



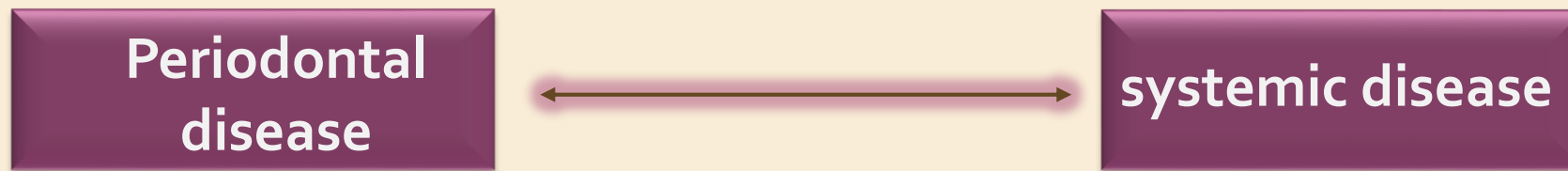
Second Semester-Impact of Periodontal Infection on Systemic Health

Lec.15



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- Periodontal disease is an infectious disease but certain systemic conditions may effect the initiation and progression of the condition.
- Evidence have shed light on the converse side of the relation.



Focal Infection Theory Revised

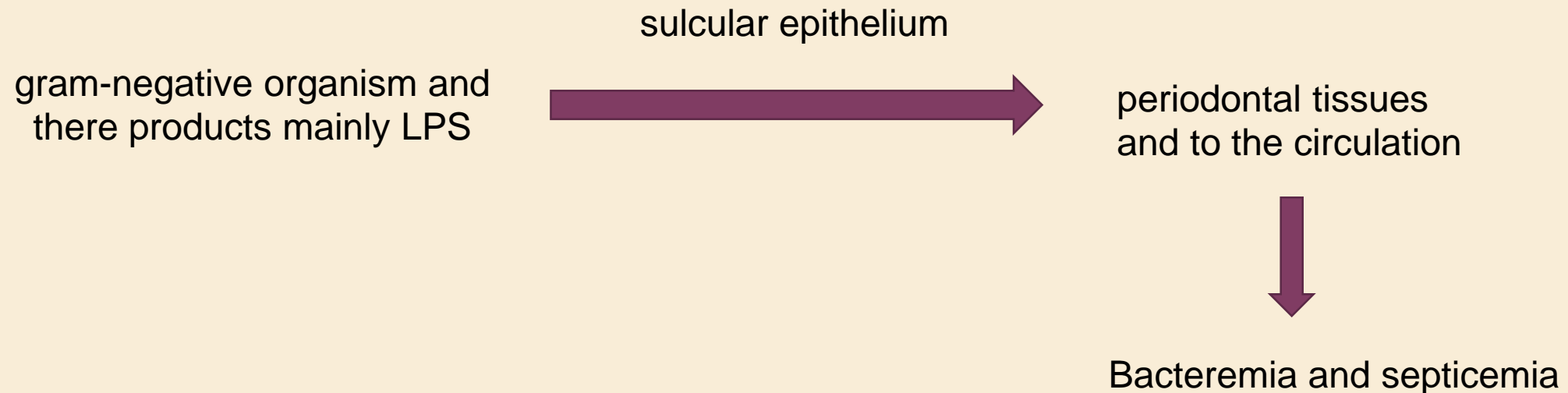
- ❖ **William Hunter** first developed the idea that focal oral infection (gingivitis, abscess) were responsible for a wide range of systemic conditions.

He thought that oral organisms had specific actions on different tissues and that these organisms acted by producing toxins, thereby resulting in low-grade “subinfections” that produced systemic effects over prolonged periods.

- ❖ The degree of systemic effect produced by oral sepsis depended on the virulence of the oral infection and the individual’s degree of resistance.
- ❖ Finally, Hunter thought that the connection between oral sepsis and resulting systemic conditions could be shown via removal of the causative sepsis through tooth extraction and observation of the improvement in systemic health.

Subgingival Environment as a Reservoir for Bacteria

The subgingival microbiota in patients with periodontitis provides a significant and persistent gram-negative bacterial challenge to the host. These organisms and their products, such as LPSs, have access to the periodontal tissues and to the circulation via ulcerations in the sulcular epithelium.



