

UROGRAFT

Implant for the urinary bladder reconstruction

There are many congenital and acquired conditions that require urinary bladder reconstruction. The most frequent cases are neurological dysfunctions, chronic inflammations, congenital and developmental defects of the urinary tract and traumas. The most frequently used material for the urinary bladder reconstruction is the wall of the intestinal tract. However, the use of this material induces many complications. At the moment there is no commercially available medical device or Advanced Therapy Medicinal Product (ATMP) for the reconstruction of the urinary tract, which would replace autologous material (intestinal wall).

UROGRAFT is the first “straight off the shelf” product dedicated to patients requiring reconstruction of the urinary bladder.

DESCRIPTION

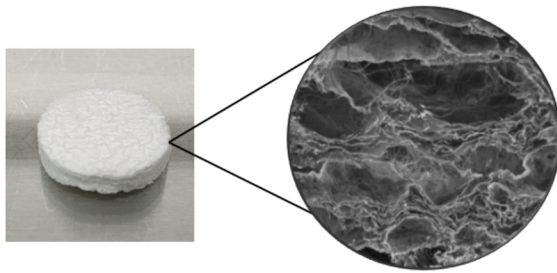


Fig. 1. The unique structure of the UROGRAFT implant.

UROGRAFT is made of a biodegradable, composite scaffold, which is characterized by biological and mechanical properties similar to the human native urinary bladder wall.

There are two available variants of UROGRAFT:

- an acellular product
- in combination with Adipose-Derived Mesenchymal Stem/Stromal Cells (AD-MSCs).

