



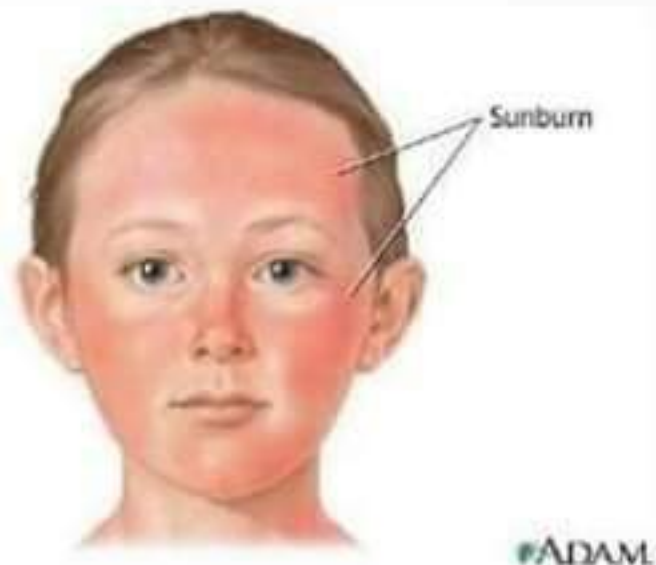
What is Inflammation?

- Inflammation is the body's first response to an injury.
- The first phase (acute inflammation) includes redness, swelling, heat, and altered function. It is self-perpetuating.
- There are several biological markers of inflammation in your blood, including C-reactive protein (CRP).
 - CRP is a protein found in the blood which can rise in response to inflammation.
 - Acute inflammation often causes elevated C-reactive protein.
 - Elevated CRP is a risk factor for several chronic inflammatory diseases.
- Inflammation appears to be a common link between several common diseases of aging.
 - These diseases include heart disease, arthritis, and periodontitis.



Examples of Inflammation

- Sunburn
- Infection
- A cut on the skin





Inflammation's Objective

- Inflammation tries to contain the injury to the local site.
- The body's reaction is immediate (called the innate response).
- Its ultimate purpose is to protect the body from further damage.



Inflammation is Damaging when Uncontrolled

- Though inflammation can be helpful under certain conditions, uncontrolled inflammation, also called chronic inflammation, is harmful and causes tissue loss.
- Chronic inflammation occurs when there is a sustained infection, like periodontitis.
- Chronic inflammation involves more inflammatory mediators than the immediate innate response.



Chronic Inflammation

- Chronic inflammation can negatively affect all organs and tissues of the body.
- Chronic diseases of aging are connected through common chronic inflammatory mechanisms.



Periodontal Paradigm Shift:

Because of this new focus on inflammation, there has been a shift in the way periodontists view periodontal disease and its relationship to other disease states.



Periodontitis is a Chronic Inflammatory Disease of Aging

- Periodontitis involves a microbial challenge to the gums which stimulates an inflammatory response
- Genetic and acquired risk factors lead to immuno-inflammatory response
- A prolonged immuno-inflammatory response leads to destruction of connective and bone tissues, which leads to the possible loss of teeth.
- Chronic inflammatory diseases, such as periodontitis, arise over decades.
- Periodontal disease is a significant contributor to the total inflammatory burden on your body and can adversely affect your systemic health.



Workshop, cont.

- The workshop was developed to expand and advance our understanding of inflammation and the role it plays in diseases of aging.
- The experts from the diverse fields addressed topics of inflammation:
 - What is inflammation?
 - What specific mechanisms constitute inflammation?
 - What factors regulate inflammation?
 - Why do individuals have different expression levels of inflammation?
 - Is the inflammation in one disease common to the inflammation in other diseases?



Workshop, cont.

