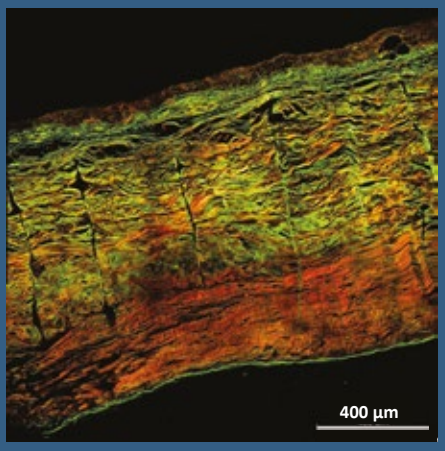
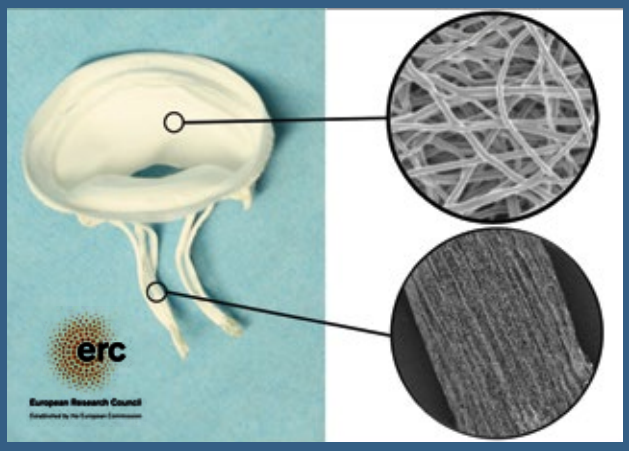
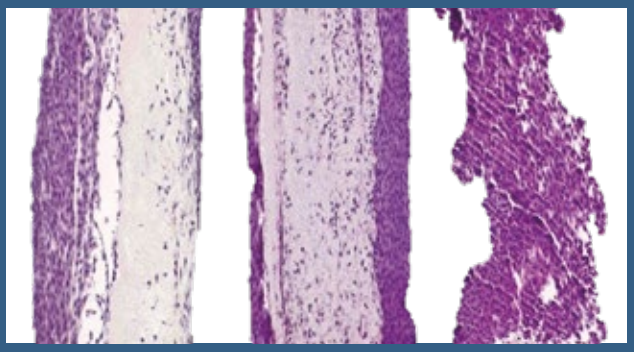
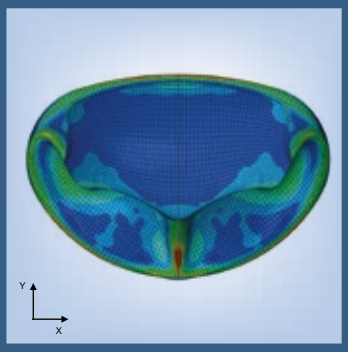
Cardiovascular Tissue Engineering Group @ Ri.MED

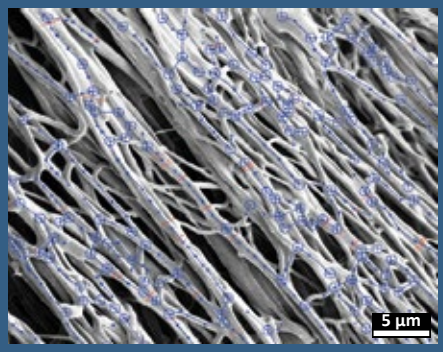
The cardiovascular tissue engineering group focuses on *in silico*, *in vitro*, and *in vivo* models and seeks to couple a mechanistic understanding of the relationship between scaffold microstructure, mechanics, and endogenous tissue growth with the development of novel biomaterials for cardiovascular tissue engineering strategies.

