

**The Human Microbiome and Disease**  
**(Advanced Caries as an Example of a Polymicrobial Disease)**

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Considerable similarity is observed among the microbiome associated with infections of the oral cavity and those of other areas of the body including the vagina and gastrointestinal tract. Dental caries, one of the two major pandemic diseases of mankind, initially results from demineralization of the tooth enamel following bacterial production of lactic and other organic acids from fermentable carbohydrates in the diet. Once the outer enamel of the tooth has been breached, bacteria can pass through the dentinal tubules destroying the dentine and finally invading the dental pulp. Recently, we have identified the major bacterial consortia associated with advanced dentinal caries using molecular methods. Fluorescence *in-situ* hybridisation (FISH) using 16S rRNA probes together with PCR amplification of bacterial DNA extracted from infected pulpal tissues and subsequent phylogenetic analysis have shown a more select group of bacteria invading the dental pulp. This group included both probiotic lactobacilli and *Streptococcus bovis*, a species which is usually associated with endocarditis, urinary tract infections or sepsis. Bacteria from the families *Coriobacteriaceae*, *Lachnospiraceae*, *Prevotellaceae*, *Fusobacteria* and *Acinebacter* were also found in infected pulp in various combinations.