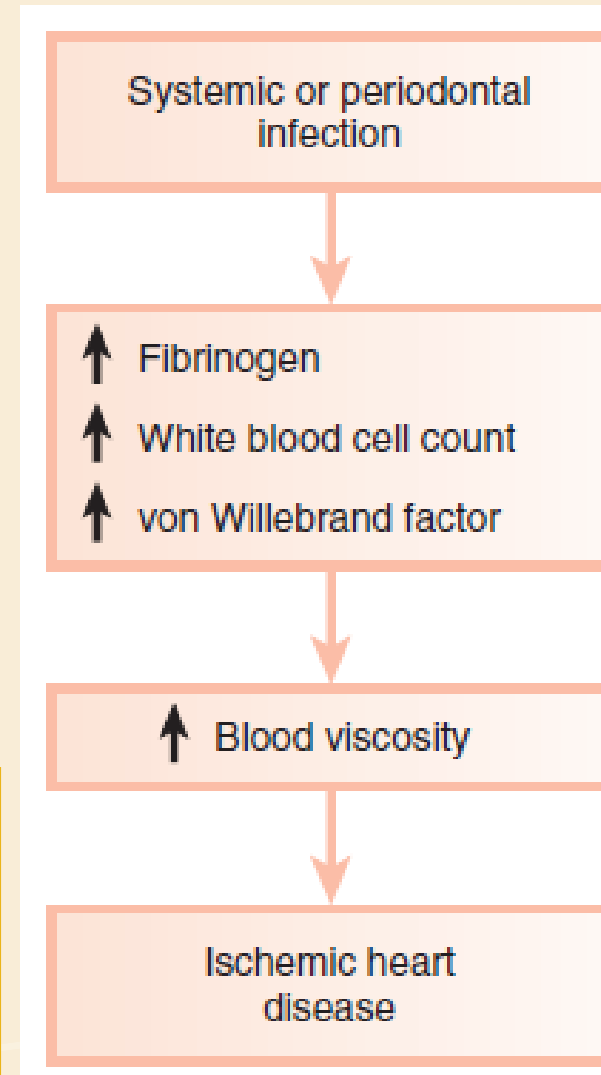
Periodontal Disease, Coronary Heart Disease, and Atherosclerosis

CHD-related events are a major cause of death.

- MI has been associated with acute systemic bacterial and viral infections and is sometimes preceded by influenza-like symptoms
- **Localized infection that results in a chronic inflammatory reaction** has been suggested as a mechanism underlying CHD in these individuals.
- This association between poor dental health and MI was independent of known risk factors for heart disease, such as age, cholesterol levels, hypertension, diabetes, and smoking.

Periodontal infection may effect the onset of progression of atherosclerosis and CHD through certain mechanism

