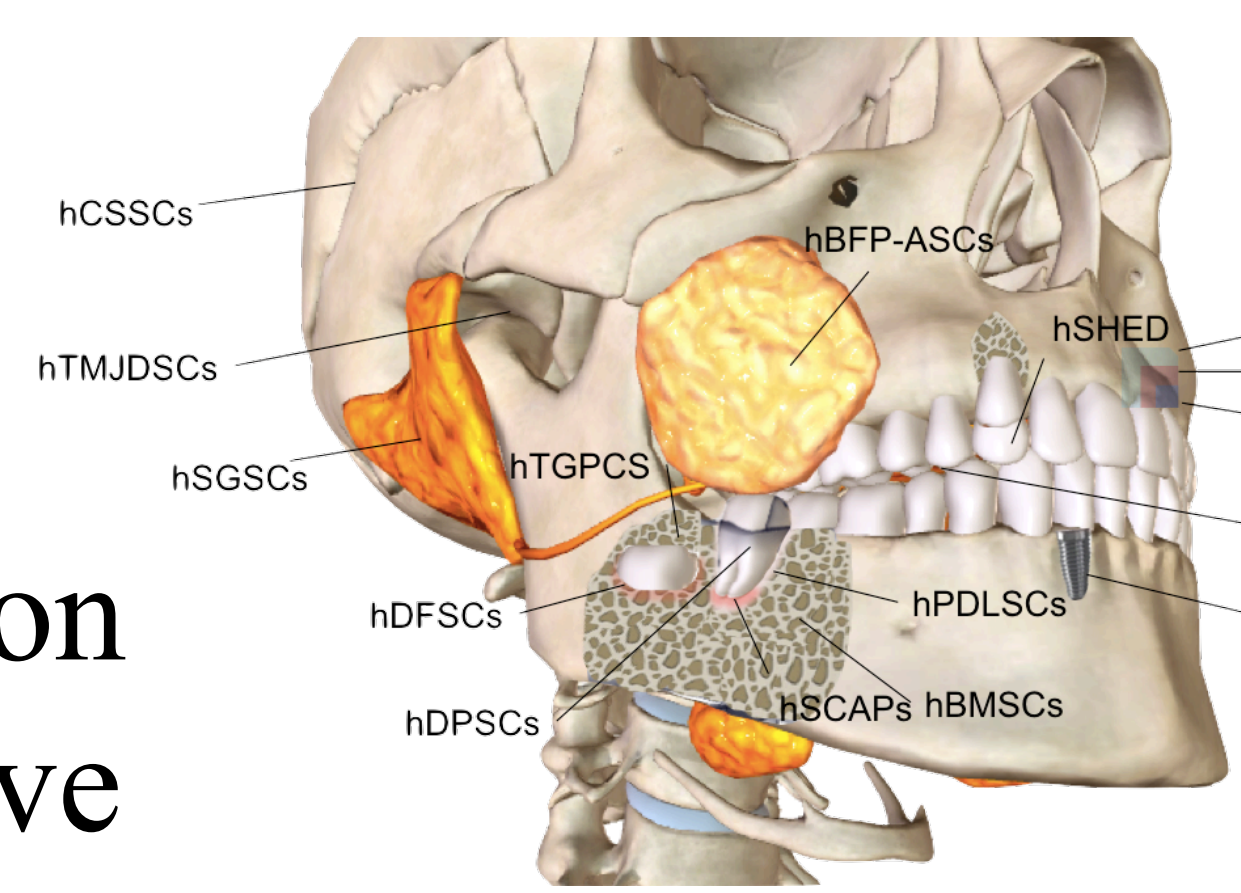


# NEW *IN SILICO* AND *IN VITRO* EVALUATION OF HUMAN DENTAL PULP STEM CELLS SCAFFOLDS FOR CRITICAL BONE DEFECTS

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The authors declare no conflicts of interest.

## INTRODUCTION

Stem cell-based **therapies** have great interest in the scientific community, For this reason, **novel** cultivation methods and expansion have emerged<sup>1</sup>. However, cells with the greatest **osteogenic** potential are not currently applied and transport techniques make their clinical application difficult in **critical** defects<sup>2</sup>. Therefore, it is important to generate novel strategies with clinical potential<sup>3</sup>.

