



EFFECT OF METAL IONS RELEASING FROM ORTHODONTIC MINISCREWS ON OSTEOCLASTOGENESIS

Charoenpong H. , Benjacholamas P., Prasit V., Wiphusitworakul P., Jansirirak T., Kamronrithisorn T., Kusirisin T.

Introduction

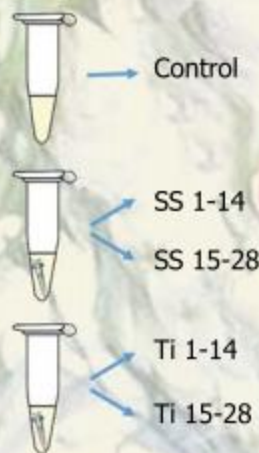
All metals that are in contact with a biological system including orthodontic miniscrews undergo corrosion which can affect cellular response. Titanium alloy (Ti) and stainless steel (SS) are two materials commonly used for orthodontic miniscrews. Metal ion released from these miniscrews can have the effect on osteoclasts which play a role in miniscrews stability and in orthodontic tooth movement.

Objectives

To investigate the effect of metal ions releasing from stainless steel (SS) and titanium alloy (Ti) orthodontic miniscrews on human osteoclastogenesis.

Methods

Human CD14+ monocytes as osteoclast precursors were cultured in cell culture media immersed with SS or Ti from either day 1-14 or day 15-28. Control group was osteoclasts cultured in the media without miniscrew immersion.



orthodontic miniscrews, osteoclastogenesis, stainless steel, titanium

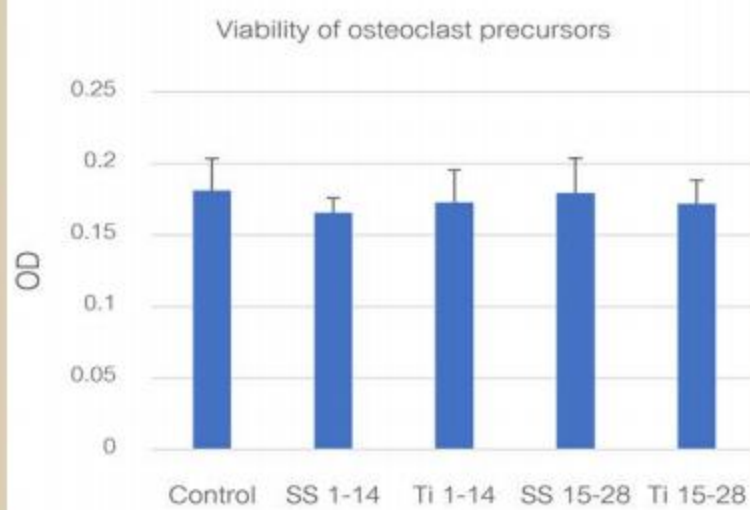
Conclusion

There was a tendency of the elute from orthodontic miniscrews from the first 14 days to inhibit osteoclast compared to the next 14 days with the same materials. Comparing between Ti and SS within the same period, Ti seem to have more inhibitory effect on osteoclast than SS.

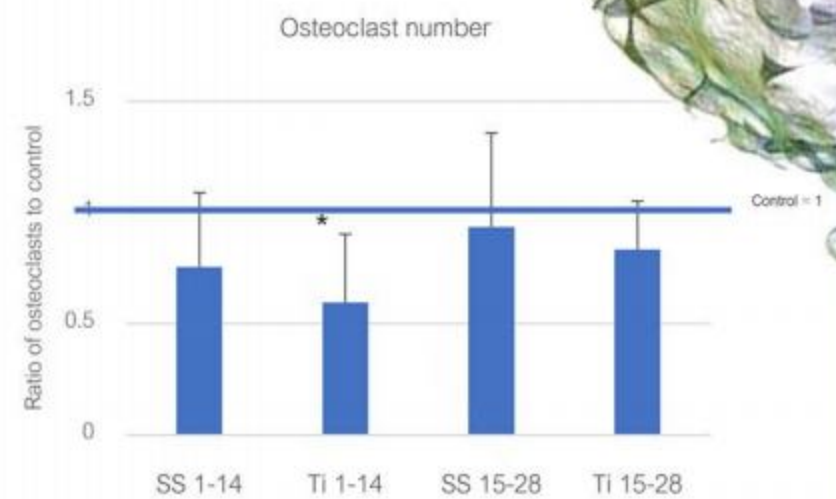
Results

	Ti	V	Al
control	1.50	<0.02	138.50
Ti 1-14	17.22	3.61	132.56
Ti 15-28	11.94	0.11	111.06
	Cr	Ni	Fe
control	<0.02	3.50	<0.1
SS 1-14	5.36	7.64	10.50
SS 15-28	<0.02	2.29	<0.1