1. Increasing viscosity of blood
2. Thrombus formation
3. Embolization

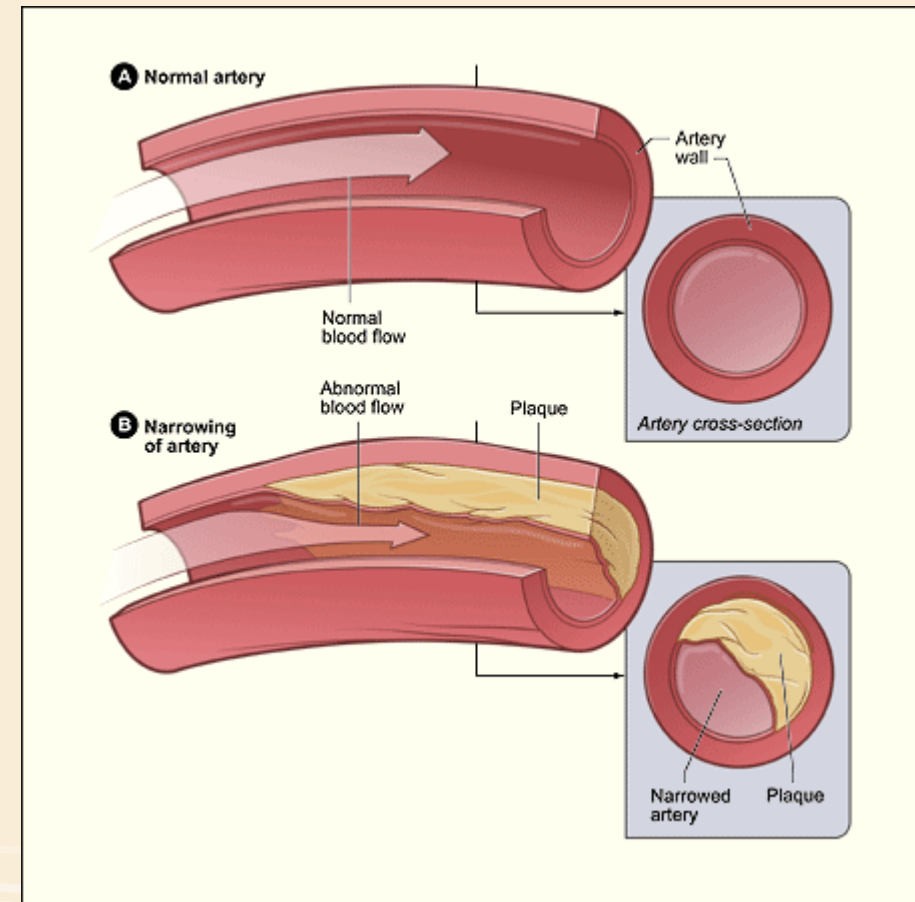
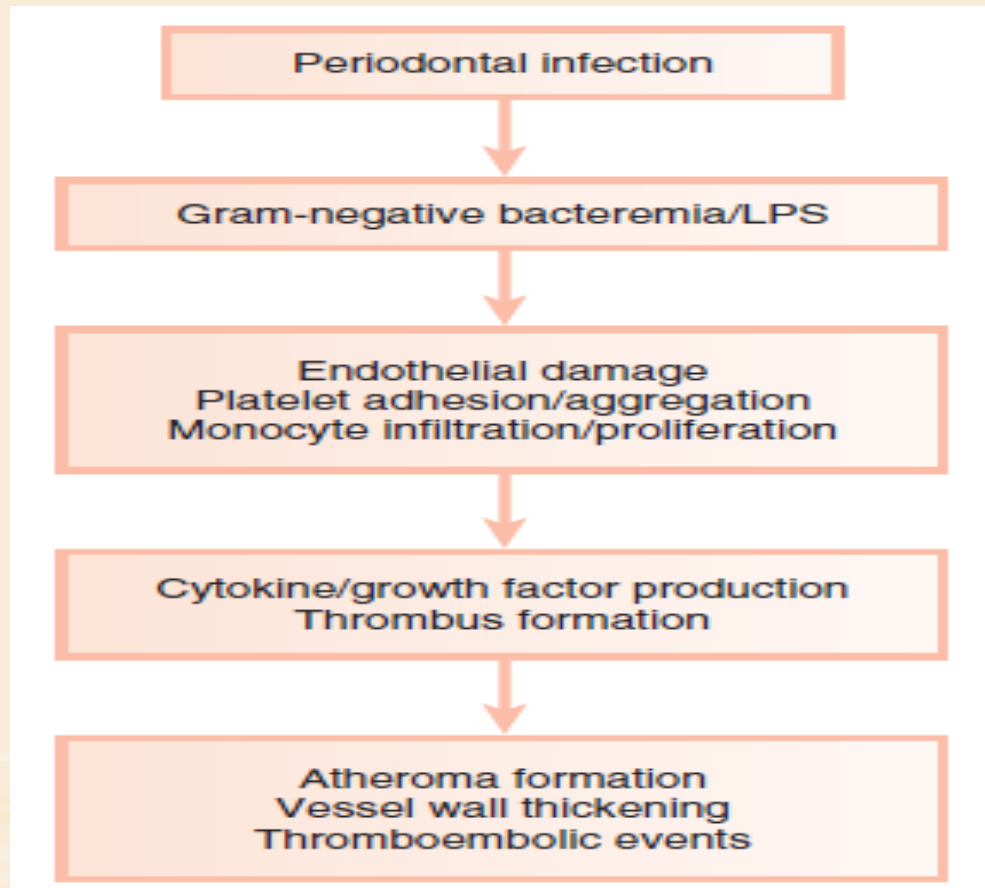


