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MICROBES IN THE PATHOGENESIS OF DENTAL CARIES

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Most evidence to date on the microbial basis of dental caries was generated from targeted, culture-based, or 16S ribosomal gene-based methods. The aim has been to study the microbes individually as well as a group. The few studies employing next-generation sequencing have been done in small clinical samples, and with little or no mechanistic validation⁸. With the improvement of technology in microbiology we have more and more knowledge on the complex dental biofilm. Using DNAseq-based metagenomics (MTG), RNAseq-based metatranscriptomics (MTX) and advanced imaging we can achieve more valuable and credible information (Frederic Meyer, 2024).

A group of scientists at the Penn Dental Medicine and UNC researchers used these methods to show that *S. sputigena*, previously associated only with gum disease, can work as a key partner of *S. mutans*, greatly enhancing its cavity-making power (Cho, H, 2023). They developed a multi-modality, discovery-validation pipeline integrating clinical data from community-based studies and informatics discovery with in vitro and in vivo experimental models to study disease-associated microbial taxa and their interactions. This model consisted of eight parts: clinical and bio specimen collection from 416 children, nuclei acid isolation and sequencing, QA/QC alignment and annotation, informatics and statistical interference, taxonomy discovery and replication, metabolic profiling, biofilm real-time imaging and in Vivo studies. They found that *Selemonas sputigena* forms a pathobiont with *S. mutans* and worsens the cariological process. *S. sputigena* is known to be a motile anaerobic bacterium but when it gets stuck in the glucan matrix formed by *S. mutans* it loses its flagella and quickly proliferates forming a web like scaffold that wrap around *S. mutans* and increases acid production. This was then verified experimentally by infecting rodents with these microbes. It was proved that *S. sputigena* notably worsen the caries.

Their research findings reveal a novel pathobiont capable of unique spatial structuring and interspecies cooperation that enhances biofilm virulence—a phenomenon that substantially improves our understanding of childhood dental disease pathogenesis and may have implications for established pathogen and pathobiont interactions in other polymicrobial infections⁹. In my opinion the fields of dental microbiology has not been given adequate attention over the years but with time and technological development this is changing.