

## CLONAL CELL LINES ISOLATED FROM MOUSE DENTAL PULP BEHAVE AS EITHER MONOPOTENT OR MULTIPOTENT PROGENITORS IN VITRO AND CONTRIBUTE TO REPARATIVE DENTIN FORMATION AFTER IMPLANTATION IN THE MOUSE INCISOR

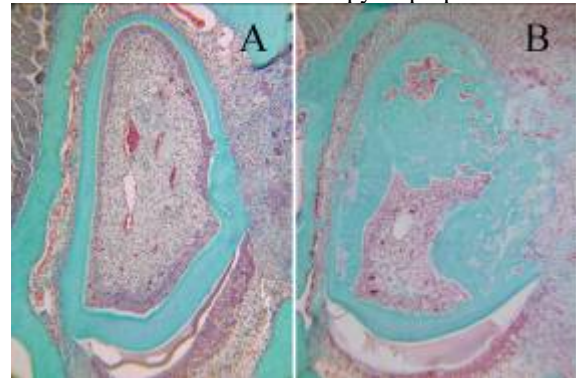
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Tooth formation depends on interactions between epithelial and mesenchymal cells of the dental papilla originating from the neural crest. These interactions stimulate a subpopulation of mesenchymal cells to differentiate into odontoblasts which will synthesize the primary dentin. In adult teeth, reparative dentine can be formed by odontoblast-like cells in response to trauma or carious lesions. These cells are thought to arise from the recruitment, proliferation and differentiation of a precursor cell population residing somewhere within the pulp. Despite all the data available on tooth development, still little is known on the characteristics and properties of these precursor cells. A precise understanding of the nature of these cells and of the molecular mechanisms underlying their differentiation would greatly facilitate the development of cell therapies which could be in the near future, a valuable alternative to the existing unsatisfactory treatments of dental pulp lesions.

We have recently described the isolation of a series of dental pulp clonal precursor cells from mouse ED18 first molar (1). These clones can be induced towards an odontoblastic differentiation program in vitro (2). In the present study, we have evaluated whether these odontoblast precursor clones could behave as progenitors capable of differentiating towards various lineages in vitro and in vivo. We show that, in vitro, some of the dental pulp clones behave as “monopotent” odontoblast progenitors whereas others correspond to multipotent mesenchymal-like progenitors. Indeed, the latter can engage into osteogenesis, chondrogenesis or adipogenesis in the presence of specific inducers, and express the corresponding differentiation markers (alkaline phosphatase and osteocalcin for osteogenesis, sox9, type IIA and X collagen for chondrogenesis, and PPAR and lipoprotein lipase for adipogenesis). In vivo, after implantation in an adult mouse incisor, all the pulp clones are able to contribute to the formation of reparative dentin which, depending on the progenitor clone, is of the orthodentin or osteodentin type (Fig 1). Implanted in the calvaria after formation of a critic defect, the pulpal cells contribute to new bone formation and

defect repair. Altogether, these data demonstrate the presence of “monopotent” and multipotent mesenchymal-like progenitors within the mouse dental pulp. Both types of progenitors can efficiently contribute to reparative dentin formation after implantation in the pulp. These progenitor cell lines therefore constitute novel tools to pave the way towards a stem cell-based therapy of pulp lesions.



**Fig.1: Neodentin formation 10days after implantation in the pulp of a mouse incisor:A) Sham B) Pulpal progenitor cells**

### References

- <sup>1</sup> F. Priam, Ronco V., Locker, Bourd K., Bonnefoix M., Duchêne T., Bitard J., Wurtz T, Kellermann O., Goldberg M. and Poliard A. (2005)*Archs Oral Biol*: 50, 271-277. <sup>2</sup> Lacerda-Pinheiro S, Jegat N, Septier D, Priam F, Bonnefoix M, Bitard J, Kellermann O, Tompkins K, Veis A, Goldberg M, Poliard A.(2006) *Eur J Oral Sciences* 114 : 232-254

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