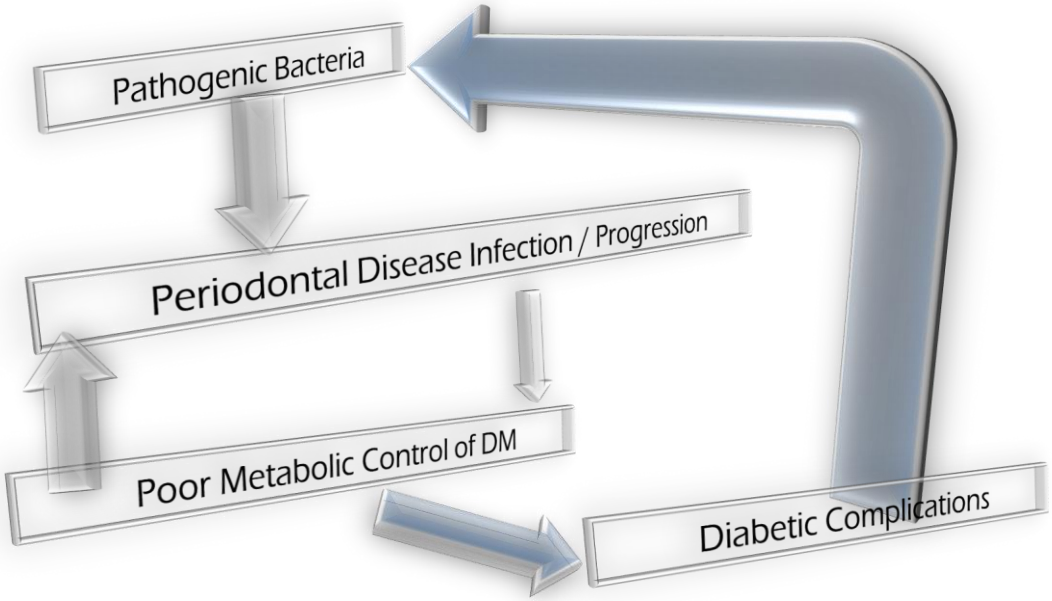
Exacerbated periodontitis

(↑++ IL-1β, TNF-α)

Systemic diseases

Metabolic disturbances

… Association of Periodontal Infection & Diabetic Control



… Modification of the Host-Bacteria Relationship in Diabetes

Effects on microbiota

- Increase in the proportions of pathogenic species

Effects on the host response

- PMNs
- Cytokines, Monocytes, & Macrophages
- Connective Tissue

… Modification of the Host-Bacteria Relationship in Diabetes

Effects on PMNs

- Reduced function
- Defective chemotaxis
- Increased collagenase activity in crevicular fluid
- Increased levels of β–glucoronidase & elastase

… Modification of the Host-Bacteria Relationship in Diabetes

Effects on Cytokines, Monocytes, & Macrophages

- Higher levels of IL-1β & PGE_2 in crevicular fluid
- Increased release of IL-1β, PGE_2 & TNF-α by monocytes
- Binding of AGEs to macrophages & monocytes
  - **Destructive cell phenotype**
  - **Increased sensitivity to stimuli**
  - **Excessive release of cytokines**

