

## CHARACTERIZATION AND MORPHOLOGICAL TECHNIQUES FOR ORAL BIOFILM VISUALIZATION: STATE OF THE ART

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**Aim:** this review analyzes the morphological methods used to identify microbial species, the adhesion mechanisms involved in biofilm formation and stability, and the efficacy of microbicidal agents against pathological biofilms.

**Methods:** a literature review was performed to examine the main features of the oral ecosystem and the qualitative and morphological techniques used for biofilm analysis.

**Results:** the oral microbiome is essential for oral and systemic health. Biofilm is a structured microbial community whose pathological shifts in microbial metabolism can damage host surfaces. Microscopy remains the primary tool for morphological biofilm analysis. Stereomicroscopy and Con-

focal Laser Scanning Microscopy (CLSM) allow detailed visualization of structure, microbial distribution, and three-dimensional architecture. Electron microscopy (SEM and TEM) enables high-resolution analysis of bacteria, the extracellular matrix and adhesion mechanisms.

Advanced techniques like STEM, HR-TEM, and correlative microscopy help evaluate antibacterial strategies by visualizing biofilm disruption.

**Conclusions:** microscopy is crucial for understanding biofilm morphology and improving targeted therapies. Further studies are needed to investigate advanced techniques and microbiological and pathological aspects of oral biofilm.

## BIODIRECTIONAL ASSOCIATION BETWEEN PERIODONTAL DISEASE AND REPRODUCTIVE DISORDER

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**Aim:** this systematic review aims to evaluate the type, presence and differences of salivary biomarkers of inflammation in patients suffering by Polycystic Ovarian Syndrome (PCOS) and the risk of periodontal disease according to emerging scientific evidence.

**Methods:** selected databases were PubMed, Scopus, Google scholar and Web of science. The search strategy included the following terms: "oral inflammatory biomarkers", "salivary mediators", "metabolic indicators", "periodontal diseases", "periodontitis", "polycystic ovary syndrome", "PCOS", "ovulatory dysfunction". Preferred Reporting Items for Systematic Reviews (PRISMA) guidelines were used.

**Results:** our review revealed that there are various possible salivary inflammatory biomarkers in women with PCOS, such as cytokines, C-Reactive Protein (CRP), Reactive Oxygen

Species (ROS), MMPs, and microbiological diversity. Furthermore, these articles suggest an association between Periodontal Disease (PD) and PCOS, as periodontal parameters were more commonly altered in PCOS patients compared to healthy young women. This altered periodontal response in PCOS has been linked to an inflammatory state that appears to increase susceptibility to PD.

**Conclusions:** the salivary biomarkers of inflammation in patients affected by PCOS are a valid diagnostic method to assess the increased risk of periodontal disease. Further new studies are needed, with more rigid protocols, to investigate the best potential of inflammatory biomarkers as a diagnostic salivary index for PCOS patients and to evaluate the true inductive properties of the biomarker in early periodontal disease screening.