LORENZA GARAU PAGANELLA

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ABOUT ME

Trained in process and mechanical engineering, I develop hydrogel-based systems to study cellular dynamics in complex tissues. My research focuses on fibroblast mechanobiology and senolytic drug delivery. More recently, I bring forward a new perspective in understanding the role of fibroblasts and senescent cells in breast cancer and tissue remodeling, with applications in regenerative medicine.

EDUCATION

ETH — Zurich, Switzerland **2020 - 2024**
Ph.D, Mechanical and Process Engineering
Prof. Mark Tibbitt & Prof. Edoardo Mazza
Dissertation: *3D biomaterials to study cell mechanotransduction*

ETH — Zurich, Switzerland **2018 - 2020**
MSc in Process Engineering - graduated with distinction
GPA 5.85/6
Dissertation: *An injectable senolytic drug delivery system to eliminate senescent cells*

EPFL — Lausanne, Switzerland **2017 - 2018**
Academic Exchange in Material Science Engineering
GPA 5.25/6

University of Triest — Triest, Italy **2015 - 2018**
BSc in Process Engineering and Material Science
Graduated with 110/110 cum laude (1st class honors)

PROFESSIONAL EXPERIENCE

Stanford University - SNSF Postdoctoral Fellow **2025 -**
Department of Mechanical Engineering
- Awarded the SNSF Postdoctoral fellowship hosted by Prof. Ovijit Chaudhuri
- Create 3D in vitro hydrogel platforms to study breast tumor–senescent stroma interactions and identify targets for diagnostic and therapy
- Develop injectable hydrogels for breast reconstruction

ETH Zurich - Postdoctoral Researcher **2024 - 2025**
Department of Mechanical and Process Engineering (Prof. Mark Tibbitt)
- Developed collagen and PEG hydrogels to study fibroblasts-ECM interactions
- Established a novel and practical primary fibroblast isolation pipeline from skin tissue
- Deciphered distinct integrin signatures for cells embedded in different hydrogels
- Lectured for Process Design and Safety course (Mechanical Engineering - Master level Course)

ETH Zurich - Doctoral Student **2020 - 2024**
Department of Mechanical and Process Engineering (Prof. Mark tibbitt and Edoardo Mazza)
- Designed and established novel protocols for collagen and PEG-based hydrogels to study fibroblast response to osmotic and hydrostatic pressure using custom made bioreactors

- Developed protocols for protein isolation maintaining post translational modifications in 3D
- Developed a novel injectable hydrogel to locally target endothelial senescent cells using Navitoclax nanoparticles and HPMC based hydrogel
- Jointly led collaborative multidisciplinary projects spanning neuron engineering (Christina Tringides Lab) to drug delivery (Outi Supponen Lab)
- Supported several teaching activities at the Bachelor (Mechanics 1) and Master level (Networks and Gels)

Roche Basel - Internship **2019 - 2020**

Pharmaceutical Technical Development & Supplies, PTD Biologics Europe

- Developed 3D bioprinting protocols for antibody-based therapeutics
- Evaluated aseptic connector technologies for manufacturing processes

GRANTS & AWARDS

Swiss National Science Foundation Postdoc Mobility (CHF 135'800)

Senescence drivers in breast microenvironment - Independent Postdoc

Best oral presentation, Gordon research seminar STEEM

Recognized for scientific excellence and communication at a leading international conference.

Young investigator award, Fusion conferences

Awarded for scientific merit and early-career contribution to regenerative medicine.

Best oral presentation, SSBRM annual meeting

Top-rated talk among early-stage researchers in the Swiss biomaterials community.

Erasmus scholarship EPFL

TEACHING EXPERIENCE

Guest Lecture - Networks & Gels (Master level)

Networks & Gels - Tissue Engineering lecture

Lecturer - Process Design & Safety (Master level)

Independently led and designed the full exercise module, including weekly sessions, assignment development, and student evaluation. Acted as primary teaching lead for 20+ students

Teaching assistant - Mechanics 1 (Bachelor level)

Delivered tutorials and supported exam preparation and grading in a core mechanical engineering course

Teaching assistant - Mechanobiology (Master level)

Student supervision

- 4 Master thesis
- 2 Bachelor thesis
- 1 semester projects

Master Thesis

J. Pietrantuomo Nepomuceno, *Influence of cell scaffold on wound healing capacity* , ETH Zurich (Switzerland) 2024 - Currently PhD student at ETHZ

F. Cuni, *Novel Engineered hydrogel for senolytic administration to senescent cardiac endothelial tisssue* , Politecnico di Milano (Italy) 2023 - Currently PhD student at ETHZ

A. Badolato, *Novel Engineered hydrogel for senolytic administration to senescent cardiac endothelial tissue*, Politecnico di Milano (Italy) 2023, Politecnico di Milano (Italy) 2023 - Currently PhD student at ETHZ

G. Meyer, *Image Processing Techniques in the Context of Cellular Assay*, RWTH Aachen (Germany) 2022

Bachelor Thesis

G. Fisher, *Investigation of human dermal fibroblast subjected to hydrostatic pressure*, ETH Zurich (Switzerland) 2023

L.Liebi, *Design and characterization of injectable hydrogels for drug delivery* , ETH Zurich (Switzerland) 2021 - Currently PhD student at EPFL

Semester project

S. Mironov, *Characterization of senescence in HUVECs* , ETH Zurich (Switzerland) 2021

INVITED TALKS AND PRESENTATIONS

- **L.Garau Paganella,** *3D Biomaterials for mechanobiology and drug delivery,* Stanford Polymer Collective, 2025
- **L. Garau Paganella***, G. Bovone*, *An injectable senolytic hydrogel to eliminate senescent cells*, SSBRM Young Scientist Symposium, 2025
- **L. Garau Paganella**, *Variations in fluid chemical potential modulate fibroblast mechanoresponse in 3D hydrogels*, GRC STEEM, 2024
- **L. Garau Paganella**, *3D models of the dermal matrix*, Mechanobiology symposium, ETH Zurich, 2023
- **L. Garau Paganella**, *Fibroblast Response to hydrostatic pressure in different 3D hydrogels*, Fusion Conference Growth Factor and Regeneration, 2023
- **L. Garau Paganella***, C. Labouesse*, *3D hydrogels to study fibroblast mechanotransduction*, Skintegrity retreat, 2023
- **L. Garau Paganella**, Fibroblast response to osmotic stress in 3D PEG and Collagen hydrogels, SSBRM Annual meeting ETH Zurich, 2022
- **L. Garau Paganella**, *3D hydrogel models for skin dermal fibrobalst*, Nanoengineering for mechanobiology, 2022

EXTRACURRICULAR ACTIVITIES

Young Scientist SSBRM - committee
- Organized scientific symposia and summer school
- Organization of finances and budgeting

BioMed@MAVT founder
- Biomedtech community for the mechanical and process engineering department at ETH
- Organization yearly symposium

Running club (half marathon competitions), Swimming club (open water)

SKILLS

Analytical:
- Chromatography (HPLC, LC-MS beginner)
- DLS
- SEM
- UV-Vis
- Nanoparticles

Biological:
- Mammalian cell culture 2D and 3D
- Tissue work
- Protein and Nuclei acid extraction
- Western blotting, RT-qPCR, single cell RNA seq
- Immunofluorescence and Microscopy

Language:
- Italian native
- English fluent
- German intermediate

Materials & Mechanics:
- Collagen, Alginate, and PEG
- Rheology, nanoindentation
- Osmometer, Bioreactors