# COMPARISON OF ATTACHMENT AND PROLIFERATION PROPERTIES OF RAT BONE MARROW AND ADIPOSE TISSUE DERIVED MESENCHYMAL STEM CELLS ON PCL NANOFIBROUS SURFACES

**Seyma Cogan[1], Merve Capkin[2], Aylin Sendemir Urkmez[1,4], Menemse Gumusderelioglu[3], Ismet Deliloglu Gurhan[1,4]**

*[1]Dept. of Bioengineering, Faculty of Engineering, Ege University, Izmir, Turkey*
*[2]Dept. of Bioengineering, Faculty of Engineering, Hacettepe University, Ankara, Turkey*
*[3]Dept. of Chemical Engineering, Faculty of Engineering, Hacettepe University, Ankara, Turkey*
*[4]Dept. of Biomedical Technologies, Graduate School of Natural and Applied Sciences, Ege University, Izmir,Turkey*

## Introduction

The limited methods used in the treatment of damaged tissue and organs revealed the need for alternative therapies. Tissue engineering, that is one of the alternative therapies, is a new approach which provides repair and regeneration of tissues [Mobarakeh, 2010]. Tissue engineering is a multidisciplinary field that contains applications of the principles of engineering and basic sciences. This field provides understanding of structure-function relations in normal and pathological tissues and development of biological substitutes that are used in regeneration and repair of tissue function [Sachlos and Czernuszka, 2003]. Although different techniques and technologies are applied for forming each of target tissues, all approaches are based on the basic principles of tissue engineering [Mikos and Mummery, 2003]. This approaches, just as in natural tissues, are based on cells, tissue scaffolds (artificial ECM) and stimulating signals [Chan and Leong, 2008; Rosa, 2012]. Among these components, tissue scaffolds is one of the most important parameters for cell viability, adhesion, proliferation, morphology and differentiation.

The aim of this study is to compare three different surfaces and choose an appropriate surface for attachment and proliferation of mesenchymal stem cells (MSCs) for tissue engineering applications.

## Methods

Mesenchymal stem cells derived from bone marrow and adipose tissue were used. Polycaprolactone (PCL) membranes (-M) were prepared by solvent casting method. Aligned (A) and random (R) nanofibers were collected on PCL membranes by electrospinning. PCL surfaces were characterized by scanning electron microscopy (SEM) and static contact angle analysis. Mesenchymal stem cells which were characterized by flow cytometry were cultured on PCL surfaces. MSC's attachment properties were examined by SEM and immunofluorosence, also proliferation properties were investigated by MTT assay.

## Results

Although the least cell attachment was observed on polystreyne surfaces, cell proliferation on PCL surfaces was not as good as polystyrene. Adipose derived stem cells adhered and proliferated on all surfaces better than bone marrow stem cells. Also the highest growth was on the PCL-A in PCL surfaces.

## Discussion

Data obtained at the end of this project, will be guide to the other new works in tissue engineering studies on cell-surface interactions.

## References

Chan and Leong, *Eur Spine J*, 17: 467–479, 2008.

Ghasemi-Mobarakeh et al., *Materials Science and Engineering C*, 30: 1129–1136, 2010.

Mikos, and Mummery, NWO| Huygens Lectures, Netherlands Organisation for Scientific Research (NWO), 40p, 2003.

Sachlos and Czernuszka, *European Cells and Materials*, 5: 29-40, 2003.

Rosa et al., *Dental Materials*, 28(4): 341–348, 2012.