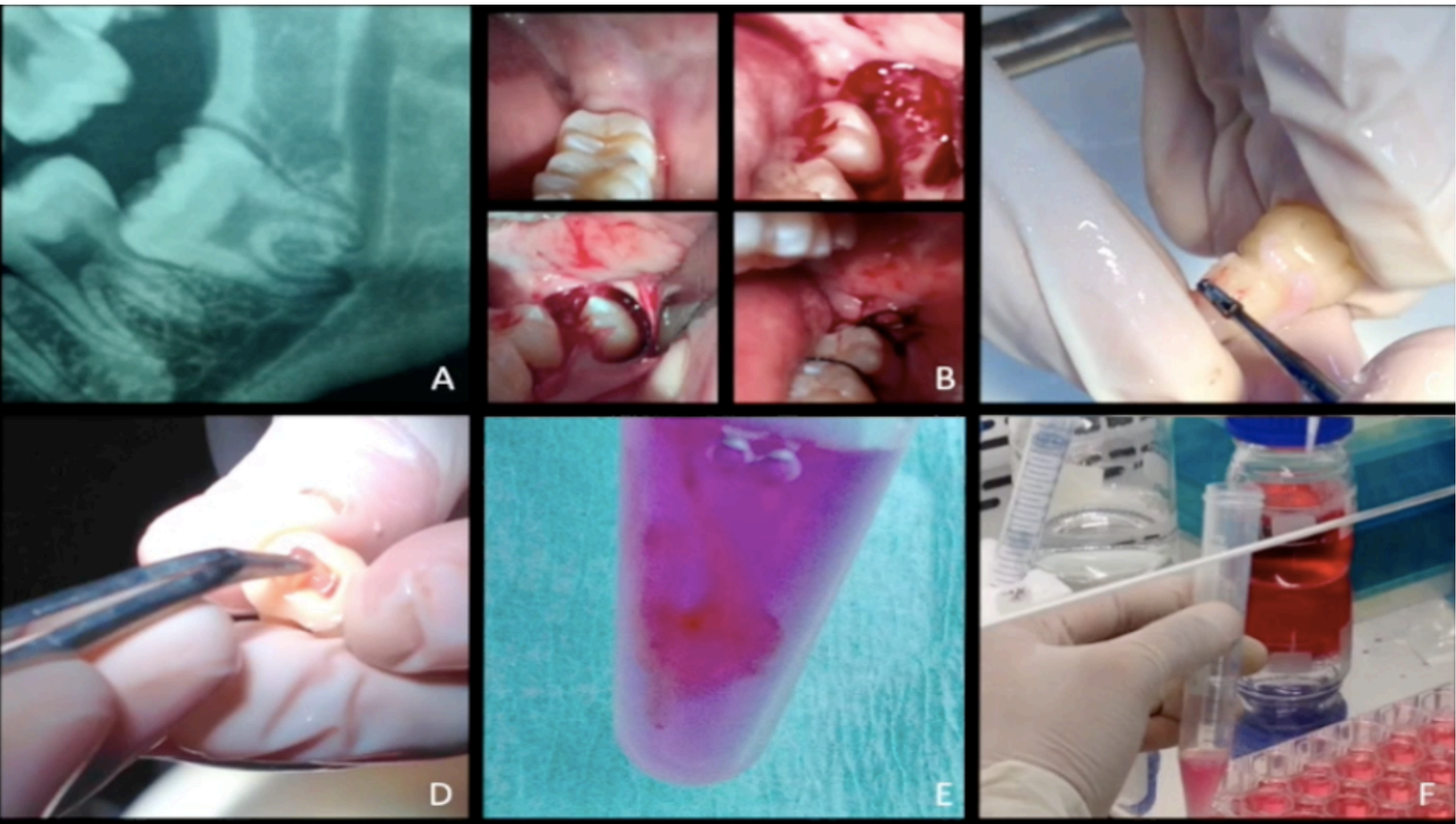


**Figure 1.** Oral and Maxillofacial stem cells sources

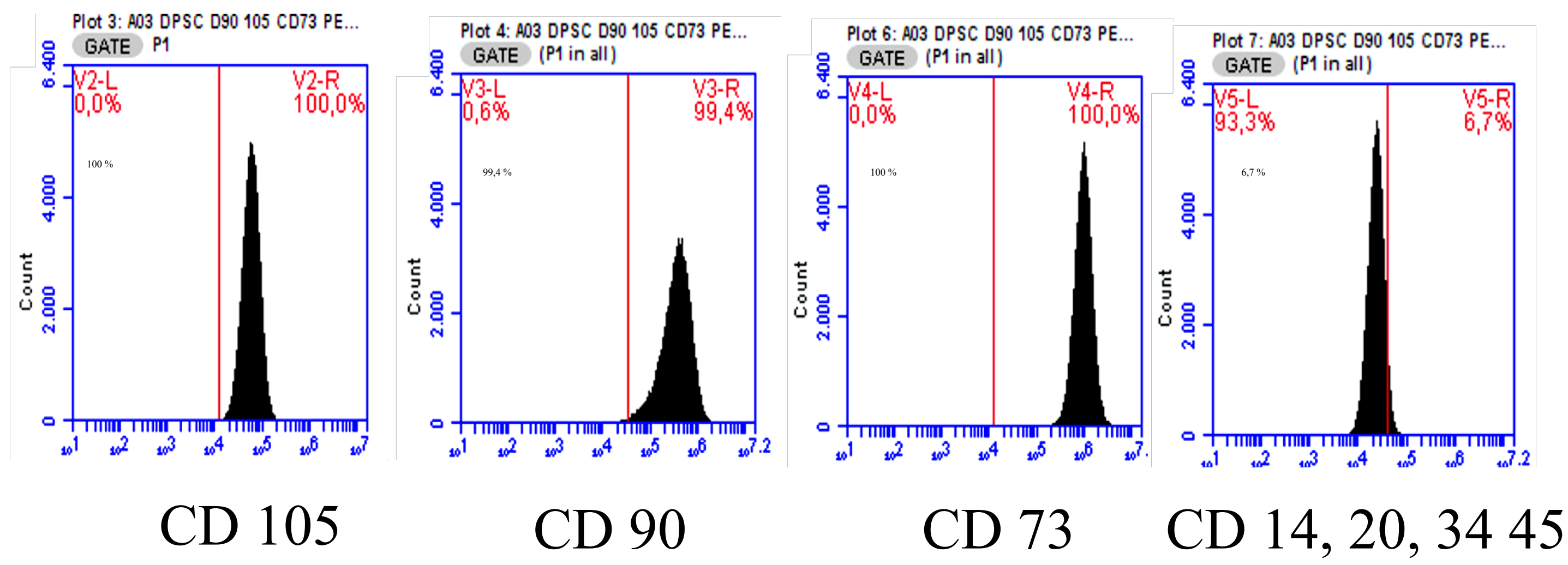
## OBJECTIVE

To **describe** a technique for *in silico* an *in vitro* evaluation of human dental pulp **stem** cells **scaffolds** for critical bone defects in oral and maxillofacial surgery.