Daily Activity

- The exposure time to bacteremia from routine daily activities such as mastication and oral hygiene procedures (tooth brushing) is much greater than from dental procedure. so there is a greater risk of bacteremia after toothbrushing in patients with higher levels of plaque, calculus, and gingivitis as compared with those with minimal plaque and gingival inflammation.
- An estimated 8% of all cases of infective endocarditis are associated with periodontal or dental disease without a preceding dental procedure.
- The periodontium, when affected by periodontitis, also acts as a reservoir of endotoxins (LPSs) from gram-negative organisms. Endotoxins can pass readily into the systemic circulation during normal daily function.
- Furthermore, the concentration of endotoxin in the bloodstream was more than fourfold greater in those with periodontitis as compared with healthy subjects.

Atherosclerosis

- ❖ Atherosclerosis is a focal thickening of the arterial intima, the innermost layer lining the vessel lumen, and the media, the thick layer under the intima that consists of smooth muscle, collagen, and elastic fibers



Role of Periodontal Disease in Atherosclerotic Myocardial or Cerebral Ischemia

There is strong evidence that periodontal bacteria disseminate from the oral cavity to the systemic vasculature, can be found within distant tissues, and can live within those affected tissues.

Furthermore, in animal models, dissemination of periodontal bacteria can induce atherosclerosis in distant vessels. Patients with periodontitis are at increased risk for thickening of the walls of the major coronary arteries.

Periodontal infection may contribute directly to the pathogenesis of atherosclerosis by providing a persistent bacterial challenge to the arterial endothelium, thereby contributing to the monocyte- and macrophage-driven inflammatory process that results in atheromatosis and narrowing of the vessel lumen.

Periodontal Disease and Stroke

- ❖ Ischemic cerebral infarction, or stroke, is often preceded by systemic bacterial or viral infection. In one study, patients with cerebral ischemia were five times more likely to have had a systemic infection within 1 week before the ischemic event than nonischemic control subjects.

Periodontal Infection Associated With Stroke

- **Stroke is classified as either hemorrhagic or non hemorrhagic.**

1. Non hemorrhagic stroke, or ischemic stroke, is usually caused by thromboembolic events and cerebrovascular atherosclerosis,
 2. Hemorrhagic stroke often results from a vascular bleed such as an aneurysm.
- Periodontal disease has been associated primarily with an increased risk of non hemorrhagic stroke.

- ❖ periodontal infection may stimulate a series of indirect systemic effects, such as elevated production of fibrinogen and CRP, which increases the risk of stroke.

- ❖ Bacteremia with (PAAP) positive bacterial strains from supragingival and subgingival plaque can increase platelet aggregation, thereby contributing to thrombus formation and subsequent thromboembolism, which is the leading cause of stroke.

Periodontal Disease and Diabetes Mellitus

Periodontal disease was designated as the “sixth complication” of diabetes because of the increased prevalence and severity of periodontitis typically seen in patients with diabetes, especially those with poor metabolic control.

The American Diabetes Association has officially recognized that periodontal disease is common among patients with diabetes.

A large number of studies have examined the impact of periodontal therapy on glycemic control in patients with diabetes. Most of these studies compared scaling and root planing (with or without adjunctive systemic antibiotics) with no periodontal therapy and followed patients for several months to assess changes in glycemic control measured by glycated hemoglobin (HbA1c) values.

Others included in the treatment regimen not only scaling and root planing but also extraction of periodontally hopeless teeth and even periodontal surgery.

- ✓ Many of these studies showed a significant improvement in glycemic control, as determined by reductions in HbA1c values.

