

An intriguing relation between periodontal and cardiovascular diseases

Francesca Diomede - Jacopo Pizzicannella - Ilaria Merciaro - Simone Guarnieri - Oriana Trubiani

Università degli Studi "G. d'Annunzio", Chieti-Pescara, Dipartimento di Scienze Mediche, Orali e Biotecnologiche, Chieti, Italia

Periodontitis is a chronic inflammatory condition promoted by bacterial colonization of the gingiva that causes alveolar bone and tooth loss. Under these conditions, bacteria, as well as bacterial products and inflammatory mediators can move from the gingival pocket to the well vascularised periodontal tissues and into the circulation. In fact, recently a possible connection between oral infection and cardiovascular disease was suggested (1). One of the major pathogens involved in the progression of periodontal disease is the *Porphyromonas gingivalis* (LPS-G). The aim of the study was to induce endothelial differentiation in human periodontal ligaments stem cells (hPDLSCs) (2) on decellularized pig heart valve as scaffold and evaluate the role of LPS-G on cell cultures in terms of reactive oxygen species (ROS) production and NF κ B pathway. Many studies have shown that ROS provoked oxidative stress plays a critical role in the development of cardiovascular disease. Excessive generation of ROS can cause cellular dysfunction and injury by directly oxidizing and damaging proteins, DNA and lipids, which ultimately result in cell death. To induce endothelial differentiation, human periodontal ligament stem cells (hPDLSCs) were cultured with endothelial growth medium (EGM-2MV) supplemented with vascular endothelial growth factor (VEGF) and seeded on decellularized pig heart valve. Valve leaflets were incubated for 30 min with 10 μ M DCFH-DA at 37°C in humidified incubator. At the end of loading, the valve leaflets were observed using multiphoton microscope. Results of time lapse experiments revealed that after treatment, with 2,5 mg/ml LPS-G, a rapid sustained increase in ROS generation was observed mainly in differentiated hPDLSCs. Comparing the average response of undifferentiated and differentiated hPDLSCs is clearly evident that the latter showed an six fold increase in ROS production after LPS-G exposure, while on undifferentiated appeared to be negligible. Moreover, in endothelial differentiated cells the NF κ B nuclear translocation in presence of LPS-G was evident. A reasonable conclusion could be that the treatment of periodontal disease not only improve dental but presumably also cardiovascular health.

References

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Keywords

Stem cells; periodontitis; cardiovascular disease; endothelial differentiation.