FOR IMMEDIATE RELEASE | WEDNESDAY 20 NOVEMBER

STRONG-UR: revolutionising tissue reconstruction with bioprinting technology

Aalborg, Wednesday 20th November 2024 - Starting this month, STRONG-UR will develop new bioprinting solutions for regenerative medicine – in particular for the fabrication of tubular organs. An international team, coordinated by Aalborg University, will work on a revolutionary combination of manufacturing technologies and biomaterials to create preclinical viable tissue constructs for the male urethra. This type of technology could improve the treatment of lower urinary tract disorders in patients.

Urethral strictures, a significant healthcare challenge

Approximately 0.6% of the male population suffers from urethral strictures. This condition often leads to debilitating physical and psychological effects and, in severe cases, results in urinary retention, sexual dysfunction, bladder damage, and kidney failure. Current surgical treatment options face limitations, such as a shortage of donor tissue, lack of standardisation, and high costs.

Bioprinting technology for medical research

The STRONG-UR project seeks to bridge these gaps through bioprinting technology, which enables the production of customisable tissue constructs with optimised cell composition, structure, and mechanical properties. The first year of the project will be dedicated to laboratory research on analysing tissues and characterising the biomaterials to be used for bioprinting.
As stated by the project coordinator, Pablo Pennisi, Associate Professor at Aalborg University: “We are conducting a comprehensive study on the structure of human urethra to better understand it and its functional relationships. Based on this information we will develop bioprinting strategies where we will personalise the architecture and the composition of the tissue structures. Afterwards, we are going to validate the technology with in vivo models”.

The core bioprinting technology of STRONG-UR is based on innovative biomaterials, dynamic hydrogels that offer unprecedented control over the mechanical and biological properties of tissue constructs. These hydrogels are combined with cells to produce so-called bioinks, which are then transformed into complex biological constructs using innovative manufacturing processes.
STRONG-UR’s innovative approach to urethral repair represents a critical step in transforming bioprinting technologies into feasible, scalable clinical solutions for tubular organ tissue engineering. Through robust collaboration and commitment to clinical standards, the project promises to contribute significant advances in the management of urethral diseases and beyond. In addition to developing tissue constructs for clinical application, STRONG-UR will develop a human-based in vitro testing platform for urethral catheters. This platform will enable a more

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ethical and reliable preclinical evaluation that goes beyond conventional methods based on animal models.

A collaborative European effort

Backed by a consortium of 12 partners from six European and one associated member state, STRONG-UR combines expertise from academic institutions, hospitals, and industry. The team includes specialists in cell biology, biomaterials, 3D printing, and urology from leading organisations including Aalborg University, Tampere University, Ghent University, Università Cattolica del Sacro Cuore and University Medical Center Utrecht, alongside industry leaders in bioink formulation, medical device manufacturing, and regulatory management such as 4Tissue, Wellspect AB, Brinter, and Adbioink Biosystem Technology. Additionally, the European Association of Urology and META Group provide dissemination expertise to support STRONG-UR's communication and outreach objectives.

About STRONG-UR

STRONG-UR is an EU-funded Research and Innovation Action with a duration of 48 months focused on developing and testing novel strategies for engineering tissue constructs to advance the treatment of urethral diseases.

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Cordis link: https://cordis.europa.eu/project/id/101191695

Keywords

- Tissue reconstruction
- Bioprinting
- Urethral Strictures
- Urethra
- Adipose derived stem cells
- 3D printing
- Regenerative medicine
- Bioink
- Biomaterials
- Hydrogels
- Regulatory compliance

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