Dottorato di ricerca in Oncologia e Chirurgie Sperimentali
(PON DOTTORATI INDUSTRIALI - a.a. 2016/2017)

(Indirizzo: Scienze Stomatologiche e Chirurgia Cervico-Facciale)
XXXII Ciclo

Phd Student: Marta Cristaldi.

Title: In vitro and in vivo investigations of osteogenic differentiation ability of dental pulp stem cells (DPSCs) and gingival mesenchymal stem cells (GMSCs) by use of nanostructured scaffolds.

Abstract

Background: Up to now, dental pulp and gingiva have been widely described as new source of adult mesenchymal stem cells, compared to other stem cell sources as bone marrow and adipose tissue which require invasive harvesting methods, dental pulp stem cells (DPSCs) and gingival mesenchymal stem cells (GMSCs) are much more accessible and easily isolable; thus, they are considered an attractive alternative as source of mesenchymal stem cells (MSCs). It is well-known that DPSCs and GMSCs harvested from human teeth and cultured in specific osteogenic medium are able to differentiate towards the osteoblast lineage, indeed expressing typical osteoblast markers as alkaline phosphatase (ALP), osteocalcin (OCN), osteopontin (OPN); they produce mineralized bone nodules *in vitro* and are able to regenerate bone tissue *in vivo*.

Aim of the study: The aim is to evaluate a new bone tissue regeneration procedure by mean of DPSCs and GMSCs harvested from periodontally compromised teeth.

Materials and methods: DPSCs and GMSCs collected from teeth compromised by periodontal disease will be isolated and cultured, then directionally differentiated towards osteogenic cell lineage. The *in vitro* osteogenic differentiation will be evaluated by histology, osteogenic markers expression (Real Time-quantitative PCR), immunohistochemistry and immunofluorescence. The ability of DPSCs and GMSCs to produce mineralized bone will be analyzed also *in vivo* by transplantation of cells, previously seeded on PLGA scaffold, in murine models (e.g. mouse NOD.SCID) and evaluation by immunohistochemistry and osteogenic marker expression (Real Time-quantitative PCR). DPSCs and GMSCs harvested from healthy patients will be used as control group.

Forecasted Results: The development of mineralized tissue *in vitro* and lamellar bone *in vivo* from DPSCs and GMSCs isolated from periodontal compromised teeth with the same characteristics and potential of the control group.

Conclusion: The final purpose of the study is to assess a new source of adult MSCs for autologous bone tissue regeneration procedures, employing teeth and tissues usually discarded after dental extractions.