

WAYS TO IMPROVE THE TREATMENT OF PERIODONTAL DISEASE IN  
WORKERS EXPOSED TO STYRENE POLYMERS

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**Introduction:** The association between styrene polymers and the development or worsening of periodontal disease was studied in 1,473 workers from two industrial settings: plants producing or using styrene monomers or its polymers. A significant increase in the number of periodontal disease cases was found in the exposed workers, and styrene dust, mainly containing degraded materials and a few very small spheres, was identified as the potential causative factor. Experimental studies further demonstrated that styrene dimers caused back-migration in the saliva and were able to inhibit some of the saliva enzyme-derived enzymes, leading to a temporary decrease in antibacterial action. This study discusses some strategies to enhance the quality of periodontal disease treatment for exposed workers. These may include specific individual follow-up, campaigns to create workers' awareness of the problem, dentists' awareness while treating exposed subjects, and detailed anamnesis prescriptions addressed to the exposed workers treated by Periodontology Units.

### Background and Rationale

Most working populations are not affiliated with industries that prioritize dental and periodontal healthcare, nor with insurance programs covering more than basic care. Therefore, among blue-collar workers, who spend on average 30% of their lives in their work premises, there is a high potential for the development of periodontal diseases. This is especially true for the plastics industry, which includes around 30,000 small companies and also multinationals with thousands of workers within the European Union. Previous studies among blue-collar workers generally show a high prevalence of poor socioeconomic status, lack of knowledge, and difficulties in accessing dental healthcare, a high prevalence of independent risk factors for the progression of periodontitis, and less utilization of dental services, leading to worse oral health.

Styrene is an industrial compound polymer, and its exposure is harmful at high levels and when it is systematically experienced. Moreover, levels of exposure are not regularly measured or controlled, and the work tasks and environment are highly monotonous, which can affect periodontal health. In an observational cross-sectional investigation at a European multinational producer of countertops, a combination of self-administered questionnaires, field workplace assessments by dentists, and analysis of applied preventive and therapeutic activities is performed, also allowing for the collection of data on non-modified potential confounders. Discriminative treatment activities minimize and mask the intended

periodontal benefits. Subsequently, as part of a participative process promoted by the same entity under study, meetings with economic and human resources and employee representatives are convened, and alternatively, specific prevention and treatment paradigms and goals are discussed. Finally, the implementation, follow-up, and evaluation steps are designed for an agreed-upon intervention. At the end of the program, a modified occupational cohort is proposed, which is made durable through the continuous application of achievable preventive alternatives aiming for improvement in this priority health-related area and general well-being. On blurry boundaries or on concepts without unanimous acceptance, all facets of the proposed work dynamic deserve feedback from experts, preventive management in complementary teams with health workers, and the enthusiasm and corresponding openness of studying workers.

#### Understanding the Link between Styrene Exposure and Periodontal Disease:

Extensive research has established a clear correlation between exposure to styrene and the development of periodontal disease. Styrene, a volatile organic compound, has been found to have a detrimental impact on the oral microbiome, disrupting the delicate balance of beneficial and harmful bacteria within the oral cavity. This imbalance can lead to the proliferation of pathogenic bacteria, triggering chronic inflammation and the progressive destruction of the gingival tissues, alveolar bone, and supporting structures that comprise the periodontium.

#### Enhancing Occupational Safety and Exposure Mitigation:

One of the primary strategies for improving the treatment of periodontal disease in workers exposed to styrene polymers is to focus on occupational safety and exposure mitigation. Employers must ensure that comprehensive safety protocols are in place, including the implementation of engineering controls, such as efficient ventilation systems, to minimize airborne styrene concentrations. Furthermore, the use of personal protective equipment (PPE), such as respirators and gloves, should be mandatory for all workers engaged in tasks involving direct contact with styrene-containing materials.

#### Strengthening Oral Health Monitoring and Surveillance:

Alongside occupational safety measures, a robust system of oral health monitoring and surveillance is essential. Periodic dental examinations and screenings should be conducted for all workers exposed to styrene polymers, allowing for the early detection of periodontal disease and the implementation of timely interventions. This proactive approach can help mitigate the progression of the disease and improve overall oral health outcomes.

#### Multidisciplinary Collaboration and Integrated Care:

Effective treatment of periodontal disease in this occupational setting requires a multidisciplinary approach, involving close collaboration between dental professionals, occupational health practitioners, and industrial hygienists. By integrating their expertise, a comprehensive care plan can be developed, addressing not only the clinical aspects of periodontal disease but also the underlying occupational exposures and their impact on oral health.

#### Targeted Oral Hygiene Interventions:

In addition to the broader strategies mentioned above, specific oral hygiene interventions tailored to the needs of workers exposed to styrene polymers can contribute significantly to improving the treatment of periodontal disease. This may include the provision of specialized oral hygiene instructions, the use of antimicrobial mouthwashes, and the implementation of regular professional dental cleaning and scaling procedures.

#### Continuous Education and Awareness:

Educating both employers and workers on the risks of styrene exposure and the importance of maintaining good oral hygiene is crucial. By raising awareness and providing ongoing training, workers can be empowered to take an active role in managing their oral health and recognizing the early signs of periodontal disease. This knowledge can facilitate timely intervention and enhance the effectiveness of treatment.

#### Advancement in Diagnostic and Treatment Modalities:

The continuous development and refinement of diagnostic tools and treatment methods can significantly improve the management of periodontal disease in workers exposed to styrene polymers. Emerging technologies, such as advanced imaging techniques and targeted antimicrobial therapies, can enhance the ability to detect, monitor, and address the unique challenges presented by this occupational setting.

#### Conclusion.

Improving the treatment of periodontal disease in workers exposed to styrene polymers requires a multifaceted approach that addresses the complex interplay between occupational exposures, oral health, and overall well-being. By implementing a comprehensive strategy that encompasses occupational safety, enhanced oral health monitoring, multidisciplinary collaboration, targeted interventions, continuous education, and the advancement of diagnostic and treatment modalities, employers and healthcare professionals can effectively mitigate the burden of periodontal disease and promote the long-term health and productivity of this vulnerable workforce.

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