# ELECTROSPRAYED CELLS PROLIFERATIVE BEHAVIOUR IN A 3D MICROPOROUS SCAFFOLD

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## Introduction

Cartilage tissue engineering (TE) is a constantly evolving technique which can offer solutions for several articular cartilage degenerative diseases or traumas. The combination of biomaterials and cells, using cartilage TE techniques, allows the mimicking of the depth dependent nanostructural organization of the fibrous collagen network of the native articular cartilage [1]. One of these techniques that enables mimicking the natural biological environments through the production of scaffolds, is electrospinning. In 2006 it was first reported the possibility of electrospinning a cellular biosuspension effectively, while it was not observed significant differences in terms of cell viability between electrospun cells and cells that were not electrospun [2]. It has also been proved the capability of electrospun cells to form functional three-dimensional cell-bearing matrices, by combining them with biopolymers [3]. The following work shows the possibility of successfully electrospraying a cellular biosuspension, which was then used to seed 3D anisotropic microporous scaffolds made of polycaprolactone/gelatin/graphene oxide (PCL/gel/GO). Over a period of 21 days, the cell viability in the scaffolds was measured.

## Methods

A cellular biosuspension with DMEM/F-12+1% penicillin/streptomycin + 10%FBS (FETAL BOVINE SERUM) was prepared for the electrospraying experiment, using chondrocytes. The chondrocyte electrospraying was done in a NANON 01 electrospinning equipment. For this, a needle with size 0.36mm x 12mm was used, the applied voltage was 17.5 kV, at a distance of 12.5cm and a flow rate of 2 mL/h.
Cell viability was measured after electrospray, through the resazurin method to assess cell metabolic activity. Then, the cells were seeded in PCL/gel/GO microporous scaffolds, and the viability of the cells was measured through a period of 21 days in static conditions and compared to the control (scaffolds seeded with non-electrosprayed cells).

## Results

Cell viability was measured after the electrospraying process, and it showed a viability of 87%. The cells were seeded in the PCL/gel/GO microporous scaffolds and the viability was measured in both the control seeded scaffolds and the scaffolds seeded with the electrosprayed cells. Viability was measured at day 1, 3, 7, 14 and 21 and showed a progressive increase in viability throughout the 21 days (figure 1).

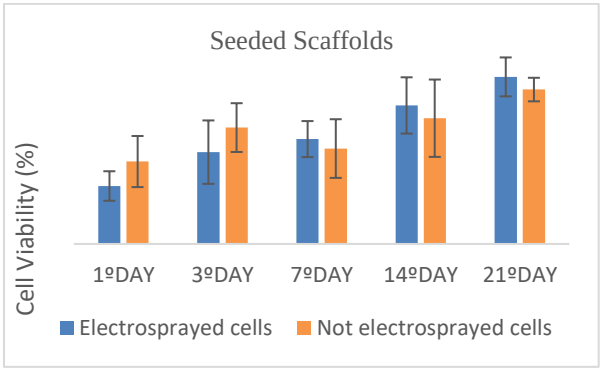


*Figure 1: Cell viability assays of cells seeded on microporous scaffolds after 1, 3, 7, 14 and 21 days of culture.*

## Discussion

The cell viability obtained after cell electrospraying was high, showing that the cells survived in great number to the conditions used for electrospray to occur. For future studies, these conditions are compatible with the use of concurrent electrospinning with a biopolymer, like collagen [4]. The electrosprayed cells were seeded in the scaffolds and both the control and the electrosprayed cells showed an increase in their viability throughout the period of 21 days. This indicates that the cells adapted to the environment in the scaffold and were able to proliferate. It also displays that the cells that suffered the process of electrospray weren't affected by that process and had the ability to withstand the conditions used in the process, being able to adhere to the scaffold and proliferate in them like not electrosprayed cells do.

## References

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## Acknowledgements

This work is supported by the project POCI-01-0145-FEDER-028424 supported by the funding of Programa Operacional Competitividade e Internacionalização (COMPETE 2020) na sua componente FEDER e funding by Fundação para a Ciência e a Tecnologia na sua componente OE. The authors also thank FCT for the PhD grant SFRH/BD/133129/2017.