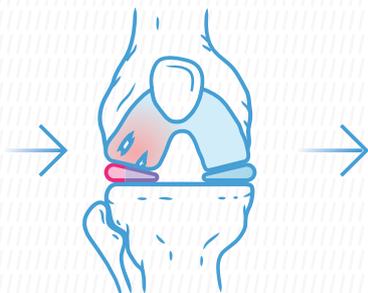


MEFISTO

Meniscal functionalised scaffold to prevent knee Osteoarthritis onset after meniscectomy

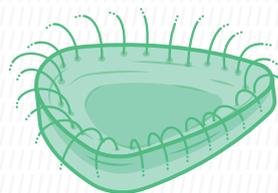
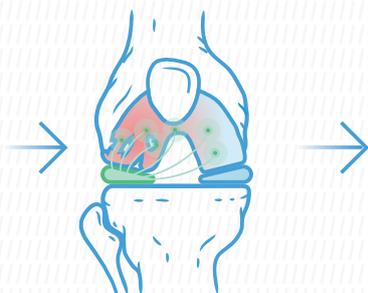
A great many patients who had partial resection of the meniscus suffer from early degenerative changes in the knee. The EU project MEFISTO is taking on the challenge of developing innovative ways using bioactive functionalised materials to prevent the onset of osteoarthritis following meniscus loss.

BIOACTIVE RESORBABLE SCAFFOLD FOR MENISCUS REGENERATION



Enhanced vascularization
Blocked vascularization

BIOACTIVE UNLOADING PROSTHESIS FOR MENISCUS REPLACEMENT



Antiinflammatory factors

Potential impact on national health systems

For most of the 20th century, the preferred approach to meniscus treatment was the removal of the damaged tissue (meniscectomy). This practice expanded with the advent of arthroscopy. In recent decades, the understanding of meniscal function, and consequently the management of meniscal injuries, has evolved and gained increasing commitment among physicians towards the preservation of the meniscus whenever possible. However, based on

the fact that meniscal resection is still widely performed, a huge rate of post-meniscectomy osteoarthritis can be expected in the European population in the coming years. In particular, the treatment of osteoarthritis in younger patients is challenging, often involving early replacement of the patients' knee joints, which later represents a social and economic burden for national health systems.

Different solutions depending on the stage of degeneration

The MEFISTO project will identify those patients after meniscal resection who are at higher risk of early compartment degeneration and will provide evidence from pre-clinical tests towards a personalized approach for the patient. Younger patients with early osteoarthritic changes will be treated with a controlled vascularized bioactive biodegradable meniscal scaffold, designed to regenerate the native meniscus. Patients with advanced osteoarthri-

tis will be treated with a bioactive non-biodegradable meniscal prosthesis, which acts as a mechanical unloading device and a drug delivery system, with the capacity to modulate the inflammatory environment. A socio-economic analysis of the cost-effectiveness of existing meniscal substitutes and an evaluation of the impact of adopting MEFISTO into healthcare systems complete the project.

Over the next five years, **Geistlich Pharma AG**, a leading company in tissue regeneration, and **Humanitas University**, a prominent international higher education institution dedicated to clinical and translational research, will coordinate the MEFISTO project with the help of **SCIPROM Sàrl**. The data for the meniscus implant design will be prepared by **Universiteit Antwerpen** and **Universitätsklinikum Regensburg**. Together with **Universitair Medisch Centrum Utrecht**, they will perform pre-clinical evaluation which includes establishing in-vitro testing protocols to assess implant performance as well as selecting appropriate in-vivo animal models to evaluate effectiveness of the different implants. **Consiglio Nazionale delle Ricerche Napoli** will be responsible for design, preparation and characterization of bio-ink and scaffold. **Universidad de Santiago de Compostela** will provide their expertise in

nanoparticles, growth factors and anti-inflammatory molecules loading and incorporation in the scaffold, and **Tissue Click Ltd.** will lead the functionalisation and scaffold characterisation by contributing their peptide technology. Cell culture conditions, evaluation of cell migration and cell viability will be performed by **Établissement français du sang**. A non-resorbable meniscus implant with drug delivery capabilities will be developed by **Active Implants**. The MEFISTO exploitation strategy will be developed through interaction with stakeholders, supported by an assessment of Key Performance Indicators delivered by **Orthokey Italia S.r.l.** and a health economic analysis performed by **AiM GmbH**. The health economic analysis includes the review of data from existing treatment options, design and programming of a health economic model and running the analysis.

 www.mefisto-project.eu
 info@mefisto-project.eu
 [@MEFISTO_h2020](https://twitter.com/MEFISTO_h2020)



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