… Modification of the Host-Bacteria Relationship in Diabetes

Effects on Connective Tissue

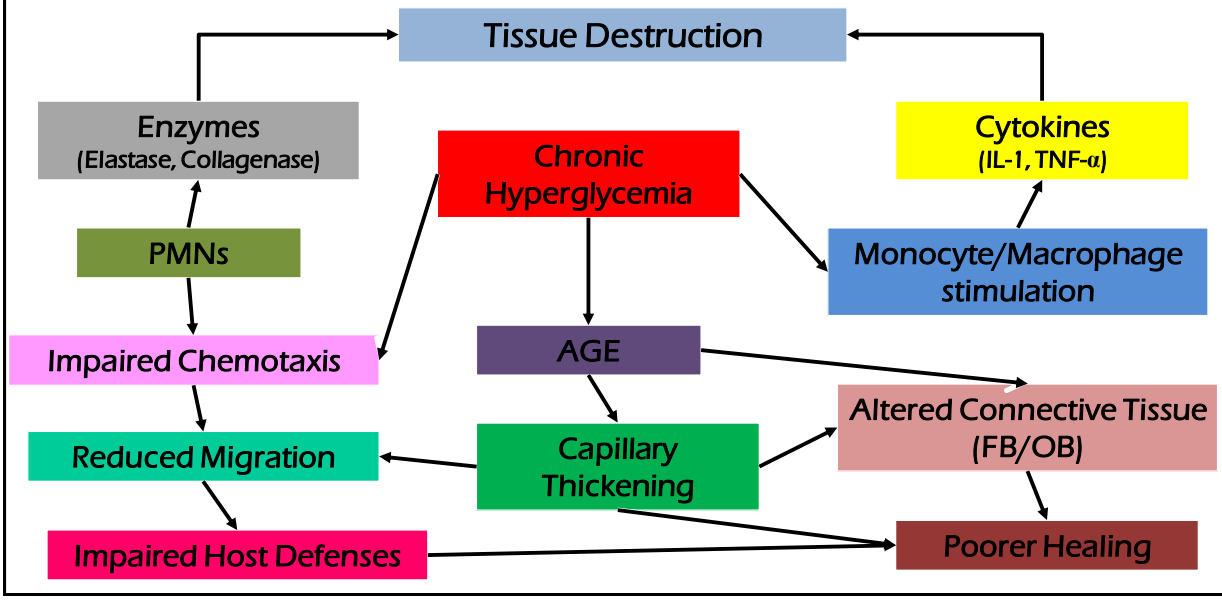
- Reduced growth, proliferation, & differentiation of FB & OB
- Reduced matrix synthesis by FB & OB
- Formation of reactive oxygen species damaging cellular function (oxidative stress)
- Altered collagen metabolism due to AGE accumulation
  - **Vascular changes (thickening of capillary basement membrane)**

… Modification of the Host-Bacteria Relationship in Diabetes

Effects on Healing & Treatment Response

- Decreased synthesis of collagen by FB
- Increased degradation by collagenase
- Glycosylation of existing collagen at wound margins
- Defective remodeling & rapid degradation of newly synthesized, poorly cross-linked collagen

... Modification of the Host-Bacteria Relationship in Diabetes



Puberty, Pregnancy, & The Menopause

Puberty, Pregnancy, & The Menopause

Effects of Estrogen & Progesterone on the periodontium

- Affect salivary peroxidases (Estrogen)
- Stimulate collagen metabolism & angiogenesis (Estrogen)
- Trigger autocrine or paracrine GF signaling pathways (Estrogen)
- Modulate vascular responses & connective tissue turnover in the periodontium (Estrogen & Progesterone)
- Interaction with inflammatory mediators (Estrogen & Progesterone)

Puberty, Pregnancy, & The Menopause… Puberty & Menstruation

Increase in gingival inflammation
No change in plaque levels

Differences between studies (related to study designs)

Prevotella intermedia (can use progesterone as nutrient)

Increased inflammation during menstruation

Puberty, Pregnancy, & The Menopause… Pregnancy

- Pregnancy gingivitis
  - Increase in BoP, PD, Crevicular Fluid Flow
- More significant during 2nd & 3rd trimesters
- Effects on the microbiota
  - Increase in growth of periodontal pathogens (*P. intermedia*)

Puberty, Pregnancy, & The Menopause… Pregnancy

- Effects on the tissues & host response
  - Increased capillary permeability & dilatation (increased gingival exudate)
  - Stimulation of prostaglandin synthesis
  - Decreased keratinization of the gingiva
  - Increased epithelial glycogen
  - Suppression of the immune response to plaque
    - **Suppression of PMN chemotaxis & phagocytosis**
    - **Suppression of antibody & T cell responses**

Puberty, Pregnancy, & The Menopause… Pregnancy

- Pregnancy granuloma or epulis
  - Pedunculated, fibro-granulomatous lesion
  - Bright red, hyperemic, & edematous
  - Interdental papillae (max. ant. teeth)
  - Regression after parturition
  - Recurrence after surgical removal during pregnancy
  - Good oral hygiene & debridement (during pregnancy)

Puberty, Pregnancy, & The Menopause… Menopause & Osteoporosis

- Reduction of hormonal levels
- Desquamation of gingival epithelium
- Osteoporosis
  - Reduction in bone density
  - Prevented by estrogen replacement therapy
  - Lower risk of tooth loss with replacement therapy
- Effect of smoking on osteoporosis
  - Increased levels of FSH & LH (reduction in estrogen)

