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MORPHOLOGICAL STUDY OF A BIORESORBABLE TUBULAR MATRIX OF A SMALL DIAMETER FROM A POLY(L-LACTIDE) FOR A TISSUE-ENGINEERED VASCULAR IMPLANT

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Non-woven tubular bioresorbable matrices with an inner diameter of 1.1 mm were obtained by electrospinning from solutions of poly(L-lactide) (PLA). Matrices were implanted in the abdominal part of the aorta to rats as a tissue-engineered vascular implant for a period of 2 days to 16 months and showed high biocompatibility, non-toxicity, and pronounced atrombogenic properties. The total implant patency was 93%. Morphometric analysis of the dynamics of population of the matrix with cells showed that at all periods of observation in the outer half of the matrix wall the number of cells prevails, which indicates the migration of cells from the connective tissue capsule surrounding the matrix. It was shown that two parallel processes occur in the matrix wall: bioresorption of PLA fibers and the formation of connective tissue. Complete bioresorption of matrices with the replacement of native tissues, the formation of the endothelial and subendothelial layers took place over the 16 months of the experiment. By this time, all experimental animals in the reconstruction zone had aneurysmal enlargement that did not lead to rupture of the implant. In order to prevent the development of such complications, it is necessary to develop a method for additional strengthening of the matrix wall.

Keywords: tissue engineering, cell transplantology, tissue engineering vascular implant, bioresorbable matrices, polylactide, electroforming