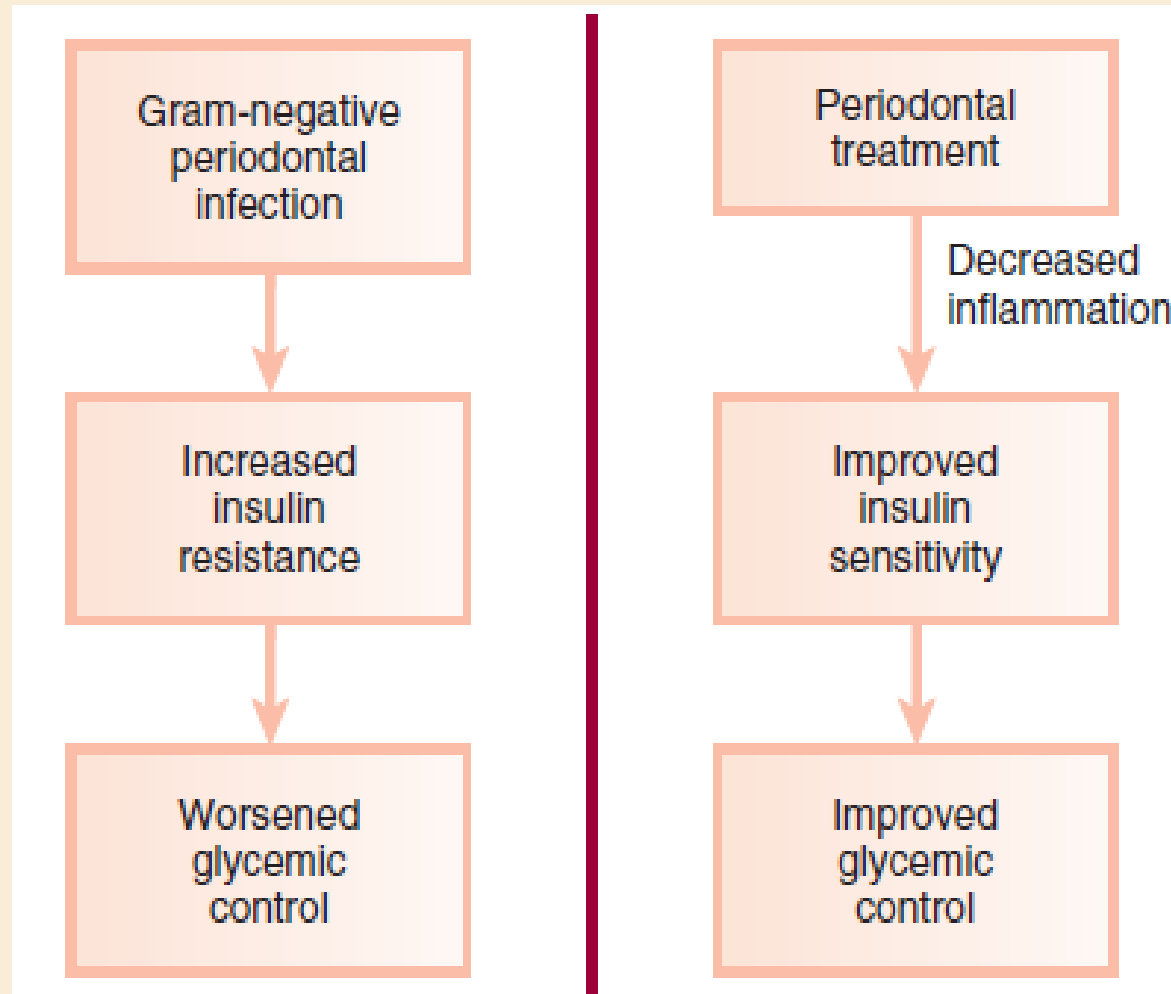
Periodontal Infection Associated With Glycemic Control in Diabetes

It is well known that systemic inflammation plays a major role in insulin sensitivity and glucose dynamics

In patients with periodontitis, persistent systemic challenge with periodontopathic bacteria and their products results in an up-regulation of the immunoinflammatory response, with elevation in serum levels of proinflammatory mediators such as IL-1 β , TNF- α , and IL-6

Increased serum levels of several cytokines, including TNF- α and IL-6, are associated with increased insulin resistance. This mechanism would explain the worsening of glycemic control associated with severe periodontitis.

- ❑ The improved glycemic control seen in many studies of periodontal therapy would support such a hypothesis.



Potential effects of periodontal infection and periodontal therapy on glycemia in patients with diabetes

Complications of Diabetes Mellitus

1. Retinopathy
2. Nephropathy
3. Neuropathy
4. Macrovascular disease
5. Altered wound healing
6. Periodontal disease



Thank you for your attention