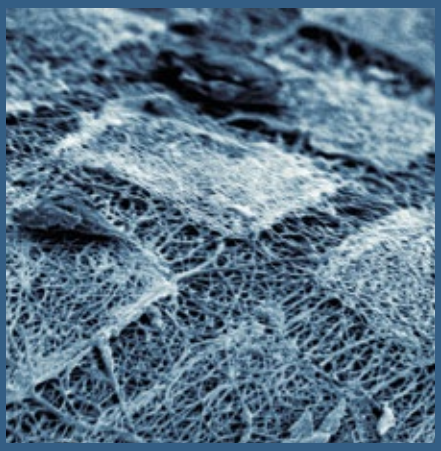


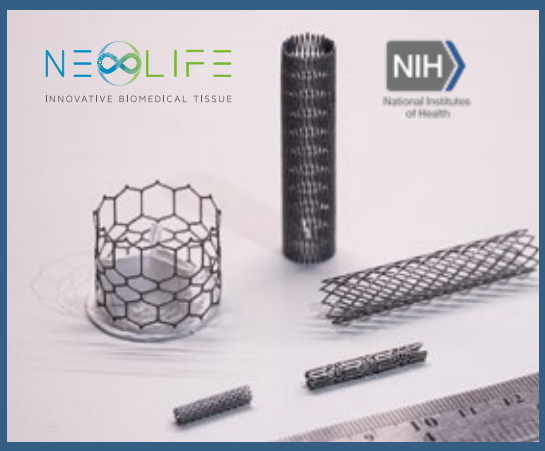












Fondazione Ri.MED

FOCUS

- Tissue-engineered heart valves
- Tissue-engineered vascular grafts
- Tissue-engineered cardiac patches
- Bioreactors for enhanced extracellular matrix elaboration
- Native/engineered tissue image-based structural and histopathological analysis
- Native/engineered tissue numerical models for mechanics and tissue growth

AIMS

- *In silico*, *in vitro*, and *in vivo* models
- Quantitative histology and biomaterial micro-structure image-based analysis
- Structural modelling for cardiovascular tissue engineering
- Mechanical and topological conditioning to duplicate native tissue properties
- Endogenous tissue growth, vascular grafts, and engineered heart valves.

OUTCOME

- More than 16 patents applications, 7 issued, 4 in the active commercialization process
- More than 150 publications
- A start-up at the preclinical stage: Neoolife
- More than 8 active projects for a total value of $7 million, including:

European Research Council Consolidator Award 2020, *"Engineering the mitral valve: bioinspired control of structure and function for enhanced in vivo performance, (BIOMITRAL)"*,

National Institutes of Health Award 2023 funding for the Small Business Technology Transfer (STTR) Program, *"Development of a Biomimetic Stentless Pulmonary Heart Valve for the Treatment of Pediatric Congenital Heart Disease"*

EXPERTISE AND RESOURCES

- Advanced engineered tissue biofabrication
- Biomaterials' processing
- Mechanical, physical, and chemical characterization of native and engineered tissues
- Qualitative and quantitative histological evaluation
- Formulation and characterization of controlled drug-release medical devices
- *In silico* and *in vitro* mechanobiology models
- Tissue growth/scaffold degradation and structural image-based analysis
- *In vivo* characterization in large and small animals of biomaterials and tissue constructs
- 23 people strong

COLLABORATIONS

- McGowan Institute for Regenerative Medicine (MIRM), Pittsburgh, USA
- University of Pittsburgh Medical Center (UPMC), Pittsburgh, USA
- The Mediterranean Institute for Transplantation and Advanced Specialized Therapies (ISMETT-IRCCS), Palermo, ITA
- Universidad Abierta Interamericana (UAI), Buenos Aires, ARG
- Advanced Technologies Network Center (ATeN Center), Palermo, ITA
- Neoolife, Pittsburgh, USA
- TELEA BioTech, Sandrigo, ITA
- Columbia University Irving Medical Center (CUIMC), New York, USA
- Technical University of Munich, (TUM), Munich, DEU
- University of California Irvine (UCI), Irvine, USA

Fondazione Ri.MED

www.fondazionerimed.eu

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