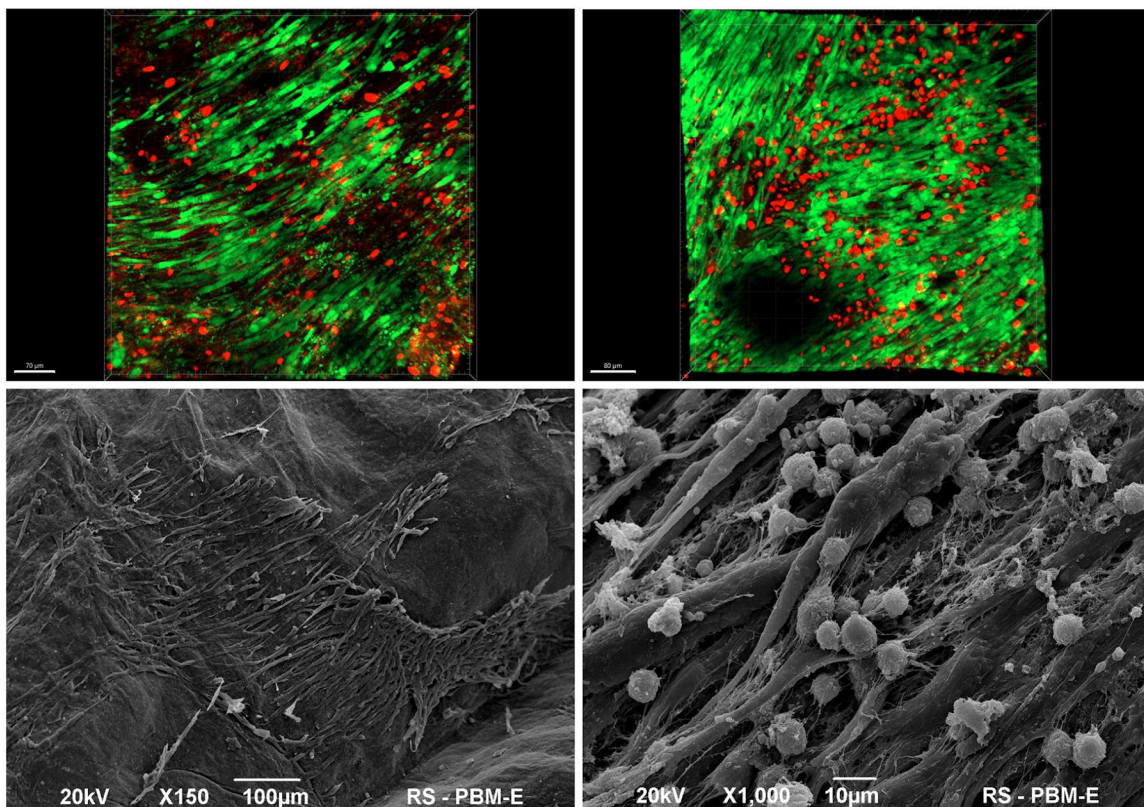


Fig. 2. Human AD-MSCs seeded on the UROGRAFT implant - live-dead staining - confocal microscope image and SEM (Scanning Electron Microscopy). The SEM results showed that the AD-MSCs cells have a correct morphology, attach to the UROGRAFT scaffold, creating a compact monolayer. The live-dead staining results showed high >80% viability of AD-MSCs on the UROGRAFT scaffold.

The preclinical results on 20 pigs confirmed the safety and efficiency of the UROGRAFT product for the regeneration of the urinary bladder.

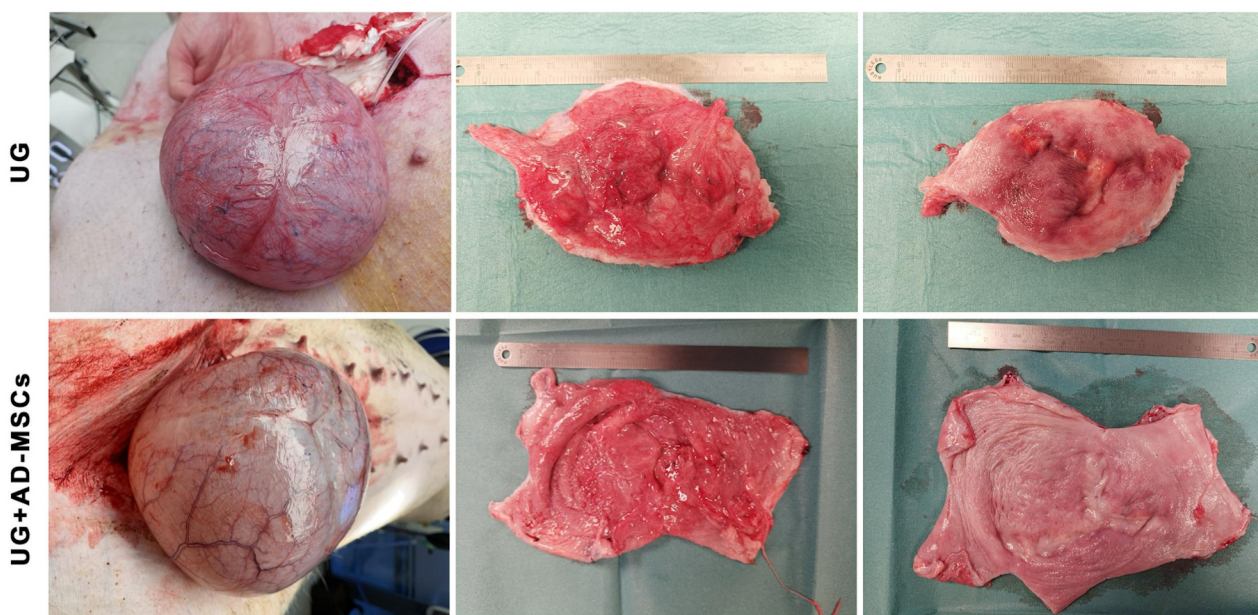


Fig.3. Porcine urinary bladder reconstructed with the UROGRAFT implant (UG) or with the UROGRAFT implant seeded with Adipose-Derived Mesenchymal Stem/Stromal Cells (UG+AD-MSCs). Macroscopic images of reconstructed bladder after 6 months follow-up. A very good integration of the UROGRAFT implant with the native tissues is visualised.

