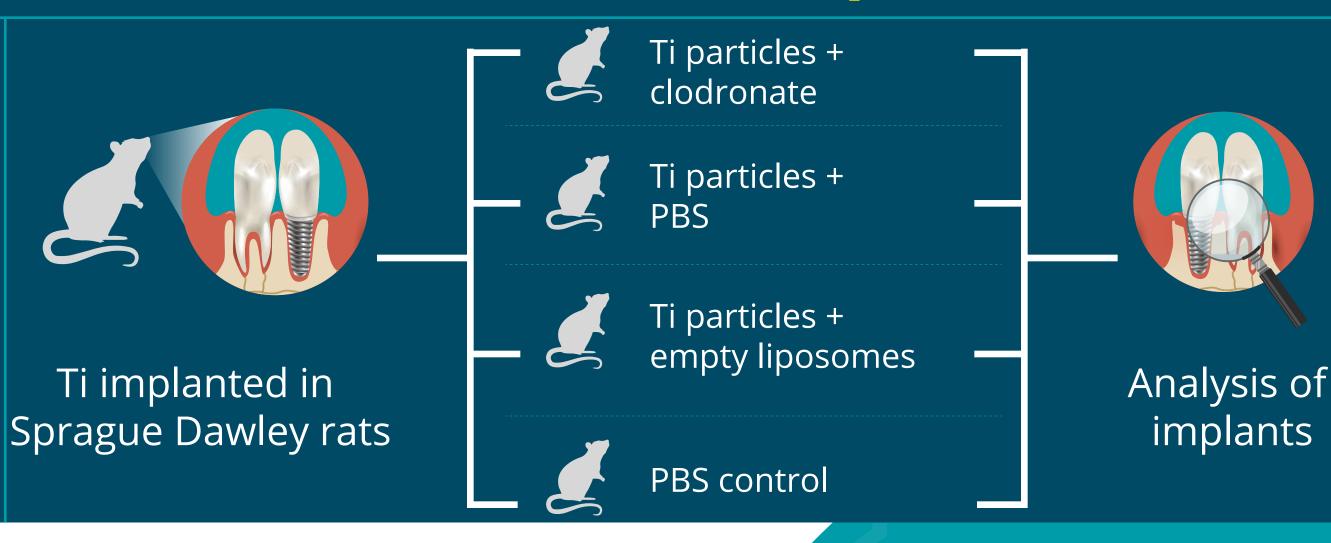
## Do Titanium Particles Cause Bone Loss Around Dental Implants?

Bone loss around dental implants leads to implant failure



Is bone loss triggered by leakage of titanium (Ti) particles from the implant, and if so, what is the mechanism?



Ti increases inflammatory M1 macrophages, pro-inflammatory cytokines, and bone loss

Inflammatory cytokines and bone loss induced by Ti particles were reduced upon depletion of macrophages by clodronate

Titanium particles
from dental implants
activate macrophages
that cause inflammatory
reactions resulting in
bone loss and implant
failure

