

Pune institute develops materials that can reduce dental implant failure

Dental implants are useful to make up for the teeth lost due to dental caries, gum diseases, and other causes. They help to restore normalcy in aesthetics and functions. Titanium is a popular implant material because of its mechanical properties, biocompatibility, chemical stability, low toxicity, and corrosion resistance.

Implant alloys have improved in design to achieve success in almost 95 % cases. However, implant failures occur in around 5 % cases due to poor oral hygiene, bacterial infections, diabetes, hypertension, and the use of tobacco products.

Knowing the property of silver in inhibiting the growth of bacteria, scientists at the Agharkar Research Institute (ARI) have successfully carried out implant surface modifications by depositing a nano-scale thin film of silver on the titanium surface to address the challenge of implant failures, especially due to bacterial infections. ARI is a Pune based autonomous institute of DST.

The critical area of an implant is at the junction of the bone and the oral cavity. Silver-deposited titanium (Ti-Ag) inhibited the growth of *Pseudomonas aeruginosa*, *Streptococcus mutans*, *Staphylococcus aureus*, and *Candida albicans*. The ‘nano-silver’ coat ensured controlled release of silver up to 22 days, maintaining a long-term antibacterial activity. Human gingival fibroblast cells, the most abundant cell types in periodontal connective tissues, could proliferate in the vicinity of the nano-silver coated abutments. Thus, the modified surfaces showed excellent bioactivity. The nano-scale coating can prevent the initial microbial adhesion and help in the soft tissue integration of the implant. The above findings have been reported in a paper published in a peer-reviewed journal *Colloids and Surfaces B: Biointerfaces*.

Our teeth perform multiple functions. They cut and crush the food that we eat, thus helping in swallowing and digesting the food. Our speech, facial shape, and jaw bones also benefit from our teeth. We lose our teeth because of dental caries and gum diseases. Teeth loss impacts our physiological, social, and emotional quality of life. This nano-scale thin film of silver on the titanium surface could reduce implant failures due to infection, which can affect our lives.

Dr. PK Dhakephalkar, Director (Officiating), Agharkar Research Institute, Pune, director@aripune.org, 020-25325002 can be contacted for more details.

Reference:

*S. Kheur, N. Singh, D. Bodas, J-Y. Rauch, S. Jambhekar, M. Kheur, J. Rajwade. (2017) Nano-scale silver depositions inhibit microbial colonization and improve biocompatibility of titanium abutments. *Colloids and Surfaces B: Biointerfaces* 159: 151–158*