Streptococcus mutans and Dental Caries An In Depth Guide

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Introduction

Dental caries, more commonly known as tooth decay or cavities, is one of the most prevalent chronic diseases globally, a ecting individuals of all ages [1]. It is characterized by the demineralization of tooth enamel and dentin, leading to structural damage and, in severe cases, tooth loss [2]. A primary bacterial agent involved in the development of dental caries is Streptococcus mutans (S. mutans), a Gram-positive, facultative anaerobe belonging to the lactic acid bacteria group [3]. is bacterium plays a signi cant role in dental plaque formation, a sticky bio lm that adheres to the tooth surface, ultimately promoting cavity formation [4]. Streptococcus mutans (S. mutans) is a type of Gram-positive bacterium that plays a key role in the development of dental caries, commonly known as tooth decay or cavities [5]. First identi ed in the early 20th century, S. mutans is known for its ability to thrive in the oral cavity and adhere to tooth surfaces, where it ferments sugars to produce acids [6]. is acid production gradually erodes the tooth enamel, leading to cavities if le unchecked. Due to its signi cant role in dental health, S. mutans is one of the most extensively studied bacteria in the oral microbiome [7].

Characteristics of streptococcus mutans

S. mutans is classi ed as a Gram-positive coccus, meaning it has a spherical shape and a thick peptidoglycan layer in its cell wall, which retains the crystal violet stain used in Gram staining. It belongs to the genus Streptococcus, known for comprising bacteria that are generally harmless or bene cial but can also include pathogenic strains. Within the species, several serotypes exist, with serotype c being the most common in the human oral cavity.

e bacterium thrives in the moist, nutrient-rich environment of the mouth, particularly in the dental bio lm on tooth surfaces. S. mutans is anaerobic, which means it can grow in low-oxygen environments. It can utilize both oxygen-dependent and -independent metabolic pathways, allowing it to persist in various conditions within the oral cavity [8]. Its optimal growth occurs at a pH of around 6.0–7.0, though it can survive in more acidic environments, allowing it to continue thriving even as it produces acid from sugar fermentation. A major factor in S. mutans' role in dental caries is its ability to adhere to teeth and form bio lms, commonly known as dental plaque. is adherence is facilitated by the production of sticky, extracellular polysaccharides, which allow the bacterium to anchor to the tooth enamel and to other microorganisms.

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