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## Analysis of smooth muscle regeneration in the tissue-engineered urinary bladder: A study in a porcine model

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**Background:** There are many medical indications such as an invasive urinary bladder cancer, congenital abnormalities or trauma which require treatment by urinary bladder wall augmentation or even reconstruction of the entire organ. The use of intestinal wall to reconstruct urinary tract is the gold standard. However, this method is associated with many complications. Tissue engineering offers a possibility to construct the urinary bladder wall de novo.

**Aim:** The aim of this study was to evaluate the regeneration process of smooth muscles after urinary bladder augmentation with bladder acellular matrix (BAM).

**Method:** To prepare acellular scaffolds, 10 porcine urinary bladders were subjected to decellularization using mechanical and chemical methods. The study involved 10 pig recipients. The first step of operating procedure was to perform hemicycstectomy then the resulting defect of urinary bladder wall was reconstructed with tissue-engineered bladder acellular matrix. After six months, follow-up reconstructed bladders were evaluated histologically, immunohistochemically, molecularly and radiologically.

**Results:** Six recipients were survived the entire observation period. The reasons for the death of four pigs were catheter blockage, mechanical damage of the matrix or anastomosis dehiscence between the native bladder tissue and the graft. The bladders reconstructed without complications functioned properly without urine retention or stagnation in the upper urinary tract. Smooth muscle tissue regeneration was observed mainly in the peripheral parts of the graft. However, arrangement of muscle fiber was irregular. Expression of smooth muscle markers in tissue engineered urinary bladders was significantly decreased compared to control. Partial fibrosis and shrinkage of grafts were observed.

**Conclusion:** Regeneration of smooth muscles in bladders reconstructed with acellular matrices is incomplete and ineffective. Further research with cell seeded scaffolds is required to enhance smooth muscle regeneration in reconstructed urinary bladder.

### Biography

Marta Pokrywczyńska is the Head of the Department of Regenerative Medicine at Nicolaus Copernicus University (NCU) (Bydgoszcz, Poland). She has completed her MSc and PhD in Medical Biotechnology from the NCU. Her research area focuses on "development of new tissue engineering and regenerative medicine technologies".

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