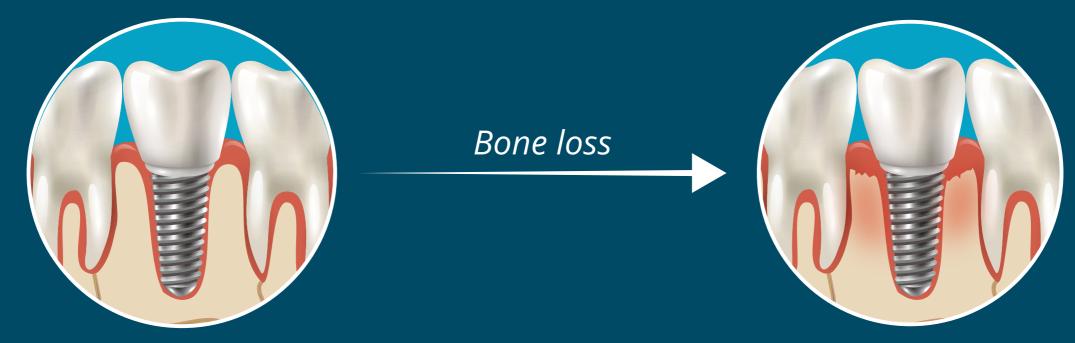




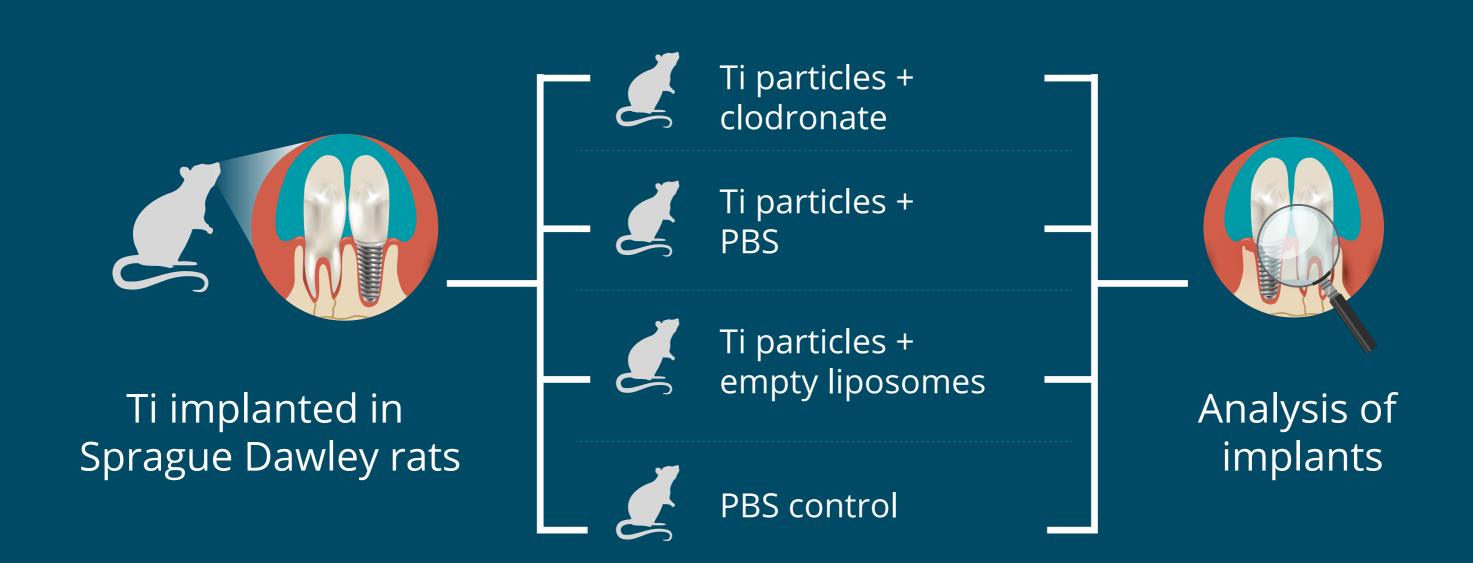
**Clodronate** 

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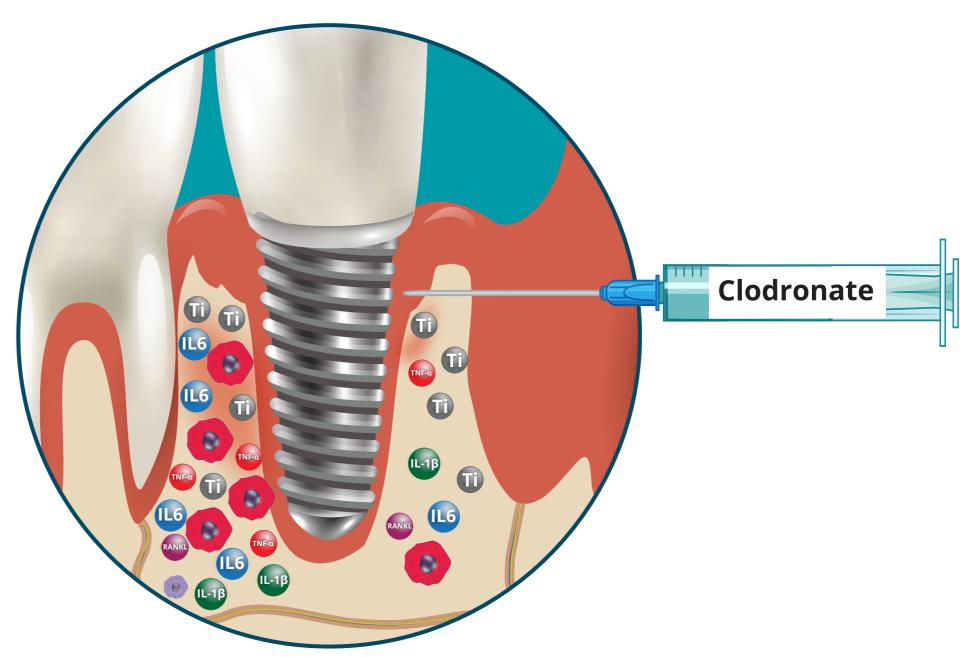
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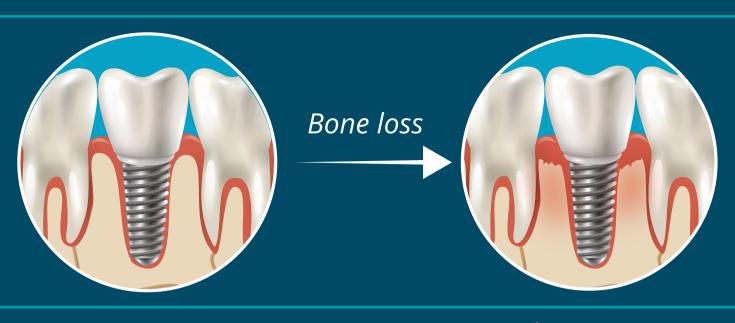


Titanium particles from dental implants activate macrophages that cause inflammatory reactions resulting in bone loss and implant failure



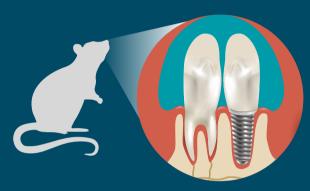


## Do Titanium Particles Cause Bone Loss Around Dental Implants?



Bone loss around dental implants leads to implant failure

Is bone loss triggered by leakage of titanium (Ti) particles from the implant, and if so, what is the mechanism?



