TERMIS EU 2019

termis®

Tissue Engineering Therapies:
From Concept to Clinical
Translation & Commercialisation

27-31 May 2019
Rhodes, Greece
Rodos Palace Hotel

Conference Chair:
Dimitrios I. Zeugolis, PhD

Conference Program Chair:
Maria Chatzinikolaidou, PhD

Find us at:

www.termis.org/eu2019

termis@nuigalway.ie

@termis_eu_2019

Organized by:

REMODEL
Regenerative, Modular & Developmental Engineering Laboratory

cúram

NUI Galway
OÉ Gaillimh

Laboratory of Biomaterials in Tissue Engineering
University of Crete

FORTH
Foundation for Research and Technology - Hellas

University of Crete

Organizing Secretariat:

convin

T: +30 210 6833600
E: congress@convin.gr
W: www.convin.gr

TERMIS EU 2019
27-31 May 2019 / Rhodes, Greece
Tissue Engineering Therapies:
From Concept to Clinical Translation & Commercialisation
termis

Piezoelectric polymeric nanofibers as smart scaffolds for tissue engineering

A. Zaszczynska[1], P.Ł. Sajkiewicz[1], A. Gradys[1]
Presenting Author: Angelika Zaszczyńska, azasz@ippt.pan.pl
[1]Institute of Fundamental Technological Research Polish Academy of Sciences, Laboratory of Polymers and Biomaterials, Warsaw, Poland

INTRODUCTION: As regards the field of biomedical engineering, in recent decades there is observed an increasing scientific and technical interest in research related to development of Smart Materials (SM). Such materials are generally designed to react to external stimuli (physical, chemical, mechanical) and behave similarly to natural body tissues. One type of such SM are piezoelectric scaffolds, which can generate electrical signals in response to the applied stress [1,2].

METHODS: Polyvinylidene fluoride (PVDF) nanofibers formed by electrospinning were subjected to in-vitro cellular studies. In the stimulation experiments, fibroblasts L929 cells cultured on the piezoelectric PVDF scaffolds collected at various rotational speeds of the collector, were exposed to ultrasounds for 30 minutes, one time per day, for 7 days. Ultrasound stimulus with power 20mW, 80mW and frequency 1,7 MHz were applied. In order to confirm the piezoelectric effect of the PVDF scaffolds on fibroblasts activities, piezoelectric PVDF scaffolds without ultrasonic stimulation were used as a control.

RESULTS & DISCUSSION: Enhanced viability and activity of cells dynamic culture have been observed and are invoked as a proof of suitability of the piezoelectric effect (Fig. 1). Cell culture studies demonstrated that the viability and growth of fibroblasts on PVDF fiber scaffolds were comparable over a 7-day period. The observations using SEM verified the attachment and proliferation of the cells on the fiber scaffolds. Moreover, the cell morphology on the fiber scaffolds was different when the 1-day culture and 7-day culture images were compared: on day 1, the cells had more rounded morphology while for 7 days their morphology was more elongated and spread-out (Fig. 1).

CONCLUSIONS: The use of ultrasounds stimulation, in combination with piezoelectric polymers, is advantageous for cellular studies. Exhibiting good cellular response show potential to be used in tissue engineering as a scaffold material.

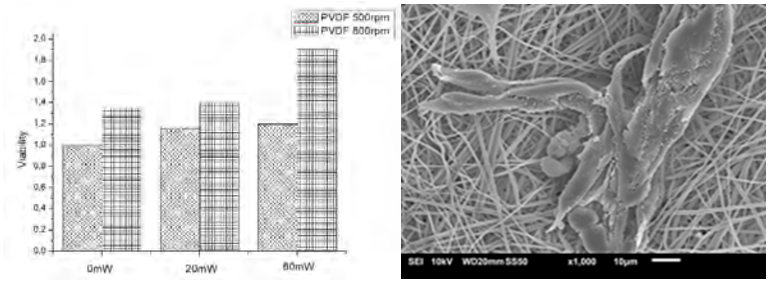

Figure 1: Viability of fibroblasts L929 using ultrasound stimulation with different power. SEM images of PVDF nanofibers with fibroblasts L929 cell culture on day 7.

REFERENCES

[1] Sajkiewicz P et al. Eur. Polym. J. 1999;35 (3):423-29.
[2] Kim YT et al. 2009, Biomaterials 2009;30 2582-25090.