Puberty, Pregnancy, & The Menopause… Hormonal Contraceptives

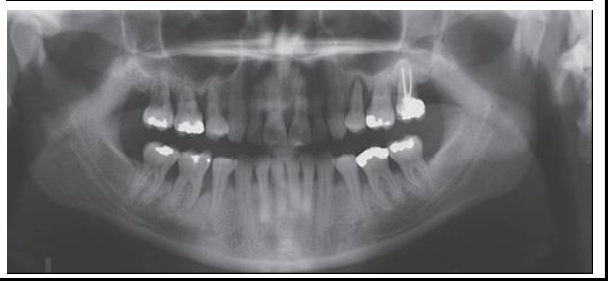
- Similar to pregnancy but less dramatic
  - Increased gingival inflammation
  - Increased gingival exudate
- Increase in tissue breakdown with long-term use

Tobacco Smoking

Smoking

Effects of nicotine

- Increase in blood pressure
- Increase in heart rate
- Increase in respiratory rate
- Decrease in skin temperature



Smoking

Periodontal disease in smokers

- Necrotizing periodontal diseases (NUG & NUP)
- Poorer oral hygiene
- Higher levels of periodontal destruction

- Deeper probing depths & larger number of deep pockets
- More attachment loss with more recession
- More alveolar bone loss
- More tooth loss
- Less gingivitis & less BoP
- More furcation involvement

Smoking… Modification of the host-bacteria relationship in smoking

Effects on plaque bacteria

- Higher levels of plaque
- Higher counts of periodontal pathogens
- Higher proportion of sites harboring periodontal pathogens

Smoking… Modification of the host-bacteria relationship in smoking

Effects on the host response

- Retarded inflammation
- Lower amounts of crevicular fluids
- Fewer blood vessels

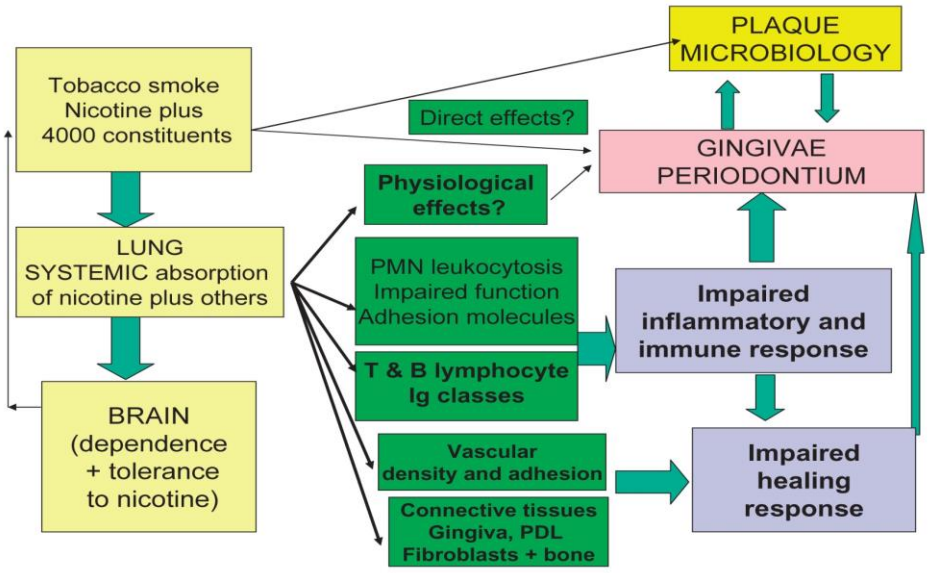
- Increased number of leukocytes in the circulation (fewer in gingiva)
- Inhibition of neutrophil & monocyte/macrophage functions
- Generation of reactive oxygen species
- Alteration in the migration of leukocytes
- Alteration in the levels of PMNs enzymes
- Alteration in T & B cell functions

Smoking… Modification of the host-bacteria relationship in smoking

Effects on healing & treatment response

- Poorer reduction in PD & gains in CAL
- Impairment & retardation of tissue healing

Smoking… Modification of the host-bacteria relationship in smoking



Thank You…