

Effect Of Folic Acid And BMP2 On Mesenchymal Stem Cells

Bendahan Z., Escobar L., Castellanos J., Mora I., González M. C., Delgado J., Hernández D.
UNIDAD DE MANEJO INTEGRAL DE MALFORMACIONES CRANEOFACIALES (UMIMC)
Facultad de Odontología, Universidad El Bosque, Bogotá - COLOMBIA



INTRODUCTION

Worldwide incidence of bone disorders has increased in recent years.¹ Bone grafts are the most frequent treatment, despite of its complications, such as rejection, transmission of diseases, limited availability and morbidity.^{2,3} In addition, bone grafts are osteoconductive but not osteoinductive.⁴ Tissue engineering aims to develop biological substitutes that restore the function of altered tissues.¹ Bone Morphogenetic proteins (BMPs), specifically BMP2/4/6/7 have an important role in osteoblastic differentiation.¹

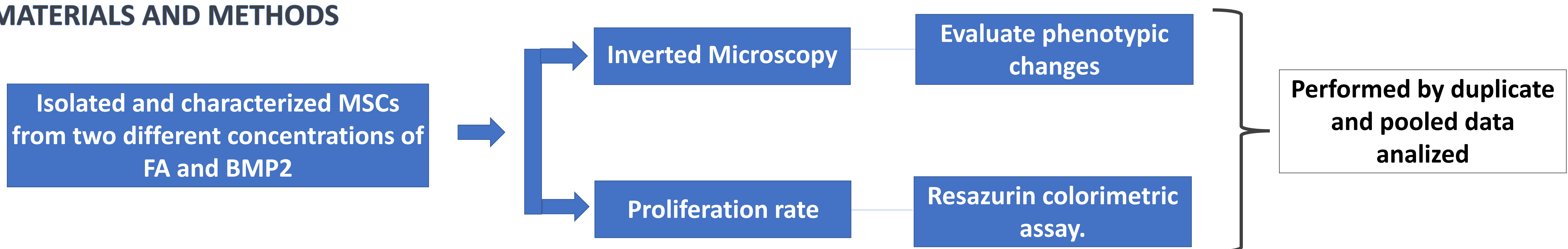
BMP2 is approved to be used in humans.⁴ On the other hand, multiple epidemiological studies have shown that folic acid (FA) and multivitamin supplements help to prevent neural tube defects (NTDs) and suggest a preventive role in the formation of orofacial clefts.^{5,6}

Although BMP2 and FA are important factors for bone formation and regeneration, its effect on mesenchymal cells (MSCs) remains controversial.

OBJECTIVE

The aim of this study is to compare the effect of FA and BMP2 on proliferation and morphology of MSCs.

MATERIALS AND METHODS



Investigation funded by Universidad El Bosque. Approved by the institutional committee on ethics act number 013-2018 of May 15, 2018. Cod: PCI 2017- 9552