Ti implanted in Sprague Dawley rats



Ti particles + clodronate

Ti particles + PBS

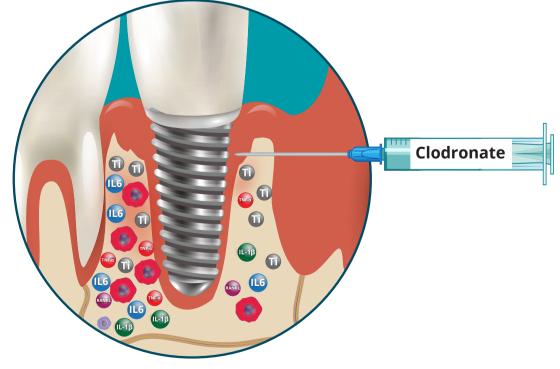
Ti particles + empty liposomes

PBS control



Analysis of implants

Ti increases number of inflammatory macrophages



Clodronate reduces production of inflammatory cytokines in bone caused by Ti

Titanium particles from dental implants activate macrophages that cause inflammatory reactions resulting in bone loss and implant failure



MACROPHAGE POLARIZATION IN ASEPTIC BONE RESORPTION AROUND DENTAL IMPLANTS INDUCED BY TI PARTICLES IN A MURINE MODEL

WANG et al. (2019) | DOI: 10.1111/JRE.12633

