
Ticha Lab

Laboratory of Tissue Mechanobiology and Bioengineering

Research

The laboratory at the Department of Plastic Surgery focuses on preclinical and clinical research at the interface of Tissue Mechanobiology and Bioengineering. Our research aims to understand how tissues respond to mechanical and material cues, and how these responses influence disease processes and reconstructive outcomes. We combine advanced in vitro and in vivo models with patient-derived tissues and clinical data to bridge fundamental research and clinical translation.

Cancer mechanobiology

Tissue mechanics is increasingly recognized as a critical regulator of cancer development and progression. However, the molecular and cellular mechanisms linking stromal remodeling and extracellular matrix stiffening to disease initiation and progression remain largely unexplored. We investigate how altered tissue mechanics regulate tumor initiation and aggressiveness. Our goal is to identify novel mechanisms and explore their potential as targets for novel therapeutic strategies.

Biomaterials

Biomaterials represent a powerful tool to support tissue repair and regeneration. However, their interaction with host tissues remains a major challenge. We investigate how biomaterial properties influence tissue responses and regenerative outcomes, with a particular focus on biodegradable implant technologies. Our goal is to understand why promising biomaterials often fail to achieve their clinical potential and develop strategies to overcome these limitations.

Plastic surgery

Translating scientific discoveries into direct improvements in patient care is an important part of our research. Through our PATREO project, we study patient-reported outcomes following reconstructive procedures to identify the factors that influence patient satisfaction and quality of life. Our goal is to generate evidence supporting patient-centered reconstructive care and guiding future innovations in reconstructive surgery. Further information is available at <https://patreo.cz/en/home/>

Team

Pavla Tichá, MD, MA, PhD Principal Investigator

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Pavla earned her MD degree from the Second Faculty of Medicine, Charles University, and undertook surgical training at Universitätsklinikum Carl Gustav Carus Dresden and Uniklinik RWTH Aachen. She completed a PhD in Experimental Surgery at the Third Faculty of Medicine, Charles University, and postdoctoral training at Stanford University and the University of California, San Francisco. She also graduated from Harvard Medical School's Clinical Science Scholars Program.

Throughout her training, she developed a strong interest in bridging clinical medicine and fundamental biomedical research. Since 2023, she has held a joint academic-clinical appointment as an Assistant Professor at the Department of Plastic Surgery, Third Faculty of Medicine, Charles University, and University Hospital Královské Vinohrady.

Martin Žídek, MD Lab manager

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Martin earned his MD degree from the Second Faculty of Medicine, Charles University, and undertook surgical training at Universitätsklinikum Regensburg. He subsequently completed postdoctoral training at the Center for Bioengineering & Tissue Regeneration, Department of Surgery, University of California, San Francisco.

He is pursuing a PhD in Experimental Surgery in the Ticha Lab, focusing on tissue mechanobiology.
Nandini Batta, MDPHD student
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Nandini earned her MD degree from the First Faculty of Medicine, Charles University.
She is pursuing a PhD in Experimental Surgery in the Ticha Lab, focusing on the mechanobiology of breast tissue.
Tomáš Herma, MDPHD student
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Tomas earned his MD degree from the Third Faculty of Medicine, Charles University, and completed residency training at University Hospitals Motol and Kralovske Vinohrady.

He serves as a plastic surgeon at the Department of Plastic Surgery, Third Faculty of Medicine, Charles University, and University Hospital Královské Vinohrady, while also pursuing a PhD in Experimental Surgery at the Second Faculty of Medicine, Charles University. He focuses on the research of biodegradable metallic implants.

Anna-Marie Stejskalová, MDPHD student
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Anna-Marie earned her MD degree from the Second Faculty of Medicine, Charles University, and undertook residency training at IKEM and General University Hospital in Prague.

She is continuing her residency at the Department of Plastic Surgery, Third Faculty of Medicine, Charles University, and University Hospital Královské Vinohrady, while also pursuing a PhD in Experimental Surgery in the Ticha Lab. She focuses on the biological mechanisms underlying breast implant illness and associated patient-reported outcomes.

Markéta Jurdičová, MDPHD student
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Marketa earned her MD degree from the Third Faculty of Medicine, Charles University, and undertook residency training at University Hospital Bulovka.

She is continuing her residency training at the Department of Plastic Surgery, Third Faculty of Medicine, Charles University, and University Hospital Královské Vinohrady, while also pursuing a PhD in Experimental Surgery. She focuses on patient-reported outcomes in breast reconstruction.

Kateřina Vadinská Technical Staff
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Collaborations

- Helms Laboratory, Division of Plastic Surgery, Stanford University, California, USA
- Valerie M. Weaver Lab, Center for Bioengineering & Tissue Regeneration, Department of Surgery, University of California, San Francisco, California, USA
- INGRID (Interdisciplinary Group for Resorbable Implant Development), Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, Czech Republic

Publications

NCOR2 represses MHC class I molecule expression to drive metastatic progression of breast cancer

Ticha P, Northey JJ, Narain R, Sharma S, Lakins JN, Gonzalez H, Kersten K, Ironside AJ, Drain AP, **Zidek M**, Tsai KK, Chen YY, Shenderov E, Weaver VM.

Nature Communications. (2026) Epub ahead of print.

Clinically Silent Local Recurrence of Breast Cancer Detected in a Mastectomy Scar During DIEP Flap Reconstruction: A Case Report

Tesina D, **Herma T**, Bayer J, Matej R, Sukop A, **Ticha P**.

Clinical Case Reports. (2026) 14:e72701.

Multiscale, interspecies evaluation of parameters affecting alveolar bone repair

Ticha P, Joshi A, Dworan JS, Armario M, Arioka M, Xu Q, Pilawski I, Liu Y, Chen CH, Pei X, Tulu US, