# The Impact of Smoking on Periodontium

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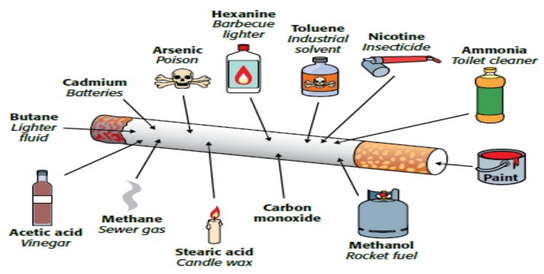
## INTRODUCTION

Smoking is associated with a broad spectrum of diseases, including Stroke, Coronary artery diseases, peripheral artery diseases, Chronic Obstructive Pulmonary Disease, Carcinoma of the Oral cavity, Larynx, Esophagus, Lungs, and Pancreas. A direct relationship between smoking exposure and the prevalence and the severity of the periodontal disease has been firmly established (American Academy of Periodontology 1996).

## CONSTITUENT OF TOBACCO SMOKE

Cigarette smoke consists of a very complex mixture of substances with over 4000 known constituents.



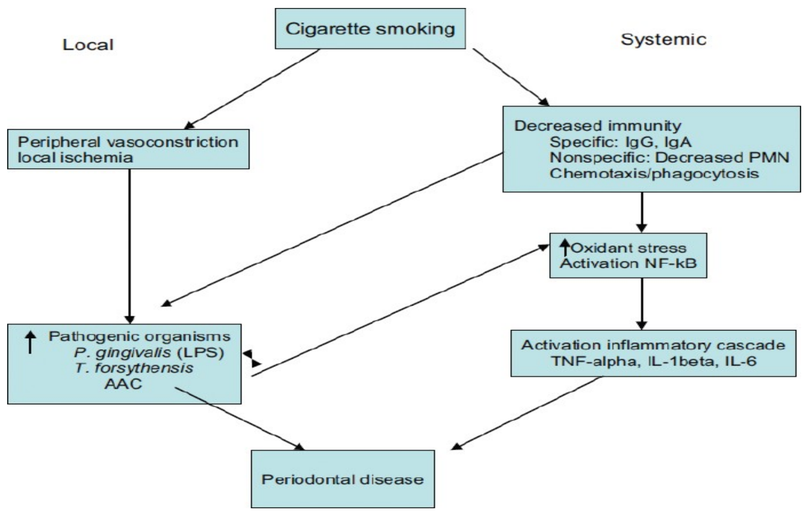

| CONSTITUENTS OF CIGARETTE SMOKE | |
|---|---|
| ***Substance*** | ***Effect*** |
| ***Particulate phase*** | |
| Tar (particulate matter minus nicotine and moisture) | Carcinogen |
| Polynuclear aromatic hydrocarbons | Carcinogens |
| Nicotine | Neuroendocrine stimulant and depressant, addicting drug |
| Phenol | Co-carcinogen and irritant |
| Cresol | Co-carcinogen and irritant |
| Napthylamine | Carcinogen |
| N – nitro Sonornicotine | Carcinogen |
| Benzo (a)pyrene | Carcinogen |
| Trace metals (nickel, arsenic, polonium210) | Carcinogens |
| Indole | Tumor accelarator |
| Carbazole | Tumor accelarator |
| Catechol | Co-carcinogen |
| ***Gas phase*** | |
| Carbon monoxide | Impairs oxygen transport and utilization |
| Nitrosamines | Carcinogens |
| Hydrazine | Carcinogens |
| Vinyl chloride | Carcinogens |
| Oxides of nitrogen | Ciliotoxin and irritant |
| Hydrogen cyanide | Ciliotoxin and irritant |
| Acetaldehyde | Ciliotoxin and irritant |
| Acrolein | Ciliotoxin and irritant |
| Ammonia | Ciliotoxin and irritant |
| Formaldehyde | Ciliotoxin and irritant |

## SMOKING AND GINGIVITIS

- Smokers show reduced clinical signs of inflammation in response to dental plaque than non-smokers, particularly the critical diagnostic indices of gingival bleeding on probing, redness, and edema because the main vasoconstrictive property of nicotine exerts its effect at the end-arterial vasculature of the gingiva.
- Increased use of tobacco increases the frequency of ANUG.
- Smoking causes hyperkeratotic and hyperplastic changes in the epithelium.
- Tar and other components in the smoke are irritating the gingiva and induce tissue necrosis and ulceration.

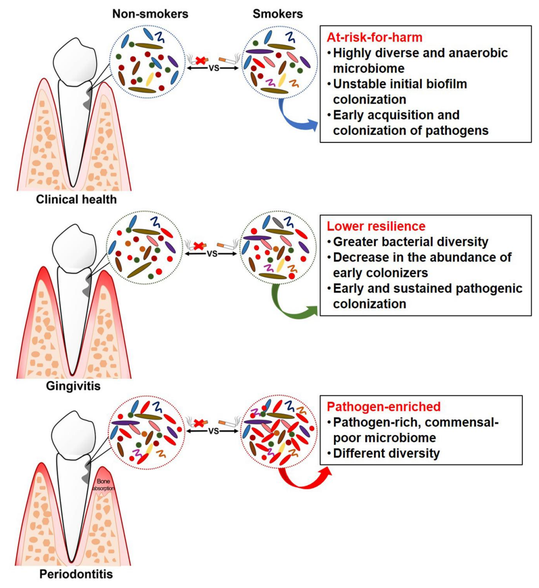
## SMOKING AS A RISK FACTOR OF PERIODONTITIS

- Pindborg (1947) was one of the first investigators to study the relationship between smoking and periodontitis.
- On average, smokers are four times likely to have periodontal disease as compared to non-smokers.
- Studies indicated that smokers exhibit increased clinical attachment loss, gingival recession, probing depth, and tooth mobility independent of age, gender, & systemic condition.
- Some studies showed higher alveolar bone resorption for smokers, especially in the anterior and maxillary palatal areas on incisors than in the mandibular regions.
- Smokers have reduced gingival crevicular fluid as well, which contributes to the reduced defense mechanism



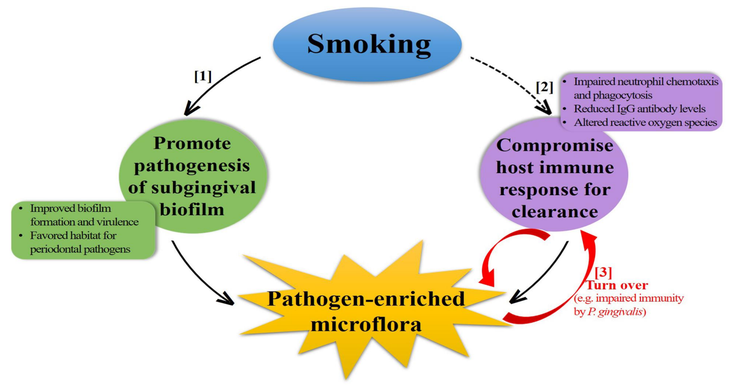

## SMOKING AND SUBGINGIVAL MICROFLORA

Several studies show that smokers harbor more microbial species associated with periodontitis, including P. gingivalis, A. actinomycetemcomitans, T. forsythia, P. intermedia, P. micros, S. aureus, and E. coli. Main harbor sites are palatal surfaces of Maxillary incisors and the facial surface of the lower anterior. Decreased subgingival temperature and decreased oxygen concentration favor more anaerobic bacterial colonization.




## THE IMPACT OF SMOKING ON IMMUNOLOGY

- Bacteria causing periodontal breakdown release several virulence factors, thus resulting in activation of the host response.
- Smoking suppresses both innate and immune host responses.
- Studies show that smokers have decreased neutrophil functions, including chemotaxis, phagocytosis, adherence, and its capacity to produce cytokines.
- Elevated levels of tissue necrosis factor-alpha, prostaglandin E2, neutrophil elastase, matrixmetalloprotinease-8 have been seen in GCF of smokers.
- Smoking causes an increased CD3+, CD4+ cells, decreased IgG2 in GCF and decreased salivary IgA.




## HOW SMOKING AFFECTS THE RESPONSE TO PERIODONTAL THERAPY

- Smoking has a negative adverse effect on the full spectrum of periodontal treatment approaches, from local and systemic antimicrobial therapy, to periodontal surgery, including regenerative procedures and oral implants.
- Decreased clinical response to Scaling & Root Planning seen in the current smokers, and decreased reduction in pocket depth after both surgical and non-surgical periodontal therapy.

## CONCLUSION

Effects of smoking on periodontal disease progression are reversible with smoking cessation. Dental professionals are well-positioned to provide smoking cessation advice to their patients because patients are likely to visit periodontists and dentists more often than their physicians.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