## MATERIAL AND METHODS

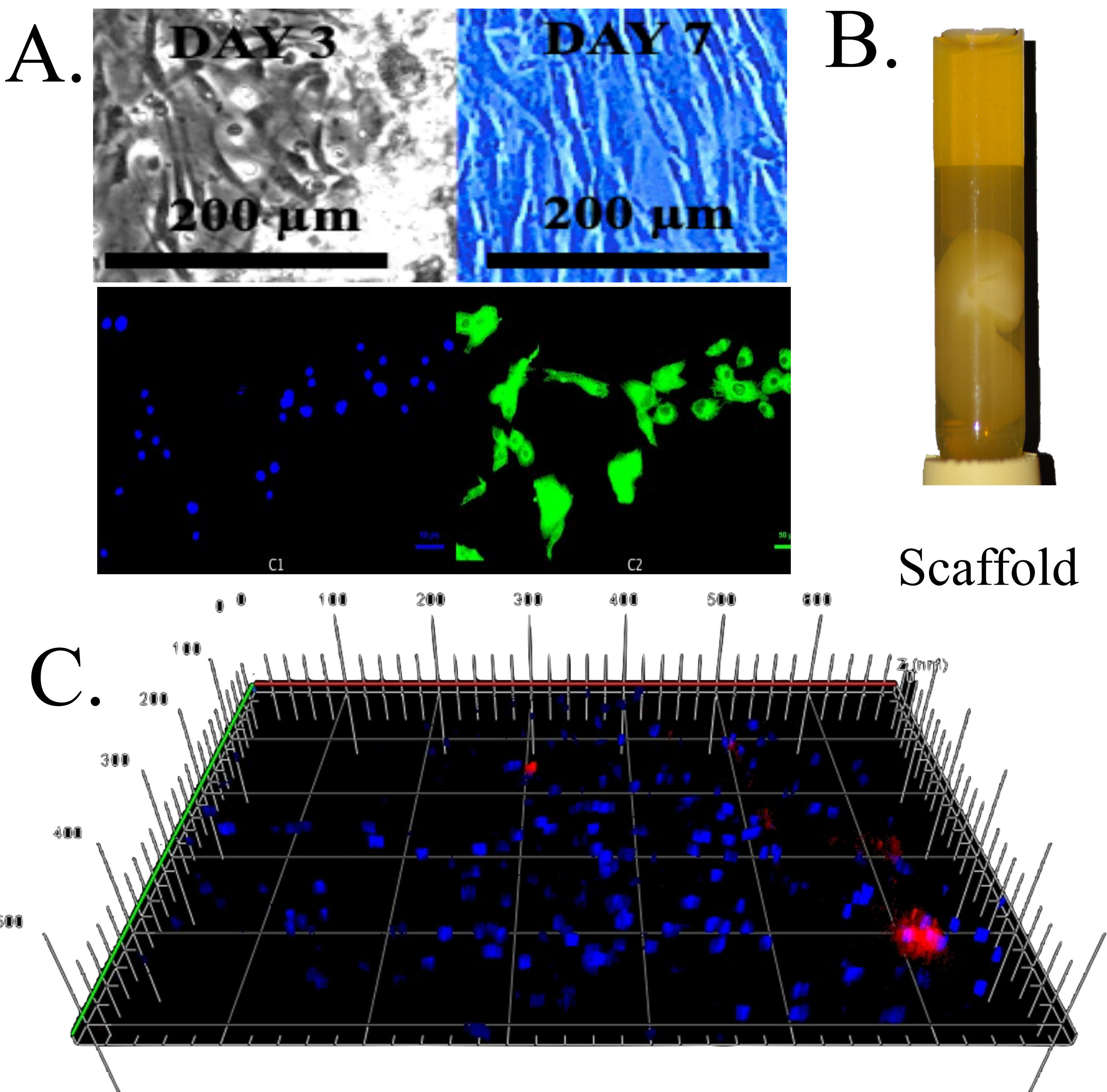


**Figure 2.** Protocol of obtention, isolation and differentiation of hDPSCs from a wisdom tooth.



**Figure 3.** Flow cytometry, positive and negative markers for mesenchymal stem cells according to the international society for cellular therapy.

