Press Release

New liver & more - SPRIND enables artificial organ replacement

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The Federal Agency for Disruptive Innovation SPRIND announces the participants of the SPRIND Funke "Tissue Engineering". The first stage of the 10-month innovation competition will fund four teams to demonstrate the feasibility of a novel approach to tissue engineering for a first human transplant. The teams will create organ replacements for liver, pancreas, muscle and joint cartilage.

Many patients are dependent on donor tissue or organ donations. However, the high demand for donor tissue and organs cannot be met by far. As a result, patients suffer from long waiting lists and countless medical challenges or die before a donation is available. Artificially created tissue, on the other hand, promises a lasting improvement in quality of life for these people.

Over the past decades, scientists, engineers and physicians have developed tools to construct biological substitutes that mimic natural tissue. However, the ultimate goal of overcoming the limitations of conventional organ transplantation remains unachieved.

"The SPRIND Funke "Tissue Engineering" therefore aims to develop a sophisticated concept that will produce the most advanced artificial tissue to date," explains Dr. Jano Costard, Challenge Officer at SPRIND. "The tissue should come as close as possible to the natural organ in order to give patients a high quality of life as a transplant. This requires innovations in the engineering of cells, the development of tissue architectures and technical materials."

The following four teams were selected to take part in the first of two stages:

Cellbricks GmbH

Without a functioning liver, the body's metabolism breaks down. That is why the Cellbricks team has set itself the goal of replacing missing or impaired liver functions. Together with their clinical partners at Charité Berlin, they want to replicate human liver tissue at scale. 3D-bioprinting will be used to create complex liver tissue from bioinks containing extracellular matrix and human liver cells. These tissue therapeutics will be biofabricated in the lab and ultimately implanted into the patients’ bodies, so that patients can enjoy longer and healthier lives.

ZonalCartHT – Bizonal cartilage grafts

Missing or damaged cartilage causes enormous pain and often renders our joints unusable. The ZonalCartHT team led by Dr. Solvig Diederichs (Orthopaedic University Hospital Heidelberg) and Dr. Uwe Freudenberg (Leibniz Institute of Polymer Research Dresden) is developing a new type of cartilage substitute to restore joint function. By combining biohybrid hydrogels and stem cells, a complex two-layer matrix is being developed that mirrors the natural transition between bone and cartilage. At the same time, the materials used should enable sustainable function and resilience in order to restore joint function and prevent multiple joint replacements.

Muscle Engineering for Human Transplant

Despite their plasticity, injuries and diseases can push the regenerative capacity of muscle tissue to its limits. In order to better treat muscle injuries and diseases, the team of Dr. Bruno Cadot (Institut de Myologie, Paris), Dr. Francisco Fernandes and Dr Léa Trichet (Sorbonne Université, Paris) wants to produce large transplantable muscle units. The ice-templating technique used by the team enables the production of macroscopic and complex tissue architectures from collagen and fibrin. These are

then to be colonized with different cell types found in muscle tissue in order to obtain functional and muscle units that will subsequently replace damaged tissue.

Functional Bioprinted Pancreas Tissue

Although insulin offers many people with type 1 diabetes an effective treatment, there is still no prospect of a cure because the body's own tissue for insulin production is missing. Riccardo Levato (Utrecht University Medical Center) and his team want to take a decisive step towards a cure. With the help of light-induced bioprinting, they simultaneously combine stem cells, biologically active molecules and extracellular matrix to form a functional tissue unit. The resulting tissue resembles the endocrine pancreas and can also produce insulin. Further functionalization is also intended to protect the new tissue from destruction by the immune system in order to solve the basic problem of type 1 diabetes.

The SPRIND Funke has a duration of 10 months in two stages. In the eight months of stage 1, SPRIND supports the participating teams in demonstrating the properties of an artificial tissue with up to 500,000 euros. Stage 2 enables the planning of a first-in-human trial with an additional up to 100,000 euros.

More information can be found at https://www.sprind.org/en/challenges/funke-tissue-engineering/

About SPRIND

The Federal Agency for Disruptive Innovation, SPRIND, was created 2019 and is headquartered in Leipzig, Germany. The sole proprietor of SPRIND is the German Federal government, represented by the Ministry of Education and Research (BMBF) and the Ministry of Economic Affairs and Climate Action (BMWK). SPRIND fills a gap in the German innovation ecosystem: it discovers novel, disruptive technologies to address the greatest challenges of our time. SPRIND also ensures that the value provided by developing radically new technologies remains within Germany and Europe. SPRIND is financially supported with funding made available through the Federal budget. SPRIND is led by Rafael Laguna de la Vera and Berit Dannenberg.

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