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Hybrid scaffold to anterior cruciate ligament regeneration

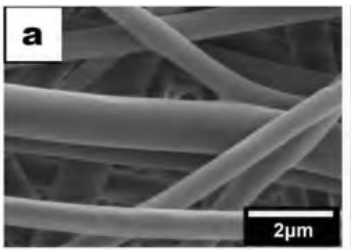
D. Kolbuk-Konieczny[1], O. Urbanek-Swiderska, O. Jeznach[1]
Presenting Author: Dorota Kolbuk-Konieczny, dkolbuk@ippt.pan.pl; dorotakolbuk@gmail.com
[1]Institute of Fundamental Technological Research Polish Academy of Sciences, Laboratory of Polymers and Biomaterials, Warsaw, Poland

INTRODUCTION: Anterior cruciate ligament rupture is ~~on~~ the main injury of sportsmen and young people. Despite the relatively long time of recovery, professional footballers cases indicate that after 3 years from the end of treatment, only 65% of the players returned to professional activity [1]. The aim of this poster is to show hybrid scaffold which is able to regenerate ligament and ~~regenerate~~ bone in which it is fixed.

METHODS: Different types of polyesters nonwovens were formed by electrospinning. Their surface was modified with growth factors and hydroxyapatite. Scaffold morphology was illustrated by SEM (scanning electron microscopy); chemical structure was evaluated by FTIR (Fourier-transform infrared spectroscopy) and EDS (energy dispersive spectroscopy). In-vitro cellular studies were carried out on fibroblasts and osteoblasts. Cellular morphology was analyzed by SEM and FM (fluorescence microscopy); cytotoxicity and proliferation were determined by MTT and Presto Blue test respectively.

RESULTS & DISCUSSION: FTIR and EDS data confirm effectiveness of chemical modification. SEM illustrates hydroxyapatite nanoparticles on electrospun fibres surface (Fig. 1). Cell culture studies demonstrated that the fibroblasts are spread on the nonwovens, they indicate proper morphology in comparison to cells seeded on TCP (tissue culture plastic- control) (Fig. 2). Cytotoxicity test indicates nontoxic character of nonwovens before and after modification; cellular proliferation is higher on nonwovens modified by TGF and BMP growth factors.

CONCLUSIONS: Nonwovens modified by growth factors and hydroxyapatite enhance cellular spreading, migration and proliferation due to similarities to natural extracellular matrix in chemical and morphological properties.



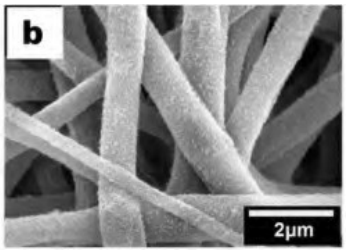


Figure 1: (left) Nonwovens morphology before (a) and after HA (b) coating. **Figure 2:** (right) Morphology of cells seeded on a) TCP, b) PLGA with TGF, c) PLCL with RGD d) PLCL with TGFβ. Images were collected with FM.

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REFERENCES

[1] Waldén M et al. Br J Sports Med 2016;50:744–50.