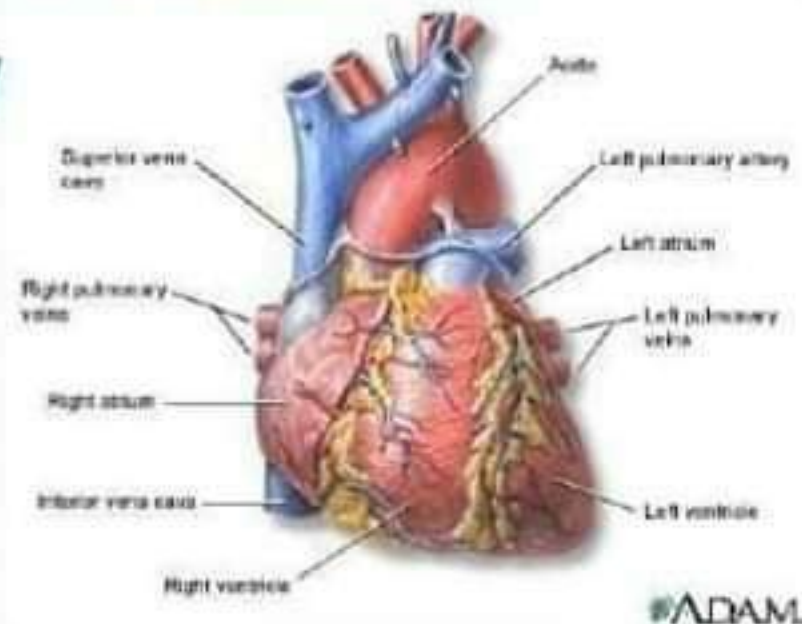


- What we learned:
 - Periodontal disease is a bacterially-induced chronic inflammatory disease that does not resolve by itself.
 - The inflammatory response is extremely complex .
 - Environmental and genetic factors affect expression of inflammation in individuals .
 - The initiation and resolution of inflammation are well controlled processes.
 - Diabetes, CVD, and stroke all share common inflammatory processes similar to periodontal inflammation.
 - Resolution of any inflammation in the body is helpful for overall health.



Cardiovascular Disease: A Quick Overview

- Cardiovascular disease generally refers to conditions that involve narrowed or blocked blood vessels that can lead to a heart attack, chest pain (angina), or stroke.
- The American Heart Association reports that cardiovascular disease is the leading killer of men and women in the United States.





Inflammation and CVD

- Inflammation contributes to heart attacks as much as or more than cholesterol.*
- Atherosclerosis always begins with injury to the endothelium of blood vessels.
 - Periodontal pathogens have been found in atherosclerotic lesions.



Periodontal Disease and CVD

- Data derived from meta-analysis:

- Five prospective cohort studies
- Five cross sectional studies
- Five case control studies

meta-analysis combines the results of several studies that address a set of related research hypotheses

Ability to control for between-study variation

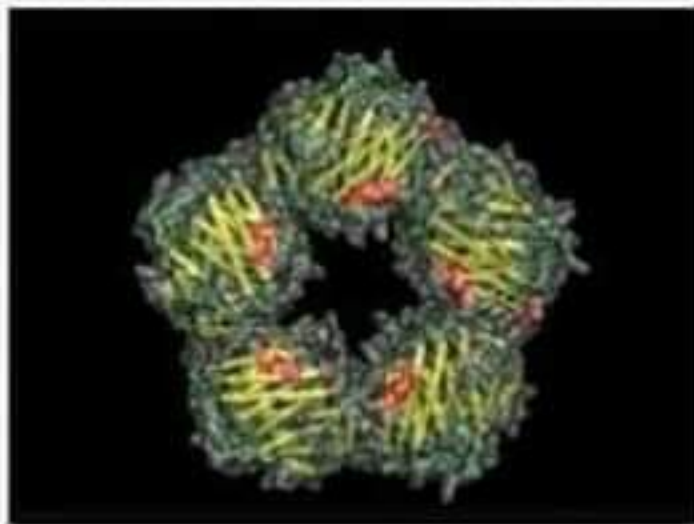
- Subjects with periodontitis had a 1.14 - 1.59 fold greater risk for developing CVD compared to those without periodontitis.

- Adjustments made for risk factors: smoking, diabetes, alcohol intake, obesity and blood pressure



C-Reactive Protein (CRP)

- CRP is a protein found in the blood that reflects the amount of inflammation in your body.
- Periodontitis and other sources of inflammation elevate CRP levels.
- Elevated CRP is a direct risk factor for CVD.





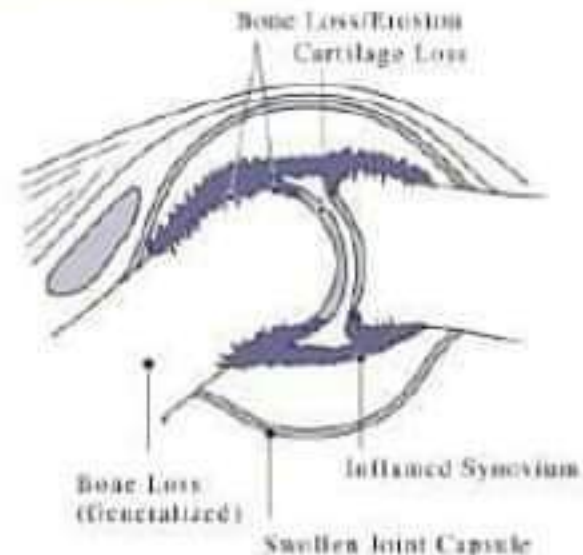
The Relationship of Periodontal Disease to other Chronic Inflammatory Diseases of Aging

- Cardiovascular disease
- Arthritis
- Diabetes
- Alzheimer's Disease
- Cancers



Arthritis

Joint Affected by Rheumatoid Arthritis



Source: National Institutes of Health

- Arthritis (Rheumatoid arthritis and osteoarthritis) is an inflammation of the joints.
- Patients with arthritis have a higher incidence of periodontal disease compared to healthy controls.*
- Periodontal treatment decreases arthritis parameters:**
 - Patients' number of swollen and tender joints decreased following periodontal treatment.
 - Patients' assessment of pain also decreased following periodontal treatment.

