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# EFFECTS OF MICROGRAVITY ON THE FORMATION OF DENTAL CARIES

**Abstract**

The action of acids on the enamel surface leads to an increase in the growth of bacterial strains such as S. Streptococcus Mutans and can ultimately cause the formation of dental caries. Once bacteria form a biofilm along the surface of the tooth, they can then rapidly metabolize carbohydrates to colonize the oral cavity. The resulting dental plaque acidification causes the destruction of the softer dentine underneath the enamel, which eventually leads to tooth decay. In 2010, the World Health Organization reported that dental caries affects 35 per cent of the world's population. During 28 Mir and 50 ISS missions, astronauts experienced 8 significant cases of dental caries. Similarly, the Kepler Space University reported that cases of periodontitis, dental caries, bone loss, and fractures in the jaw bone significantly increased after exposure to simulated microgravity.

To date, astronaut dentistry has relied on pre-flight screening and preventative measures to manage dental caries.There exists a need for diagnostic methods and treatments for dental caries that can operate within the typical constraints of in-space flight. As explorations grow in duration and distance, terrestrial dental exams alone will likely become inadequate. This study aims to inform future missions and provide recommendations for best practices moving forward in the interest of astronaut health.

To assess the current state of knowledge on the relationship between microgravity and dental caries, database searches were conducted on Web of Science, Scopus, and PubMed for primary articles and reviews published in English with a focus on adolescents and/or adults. The extracted information included date of publication, methodology, location, population, and results.

The present paper reviews the current literature on two phenomena within the realm of astronautical dentistry: firstly, the possible mechanisms by which microgravity accelerates the formation of dental caries; secondly, the diagnostic tools and treatments which are currently used for the management of dental caries on Earth. This paper provides recommendations for amendments to current space policy in the areas of in-flight diagnostics, preventative terrestrial measures, and treatments that can operate within the resource deficits of in-space flight.