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Exosomes the Missing Link in Peri-Implantitis

O. Ginesin[1, 2], H. Zigdon-Giladi[1, 2], O. Huck[3]
[1]Technion, Haifa, Israel, [2]Periodontology, Rambam, Haifa, Israel, [3]University of Strasbourg, Strasbourg, France

Objectives Exosomes are extracellular nano-vesicles ranging in size from 40 to 150 nm that are released from donor cells and internalized in recipient cells. They serve as cell-to-cell vehicles for the transfer of genetic components, proteins, metabolites, and more.
In previous human studies, exosomes were detected at elevated levels in peri-implantitis and periodontitis lesions.
Aim: to explore the influence of titanium particles on macrophages exosomes secretion and sequentially, the paracrine effect of exosomes on macrophages.
Methods Murine peritoneal macrophages were isolated and cultured. Afterward, macrophages were left untreated (M0) or treated with one of the following: LPS and IFN-γ (M1) or titanium particles (Titanium). Exosomes were isolated by serial centrifuges of the conditioned medium (Purified exosomes). Exosome quantification was done with a nanoparticle tracking analysis (NTA) (Nanosight NS300).
Purified exosomes were added to freshly isolate peritoneal macrophages. Exosome localization was determined by fluorescent confocal microscopy. The macrophage polarization state was determined by flow cytometry and compared to M1 and M0. RT-PCR was used to identify pro-inflammatory cytokines (IL1b and TNF-a).
Results Higher concentrations of exosomes were found in the presence of titanium particles compared with positive control (LPS and IFN-γ) or naive macrophages (M0<M1<<<Titanium).
Externally added purified exosomes internalized and reached macrophages cytoplasm (Fig 1). The addition of purified exosomes resulted in an elevation of IL1-b in macrophages compared to macrophages treated with LPS and IFN-γ (M1) or untreated macrophages.
Conclusions Titanium particles lead to elevated exosome secretion. Exosomes cause macrophage polarization towards a pro-inflammatory profile through a paracrine effect.