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Biocompatibility in vitro study on Human Dental Pulp stem cells (hDPSCs) of experimental fluoride-doped calcium phosphates as promising remineralising materials

Carmela Del Giudice[1], Gianrico Spagnuolo[1], Marzia Maglitto[1], Luigi Esposito[1], Sandro Rengo[1], Salvatore Sauro[2]
1. Department of Neurosciences, Reproductive and Odontostomatological Sciences, University of Naples "Federico II", Naples, Italy
2. Dental Biomaterials & Minimally Invasive Dentistry, Departamento de Odontologia, CEU Cardenal Herrera University, Valencia, Spain

INTRODUCTION & AIM

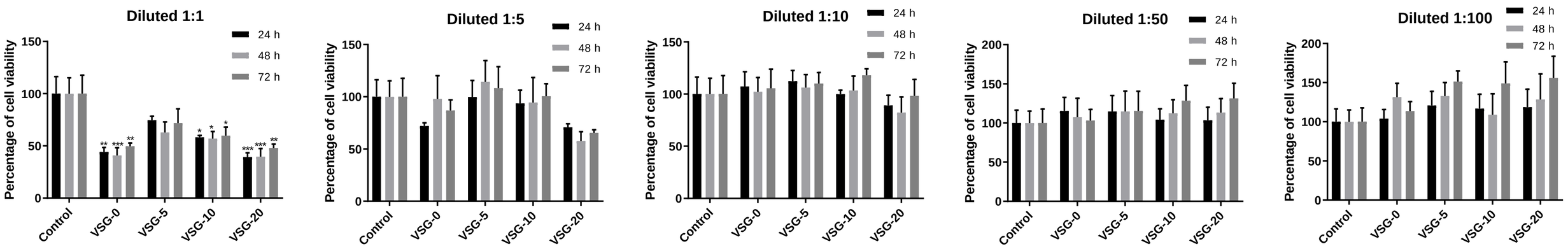
Innovative fluoride-doped calcium phosphates have great interest as potential remineralising materials for dental applications, which may be able to react with body fluid and convert into fluorapatite (FA) and/or fluor-hydroxyapatite (FHA). Hence, this invitro study aimed to assess the cytotoxicity, self-renewal, and migratory properties of these experimental materials.

METHOD

Five specimens containing 0, 5, 10 and 20% of fluoride on hDPSCs were tested at different dilutions (undiluted, from 1:5 to 1:100) and the eluates were prepared according to ISO 10993-12. Viability assays were conducted using the MTT test. Furthermore, we analysed self-renawal by observing the colony formation and the migration activity with scratch test.

RESULTS & DISCUSSION

Our results demonstrated that the powders with greatest toxicity on hDPSCs are those without fluoride and with 20% fluoride when diluted 1:1. Using exclusively the 1:50 dilution which is non-cytotoxic, we observed that the powder containing 20% fluoride causes a significant decrease in clonogenic capacity. Furthermore, the different percentages of fluoride did not affect the migratory capacity of the cells, leaving us to hypothesize that the different percentages of fluorine do not act at the level of the cytoskeleton.



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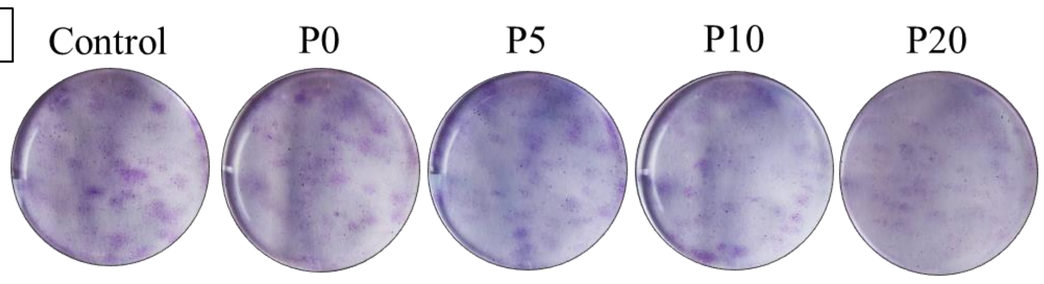

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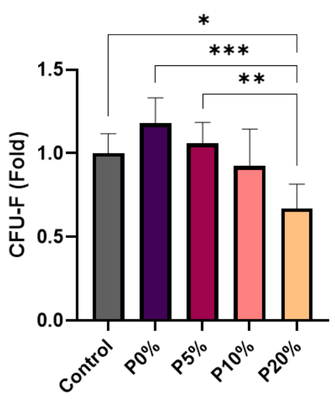

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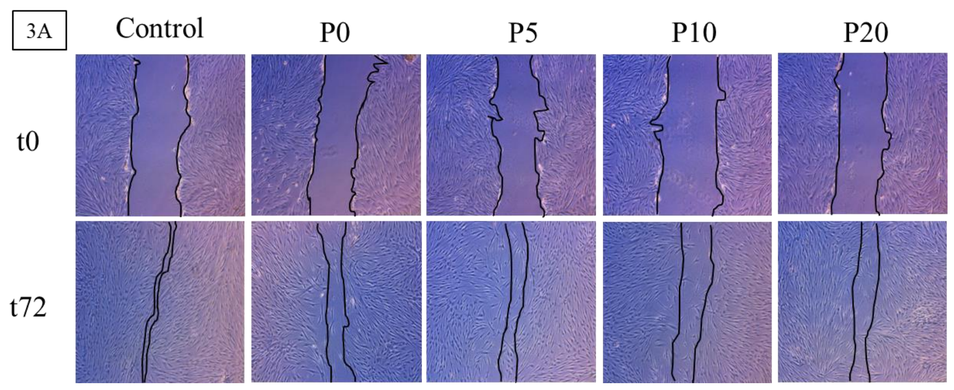

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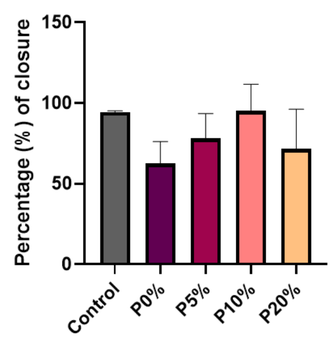

CONCLUSION

The results obtained confirm that the undiluted experimental fluoride-doped calcium phosphates are cytotoxic for hDPSCs regardless of the percentages of fluorine tested. Therefore, the data obtained represent a starting point for future studies that will focus on the most appropriate concentrations of fluoride to be used in order to obtain non-cytotoxic and osteoinductive effects.

REFERENCES

Chemical, structural and cytotoxicity characterisation of experimental fluoride-doped calcium phosphates as promising remineralising materials for dental applications. Salvatore Sauro, Gianrico Spagnuolo, Carmela Del Giudice, Davino M. Andrade Neto, Pierre B.A. Fechine, Xiaohui Chen, Sandro Rengo, Xiaojing Chenf, Victor P. Feitosa. *Dental Materials* (2023)