

# チタンインプラントから溶出するチタン粒子は 周辺組織のみならず全身へ曝露し免疫を攪乱する



*Clinical Response to Metal Implants*

replacement post discectomy, as a means to maintain vertical dimension of the jaw (Lypka and Yamashita 2007). However, as the TMJ is a loaded joint under continuous movement, PTFE discs commonly fragmented resulting in an intense foreign body (giant cell mediated) reaction and significant loss of bone (Lypka and Yamashita 2007) and possible additional surgical procedures including partial or total joint replacement (Henry and Wolford 1993).

In response to detection of significant history of failure with total or partial TMJ replacements, the FDA ordered all TMJ implant manufacturers to conduct 522 Postmarket Surveillance Studies<sup>11</sup> to help determine causes of TMJ implant failure. As of Spring 2019, these studies are showing that the most common reasons for subsequent surgical intervention include fibrous ankylosis, heterotopic bone formation, infection, and pain/swelling.

7.5.3.2 Endosseous Dental Implants, Dental Restorations, and Dental Appliances

Endosseous dental implants are used to replace teeth and restore chewing function by supporting dental restorations such as crowns or bridges. Endosseous dental implants are placed in the maxilla or mandible to replace the root and prepared crown portions of the tooth. Dental appliances have a variety of intended uses; for example, orthodontic wires are intended to assist in tooth movement as part of orthodontic treatment of malocclusion. Ni and Ti are commonly found in dental restorations and appliances such as crowns and orthodontic wires. Although Ti in endosseous dental implants, dental restorations, and dental appliances have been generally considered inert in terms of the interactions with the oral cavity, recent reviews of the literature suggest possible adverse reactions to various constituent metals including Ti (Siddiqi et al. 2011; Levi, Barak, and Katz 2012).

**FDAは2019年のレポートでTiインプラント由来のTi粒子による生体反応の問題点を指摘**

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Review

## The unfavorable role of titanium particles released from dental implants

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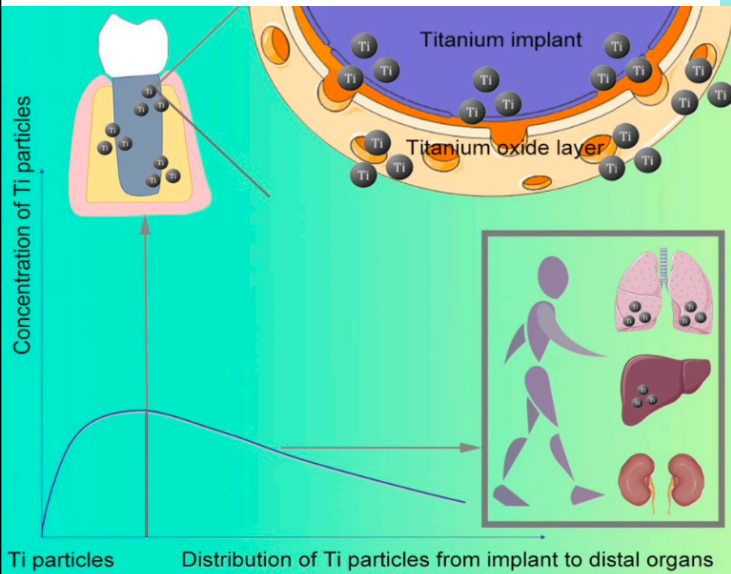
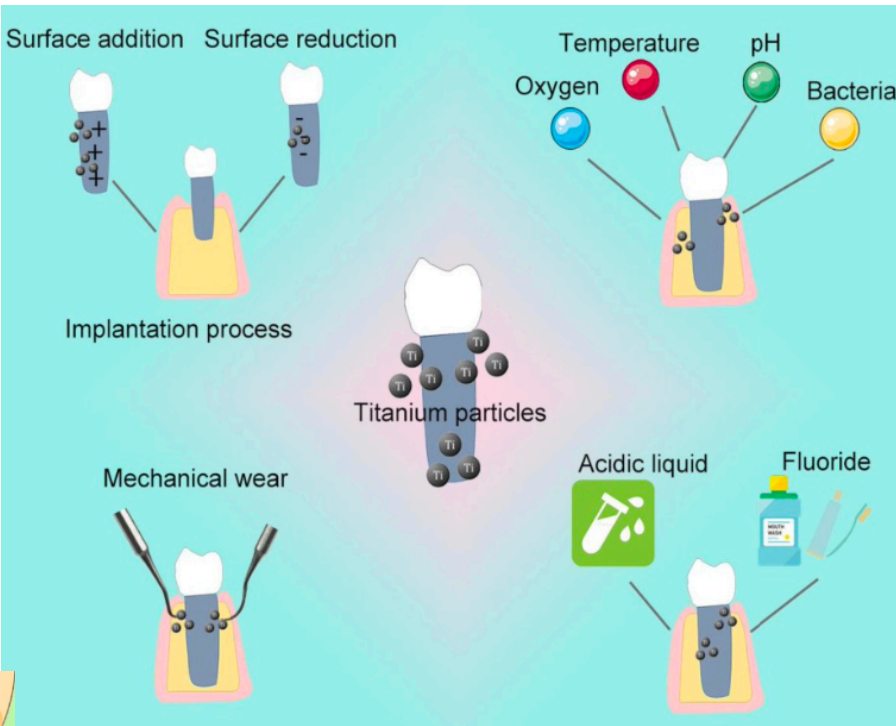
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### Abstract

Titanium is considered to be a metal material with the best biological safety. Studies have proved that the titanium implanted in the bone continuously releases titanium particles (Ti particles), significantly increasing the total titanium content in human body. Generally, Ti particles are released slowly without causing a systemic immune response. However, the continuous increased local concentration may result in damage to the intraepithelial homeostasis, aggravation of inflammatory reaction in the surrounding tissues, bone resorption and implant detachment. They also migrate with blood flow and aggregate in the distal organ. The release of Ti particles is affected by the score of the implant surface structure, microenvironment wear and corrosion, medical operation wear, and so on, but the specific mechanism is not clear. Thus, it is difficult to prevent the release completely. This paper reviews the causes of the Ti particles formation, the damage to the surrounding tissue, and its mechanism, in particular, methods for reducing the release and toxicity of the Ti particles.

Key words: Titanium Particles, Chemical Corrosion, Surface Wear, Surface Modification.



**最新の論文では、チタンインプラントから埋入プロセス、フッ素、酸、スクレーピングなどで容易にチタン粒子が溶出することが示され、溶出したチタン粒子は周辺組織のみならず肺、肝臓、腎臓などに暴露することが示されている。**

**EUでは大腸ガンのリスクが上がることから食品へのチタン粒子の添加を禁止する方向に向かっている。フランスではすでに禁止。**