PARTNERS

LEAD PARTNER

University of Mons (Belgium)
www.web.umons.ac.be

PARTNERS

IMT-Lille Douai (France)
www.imt-lille-douai.fr

Armines (France)
www.armines.net

Ghent University (Belgium)
www.ugent.be

Université de Reims Champagne-Ardenne (France)
www.univ-reims.fr

Katholieke Universiteit Leuven (Belgium)
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Eurasanté (France)
www.eurasante.com

ASSOCIATED PARTNERS

Flanders Bio (Belgium)
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Biowin (Belgium)
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CHU Ambroise Paré (Belgium)
www.hap.be

UZ Gent (Belgium)
www.uzgent.be

CHU Reims (France)
www.chu-reims.fr

CHU Amiens Picardie (France)
www.chu-amiens.fr

PROJECT DETAILS

PROJECT START:
1st April 2019

DURATION:
36 months

TOTAL COST:
1 900 000 €

ERDF CO-FINANCING RATE:
50%

ERDF FUNDING:
967 867.73 €

CONTACT

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www.3D4Med-interreg.eu

CO-FINANCERS

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3D4Med

3D PRINTING OF ONE-TO-ONE SHAPE MEMORY POLYMER IMPLANTS FOR BIOMEDICAL APPLICATIONS

3D4MED

WITH THE SUPPORT OF THE EUROPEAN REGIONAL DEVELOPMENT FUND

CONTEXT

The aging of the population leads to a **growing need for new tissue repairing technologies to substitute defective organs**. Currently, tissue repairing is performed either by autologous grafts or by transplantation from deceased donors causing problems of immune rejection of organs. In addition, the low availability of donor organs is no longer in line with ever-increasing demand of new tissues.

The main challenge of tissue engineering is the overcoming of the problems of organ shortages by providing surgeons with functional substitutes as developed in vitro. The principle is based on:

- The **personalized development of temporary polymer matrices** with minimal inflammatory issues that would allow cell colonization within its architecture during degradation and in fine the formation of the target tissue ;
- The **biocompatibility of the polymers** used in the elaboration of the tissue ;
- The **structural characteristics** (porosity / interconnectivity of pores) as well as the **mechanical properties** (elasticity / resistance) play a key role in cell development and tissue integration.

CONSORTIUM

3D4Med is a collaboration made of academic research groups, University Hospitals and SMEs through a transdisciplinary applied research in material science, tissue engineering and medicine.

3D4med gathers a cross-border partnership in the Interreg program France-Wallonia-Flanders which involves major stakeholders in the field that will work closely with a focus on areas of personalized (bio)medical solutions with minimal inflammatory issues.

OBJECTIVES AND STRATEGY

The main objective of the project is to develop biodegradable shape-memory matrices combining structure and activity biological surface by 3D printing.

The general concept is that the shape of shape-memory polymers can change after a stimulus such that temperature, pH, etc. In this project, shape-memory polymers are mainly activated at 37°C (body temperature) to adjust their form to the defective tissue to be replaced.

An act minimal surgical procedure can then be performed so that the implant will present a minimal size before actuation. Then, biodegradable polymers with shape memory properties will be resorbed over time to avoid any immune response problem or long-term infections.

The 3D printing will make it possible to process these polymer matrices with complex and personalized geometry that are difficult to achieve by usual techniques while developing objects responding to structural and mechanical requirements (porosity, rigidity, etc,..) required for cellular and tissue engineering with a low inflammatory response promoting self-healing.

INNOVATION

In this context, the 3D4Med project will be able to innovate a solution through the knowledge of materials and 3D printing, developed from the expertise of the centers that make up the consortium as:

- Through tissue engineering, it becomes possible to prepare personalized tissues and organs, in the laboratory, based on the body's proper cells. To this end, the cells will be obtained from the patient, via a non-invasive technique, multiplied in the laboratory, and finally integrated on support structures developed in the project ;
- With the support of 3D printing techniques, it is possible to develop such patient-specific structures that will provide an exact form for the defective tissue to be replaced.