Statistical analysis was performed using Kruskal-Wallis and Post hoc Scheffé

RESULTS

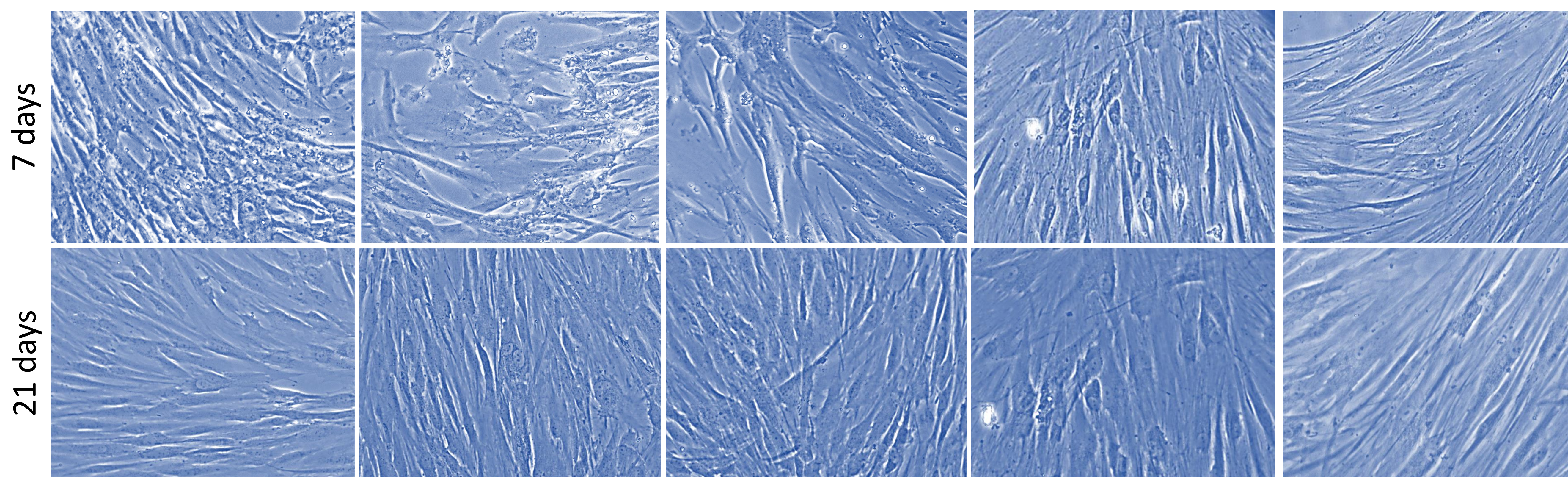


Figure 1. Morphological changes in DPSCs treated with FA and BMP2. Cells treated with 1.6mM and 0.8mM of FA were observed more elongated and less confluent than no treated cells. BMP2 (50-100ng / ml) did not generate morphological changes in the DPSCs from 7 to 21 days of treatment. Error barr: 100 μ m

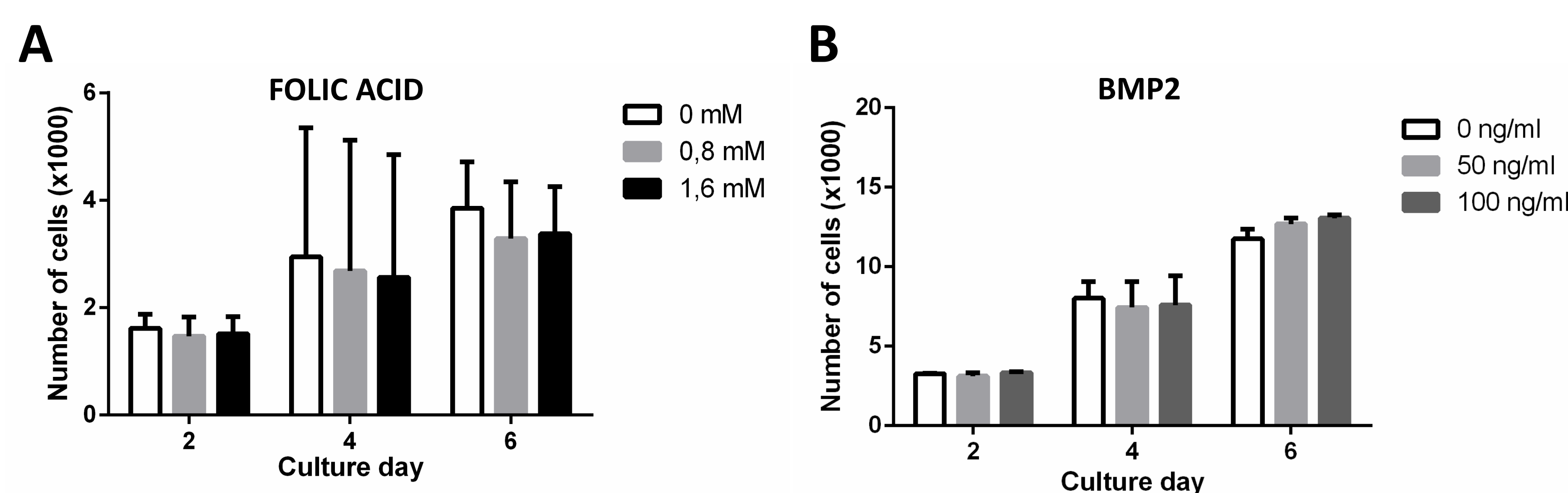


Figure 2. Changes in number of DPSCs treated with FA and BMP2. (A) 1,6 mM and 0,8 mM FA treatments induced a reduction in number of DPSCs since 6 days of treatment (12,5 and 14,8%, respectively) compared to the control group. No statistical differences were observed ($p < 0.05$, Kruskal Wallis). (B) No statistical differences were observed between BMP2 treatments and control, but BMP2 induced 8,4-6,4% more cell proliferation in 50 ng/ml and 100 ng/ml, respectively.

