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Chemical modification on dental orthodontic wire for suppression of metal ions elution

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In biomedical fields, it is one of the most important to ensure their biocompatibility. Though stainless steel is a useful material in industrial and medical fields, some metal ions can be eluted on their surface. The ion elution such as Cr, Ni and Pb etc. have a potent of inducing a metal allergy. Therefore, the elution should be prevented for reduce the risk and improve their biocompatibility in medical applications, especially.

In this study, we prepared surface-coated stainless steel dental orthodontic wire and assessed their inhibition ability of Cr and Ni ion elution. For surface modification on the stainless, two types of chemical modifications were carried out. One is an electropolymerization of pyrrole on the surface. By the polymerization, the substrate was coated by a black thin film. The other is self-assemble monolayer formation using amphiphilic phosphate with a long alkyl chain. According to contact angle measurement on the surface, the water repellent film formation was confirmed. The obtained surface modified wires were immersed into several aqueous solutions, such as acetic acid, formic acid, citric acid etc. for 1 week at 37 C. After the incubation, eluted metal ions in supernatant were analyzed using ICP-AES. These chemical modification can suppress the ion elution effectively. This result suggests that the simple surface modification can reduce elution of metal ions and then be expected to decrease the risk of metal allergy in medical fields.

Biography:

Dr. Shigeaki Abe is an Assistant Professor in graduate school of dental medicine in Hokkaido University, Japan. He received a Ph.D. degree in applied chemistry from Hokkaido University, Sapporo Japan. His research interest includes nanotechnology and biomaterial.