The method for manufacturing the UROGRAFT seeded with AD-MSCs product was validated in the clean room laboratory of the ATMP Manufacture. The process was conducted in accordance with the Good Manufacturing Practice (GMP) principles.

LABORATORY

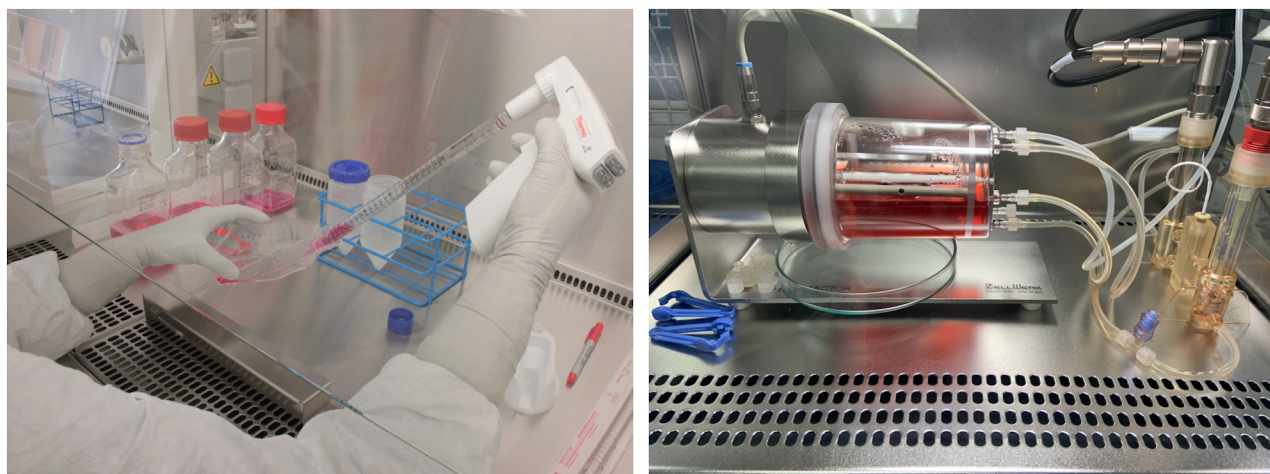


Fig.4 Preparation process of the UROGRAFT implant in a clean room laboratory, ATMP Manufacture, Department of Urology and Andrology, Collegium Medicum UMK, Bydgoszcz.

UROGRAFT is a product fully tested *in vitro* and *in vivo*, ready for use in a clinical trial.

NCBR

National Centre for Research
and Development



ADVANTAGES

- **Advantages regarding the surgical procedure:**
 - elimination of the need of gastrointestinal tissues,
 - elimination of the need to perform additional surgery,
 - shortening of the total operation time,
 - lack of complications associated with gastrointestinal tract surgery,
 - insertion of the implant through a laparoscopic or robotic trocar.
- **Full biocompatibility:**
 - biocompatibility demonstrated *in vitro* and *in vivo*
 - non-cytotoxic,
 - non-genotoxic,
 - non-inducing systemic toxicity
 - and non-inducing intradermal irritation/reactivity.
- **Impermeability to urine:**
 - unique composite implant structure reduces urinary permeability.
- **Advantages regarding the shape of the implant:**
 - minimizes the area of an unfavourable environment for regeneration,
 - avoid the need to create additional cavities in the bladder wall,
 - accepts urine storage pressure between 20-60 ml/cm H₂O.
- **Preclinical experiments on a large animal model:**
 - demonstration of the efficacy of the implant for the regeneration of the reconstructed bladder wall, on 20 pigs.
- **“Straight off the shelf” product:**
 - the acellular product is available off-the-shelf and does not need to be specifically tailored to the needs of a particular patient.
- **Combined ATMP**
 - UROGRAFT can be used in combination with mesenchymal stem/stromal cells,
 - the specific composition of the implant structure allows the growth of cells not only on the surface of the implant but also inside its three-dimensional structure.

