Polymers development as biomaterial has a prominent position in medical implants, pharmacological and biotechnology. Poly 2-hydroxy ethyl methacrylate (PHEMA) and poly lactic acid (PLLA) represent two polymeric materials with well known biocompatibility. However, the combination of PHEMA and polyester generally has not been widespread in literature, especially for medical applications. In order to increase the hydrophilicity of PLLA and improve the cell adhesion to PHEMA, in vitro and in vivo biological assays were performed to analyze the biocompatibility of this combination (PHEMA-PLLA scaffold). Firstly, for in vitro assay, human fibroblast cell (MRC-5) was cultivated as 3D-culture for 7 days. MTT assay were performed to determine cell proliferation and citotoxicity and was observed 99% of cell viability. The material also, promoted a proliferation in its surface. Adhesion and cell morphology of MRC-5 cultivated under PHEMA-PLLA disks for 72h was analyzed by scanning electron microscopy. The cells were shown a tightly attachment to the PHEMA-PLLA scaffold after 72 hours. For in vivo biocompatibility assay, PHEMA-PLLA disks were implanted in the subcutaneous tissue of Swiss mice for 4 days. The PHEMA-PLLA scaffold the scaffold promoted a great template for cell migration and spreading in vivo and also induced early layers formation. A fibrous capsule with a large number of cells suggestive of fibroblasts was surrounding of PHEMA-PLLA discs. The results suggest that the PHEMA-PLA biomaterials did not promote cytotoxicity activity in vitro and did not promote an inflammatory processes in vivo, improving cell adhesion and showing greater biocompatibility.

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Fig. 1: MRC-5 fibroblasts viability by MTT assay.

Fig. 2: Scanning electron microscopy of MRC-5 fibroblasts upon PHEMA-PLLA after 72 hours. A. Broad view of PHEMA-PLLA disc without fibroblasts cells. B. Broad view of half part of PHEMA-PLLA disc with MRC-5 for 72h. C. High magnification of B, showing fibroblasts cells overspread and well attached to PHEMA-PLLA scaffold. Bars: A-B: 1.0 mm; C: 100 µm.

Fig. 3: SEM of PHEMA-PLLA scaffolds inserted into mouse subcutaneous space for 4 days. A. PHEMA-PLLA general view. B. High magnification of A. Observe the presence PHEMA-PLLA involved by connective tissue and large number of fibroblasts. C. High magnification of C. Observe cell association forming a connective tissue. Bars: A: 1.0 mm; B: 200 µm; C: 40 µm.