*Pischon N, et al. J Periodontol. 2008 Jun;79(6):979-86.

**Ortiz P, et al. J Periodontol. 2009 Apr;80(4):535-40.



Diabetes

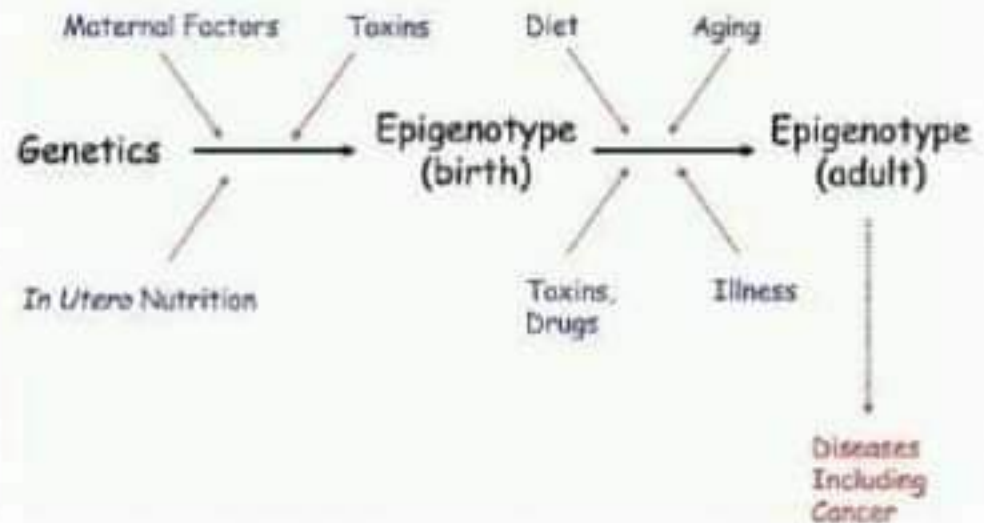
- Worldwide incidence is expected to increase with increased prevalence of obesity.
- Major public health burden because of serious microvascular sequelae.
 - nephropathy
 - retinopathy
 - neuropathy
 - cardiovascular disease
 - periodontitis
- Total annual costs exceed \$132 billion in US alone



Risk Factors for Diabetes

- Genetics
- Diet
- Sedentary lifestyle
- Perinatal environment
- Age
- Obesity
- **Chronic Inflammation**
 - Type I and Type II Diabetes

Environmental Factors Affecting the Epigenome





Cancers

- Pancreatic cancer
 - Men with a history of gum disease are 54% more likely to develop pancreatic cancer than men with healthy gums.*
- Head and neck cancers
 - Chronic periodontitis is independently associated with the incidence of head and neck cancers.**
 - Smoking increases this association.

*Michaud DS, et al. Lancet Oncol. 2008 Jun;9(6):550-8. Epub 2008 May 5.

**Tezal M, et al. Cancer Epidemiol Biomarkers Prev. 2009 Sep;18(9):2406-12.



Inflammation: 5 things to remember

1. There has been a paradigm shift in the field of periodontology.

Periodontal disease today is defined by the **inflammatory response** to the biologic components of plaque.

Other Inflammatory Diseases

- Asthma and other chronic respiratory diseases
- Osteoporosis
- Kidney disease
- Metabolic syndrome





Inflammation: 5 things to remember

5. Dentists and physicians need to work together to ensure the best health of their patients.





Inflammation: 5 things to remember

4. Reducing inflammation in the body can reduce the occurrence and severity of chronic inflammatory diseases.

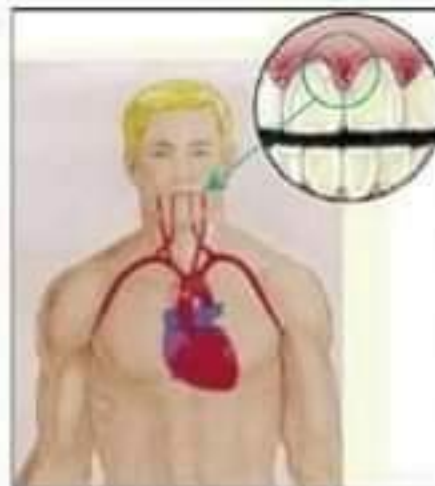




Inflammation: 5 things to remember

2. The relationship between periodontal disease and other chronic inflammatory diseases of aging is better understood.

These diseases include cardiovascular disease, respiratory diseases, diabetes and arthritis.





Inflammation: 5 things to remember

3. Treatment of chronic oral inflammation should be done by trained dental professionals.

Co-management with periodontal specialists to help in evaluating, diagnosing, and treating periodontal inflammation and disease.





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