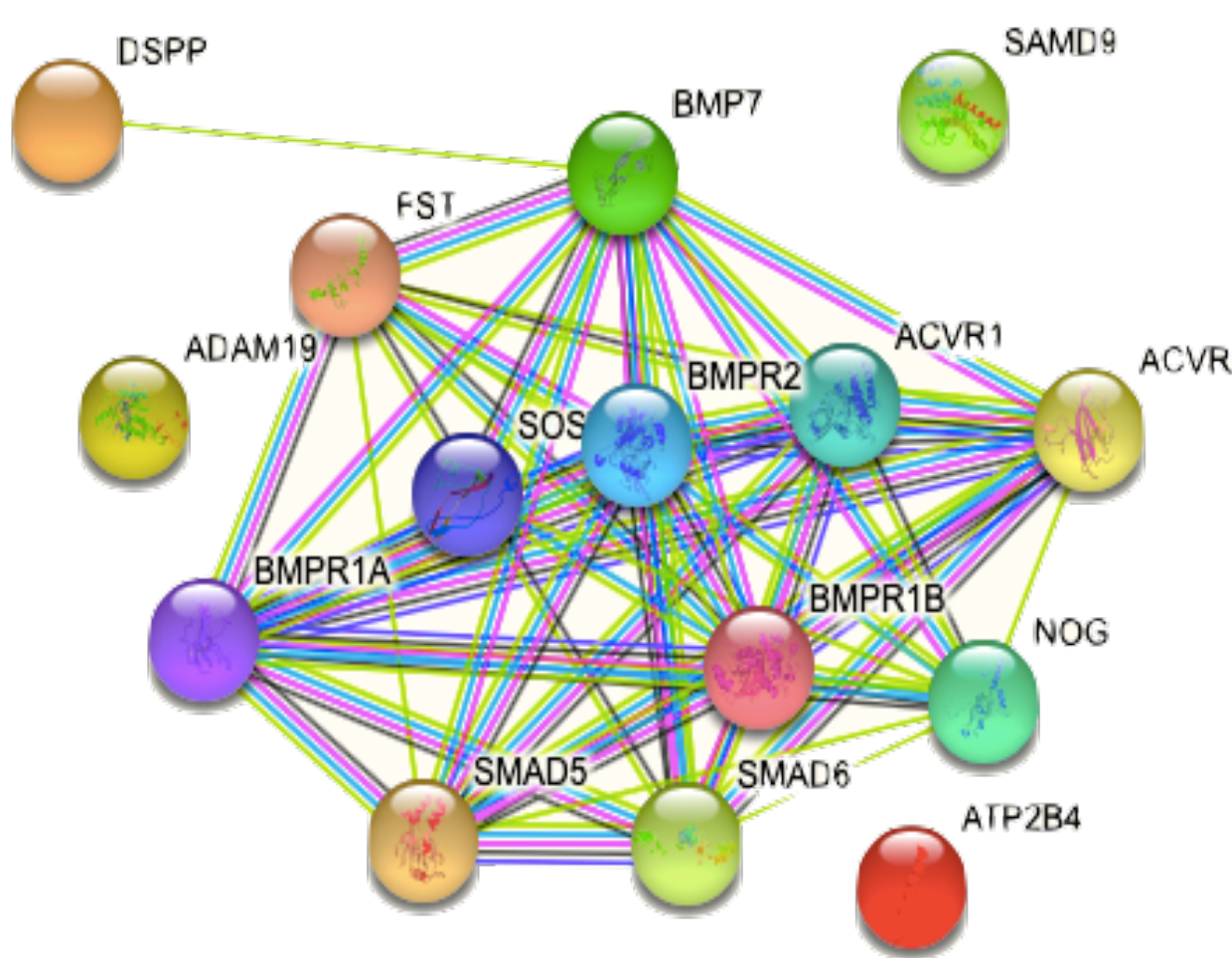
## RESULTS



**Figure 4.** **A.** 2D culture of hDPSCs at diferent times viewed under inverted microscope. **B.** PRF Scaffold with osteoblast from hDPSCs differentiation **C.** 3D culture of hDPSCs disposition and viability by Z-Stacking..

## DISCUSSION

According to Sart el at. **3D** microenviroment and secretome proteins from hDPSCs induce cartilage and bone formation between the Dentin sialophosphoprotein (DSPP) and Bone morphogenetic protein 7 (**BMP7**) release and interactions in **OMFS** therapies. Nowadays BMPs have been applied for critical bone size defects of the maxillofacial region and with good results however without 100% **regeneration**<sup>4</sup>.



**Figure 3.** *In Silico* analysis by STRING, Interactions Between DSPP And BMP7;

## CONCLUSION

This innovative *in silico* and *in vitro* evaluation of 3D **hDPSCs** scaffolds culture methods allows a practical approach in oral and **maxillofacial** surgery for its **clinical** application.

## REFERENCES

(1) Rodríguez AA, Niño JCM. Células troncales mesenquimales de papila apical y su papel en la biología radicular. Rev Mex. Estomato. 2017;3(2):61-74.  
(2) Sart S, Agathos SN, Li Y, Ma T. Regulation of mesenchymal stem cell 3D microenvironment. Biotechnol J 2016 January;11(1):43-57.  
(3) Tsai A, Ma T. Expansion of Human Mesenchymal Stem Cells in a Microcarrier Bioreactor. Methods Mol Biol 2016; 15(2) 77-86.  
(4) Guiqian Chen, BMP Signaling in the Development and Regeneration of Cranium Bones and Maintenance of Stem Cells, Front Cell Dev Biol. 2020; 8: 135.