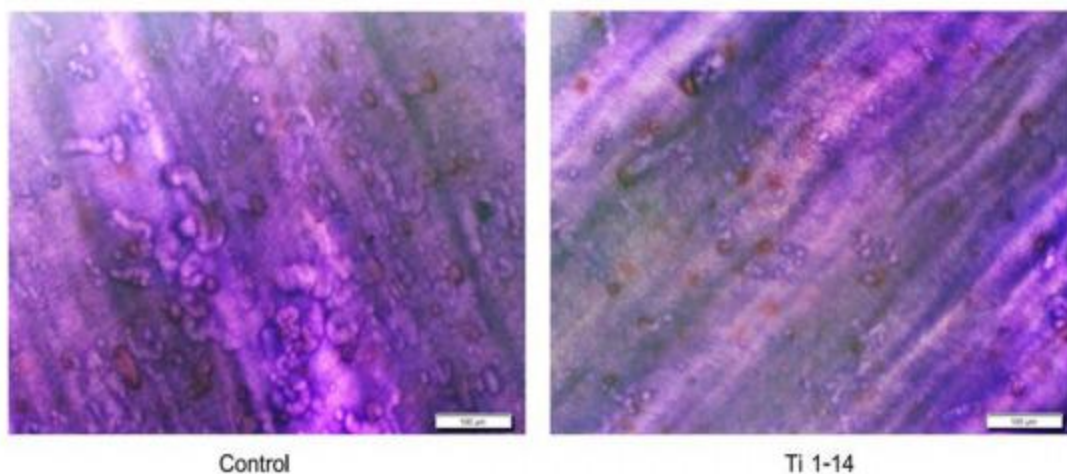
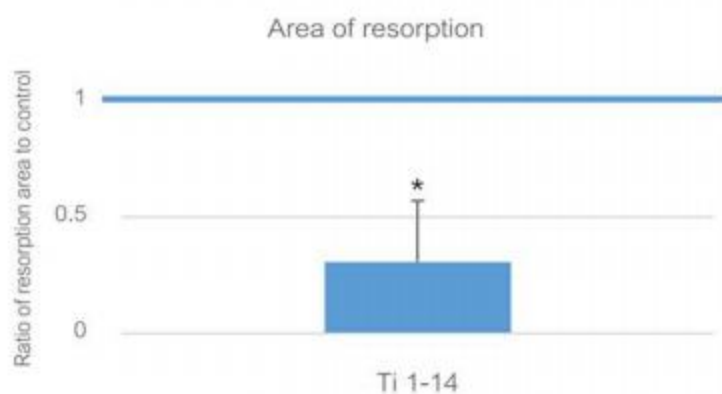
Concentration of metal ions (µg/L, ppb)



Viability of osteoclast precursors was not affected by the metal ion released from orthodontic miniscrews.



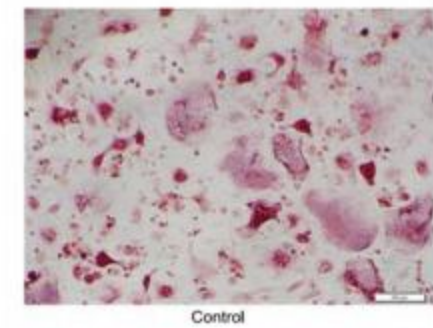
There was a significant reduction of the number of osteoclasts to approximately 59% of control in Ti day 1-14 groups.



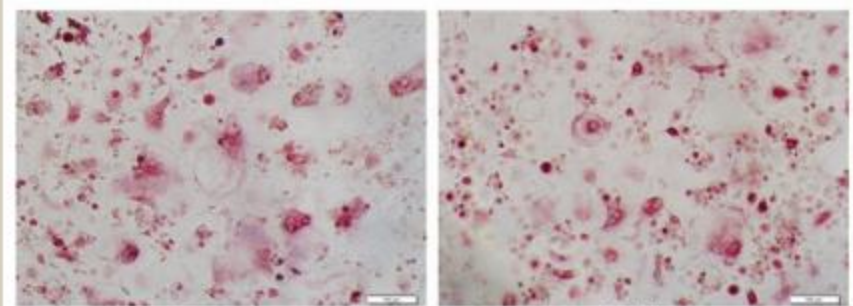
Control

Ti 1-14

The area of resorption was also significantly reduced in Ti 1-14.

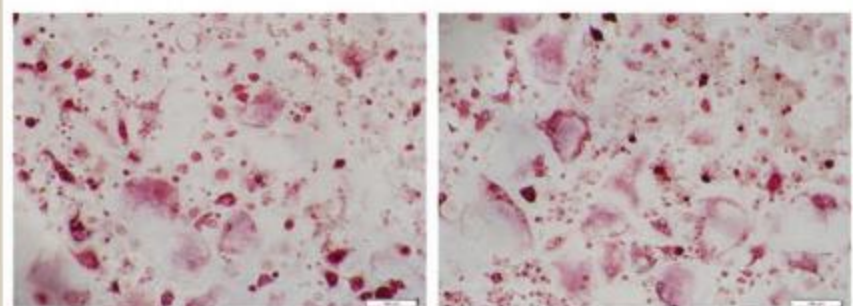


Control



SS 1-14

Ti 1-14



SS 15-28

Ti 15-28

TRAP staining after 14 days of osteoclast differentiation in different types of media.