

Dr. Mario M. Modena

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PROFILE

Scientist and team leader with seven years of experience leading an interdisciplinary group that builds human-relevant cellular models for preclinical drug testing in oncology and neuro-oncology. Set the scientific direction and milestones for multiple projects in parallel, raised over CHF 3.5 million in competitive funding and supervised 13 researchers. Developed three cellular models in collaboration with Novartis, including one for testing shuttling efficacy of antibodies across the blood-brain barrier. Directed multi-partner projects in collaboration with pharma, biotech and clinical settings.

Key skills

3D tissue models · Immune-competent and cellular barrier models · Drug efficacy and cytotoxicity testing · Scientific strategy and project leadership · Milestone and resource planning · Cross-functional team leadership · Management of external collaborations · Technology transfer

EXPERIENCE

○ Oct 2019 to Sep 2026

Lead of the Organ-on-Chip Team

ETH Zurich, Bio Engineering Laboratory, Basel, Switzerland (Continuing collaboration and consulting with ETH Zurich)

Scientific strategy and project leadership. Defined the group's scientific direction, project milestones and deliverables. Led about five projects in parallel with a combined annual budget of CHF 500–600k (personnel and consumables). Took go/no-go decisions on results and partner feedback: redirected research activities when results showed limited efficacy or throughput; stopped high-complexity, low-throughput models after publication when partners did not adopt them or complexity/outcome did not justify the effort.

Cellular models for drug testing. Developed 3D co-culture and immune-competent models for efficacy testing in oncology and neuro-oncology, including glioma–neural co-cultures, a blood-brain barrier–tumor platform for compound permeation and efficacy, a PBMC–glioma co-culture model for antibody-dependent cellular cytotoxicity assays, a leukemia drug-response platform and ex vivo tissue slices. Three barrier models are being developed and used together with Novartis Biomedical Research: blood-brain barrier (antibody testing, proof of concept), proximal tubule (radioligand therapy testing) and skin (disease modeling). Blood-brain barrier models are being adopted by two groups at the University of Zurich.

Assays and readouts. Cytotoxicity assays on tumor spheroids (e.g., ATP content, growth, live/dead imaging) and assays to monitor antibody-dependent cellular cytotoxicity (ADCC); flow cytometry to analyze cell viability, population composition and marker expression; characterization of 3D models by imaging (cellular organization, marker expression); transcriptomics analysis (bulk RNA sequencing and RT-qPCR); live imaging to monitor tumor cell invasion and interaction with the tumor microenvironment.

Cross-functional and partner management. Coordinated multidisciplinary projects (biology, engineering, imaging, data analysis) with Novartis, Zurich Children's Hospital, Lunaphore and InSphero. Agreed milestones with partners, held monthly partner meetings and weekly/biweekly data reviews with the team to interpret results and decide next steps. Main proponent and project manager of two Innosuisse projects with Swiss companies, and main applicant of an awarded Swiss Cancer League grant; over CHF 3.5 million in funding in total (Krebsliga Schweiz, Innosuisse, PHRT, Novartis).

People leadership. Supervised and mentored 6 postdocs and 7 PhD students, and directly hired 8. Supported career development, including transitions into pharmaceutical and other industry positions.

Technology transfer and IP. Developed the immune-competent organ-on-chip platform with InSphero AG (Innosuisse project), contributing to the technology transfer and defining the user protocols; InSphero commercializes it as Akura™ Immune Flow (patent EP4433572B1, co-inventor). Developed a new platform for ex vivo culturing and imaging of tissue slices in collaboration with Lunaphore Technologies SA (Innosuisse project); Lunaphore Technologies SA submitted a patent application on our invention. Co-inventor on three patents in total.

Operations and compliance. Ensured biosafety compliance for the group, including viral vector work; managed equipment investments and pooled purchasing.

Teaching. Designed, organized and taught the microfabrication session of the Master's practical course at ETH Zurich every year for 7 years (20–25 students per year).

○ Oct 2016 to Sep 2019

Postdoctoral Researcher

ETH Zurich, Bio Engineering Laboratory, Basel, Switzerland

Automated and miniaturized antischistosomal drug screening using label-free, impedance-based detection of worm motility: over 60 compounds screened continuously and in parallel for 72 hours.

Developed microphysiological systems for multi-tissue co-culture models of 3D tissues; supervised 1 postdoc and 2 PhD students.

Jun 2011 to Sep 2016

Doctoral and Postdoctoral Researcher

Max Planck Institute for Biophysical Chemistry, Göttingen, Germany

Built and operated mass-measurement setups using suspended microchannel resonators and developed micromechanical mass correlation spectroscopy, a new analytical method for nanoparticles and biomolecular complexes in fluid. Studied amyloid aggregation kinetics and selective permeation of binary solvent mixtures in mesoporous nanoparticles in solution.

Feb 2010 to Apr 2011

Master Thesis, then Research Assistant

Columbia University (Thesis research to Sep 2010; research assistant Oct 2010 to Apr 2011)

Thesis research at Columbia University on point-of-care diagnostic devices for HIV detection in whole blood, including field testing in Rwanda.

TRAINING

Mar to Apr 2023	Project Management in the Life Sciences Industry, University of Basel
May 2019	Project Leadership, ETH Zurich
Apr 2017	Drug Discovery and Development, Novartis AG

EDUCATION

2011 to 2015	PhD in Physics, magna cum laude International Max Planck Research School, Göttingen University
2008 to 2010	M.Sc. in Nanotechnologies, 110/110 with honors Politecnico di Torino, INP Grenoble, EPFL (joint program). Thesis research at Columbia University
2005 to 2008	B.Sc. in Physical Engineering, 110/110 Politecnico di Torino

SELECTED METHODS

Analytical methods. Quantitative imaging and image analysis (NIS-Elements, Fiji, Ilastik, QuPath), flow cytometry, ELISA, RT-qPCR and bulk RNA sequencing, impedance-based analysis.

Data analysis. Matlab, FlowJo (basic).

Engineering. Microfluidic device design and prototyping, cell-culture platform design and optimization in plastic material.

SELECTED PUBLICATIONS

Petr JB, Lin MS, Gomes C, Hochuli D, Hierlemann A, Baumgartner M*, Modena MM*. PHIROS: Integrated microfluidic platform for multi-day high-resolution imaging of organotypic slices. *bioRxiv* 2026, under review (*equally contributing authors).

Wei W, Stano M, Kritzer B, Nazarian J, Hierlemann A, Modena MM. A perfused, parallelized blood brain barrier-tumor platform for compound permeation and efficacy investigations. *Microsystems & Nanoengineering* 2026, 12, 175 (last and corresponding author).

Lohasz C, Häfeli T, Hasanova D, ..., Hierlemann A, Frey O, Modena MM. A microfluidic platform for the co-culturing of microtissues with continuously recirculating suspension cells. *Microsystems & Nanoengineering* 2025, 11, 184 (last author).

25 publications (21 research articles, 4 reviews, including 2 preprints), 9 as last author. Full list on ORCID.

PATENTS (CO-INVENTOR)

US9268911B2	Field optimized assay devices, methods, and systems · granted 23 Feb 2016
EP4433572B1	Microfluidic device · granted 24 Dec 2025
PCT application	Ex vivo tissue sampling · filed 19 June 2024 (pending)

LANGUAGES

Italian (native) · English (C2) · German (B2, actively improving) · French (B1)

INTERESTS

Road and mountain biking · Hiking · Analog and digital photography