Figure 3. Effect of FA over the DNA's content of DPSC (A) and (B) Percentage according to treatment. The values are presented in means and standards deviations.

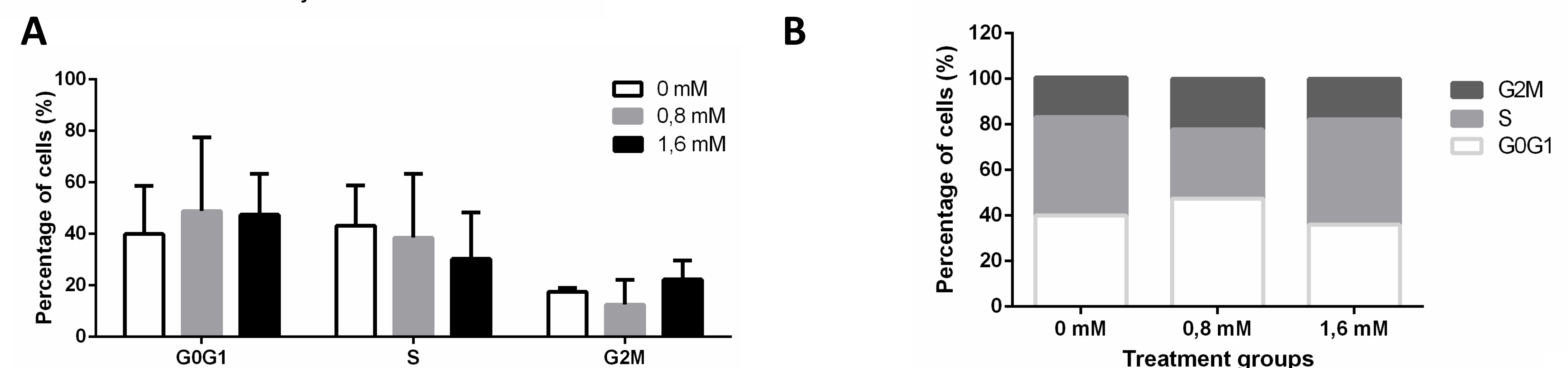
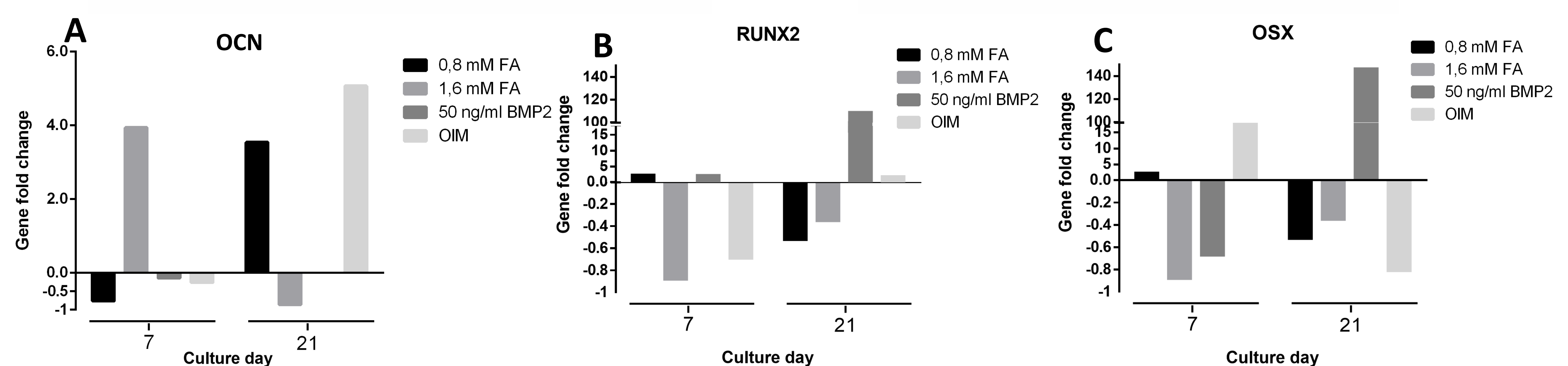


Figure 4. Gene expression over the DNA's content of DPSC with FA and BMP2 (A) Expression of OCN (B) Expression of RUNX2 (C) Expression of OSX



CONCLUSIONS

BMP2 (50-100ng/ml) did not induce changes in phenotype and proliferation, FA (1.6-0.8mM) induce morphological changes and reduce the proliferation of MSCs. Its effect on differentiation into mineralizing phenotype in vitro has to be determined.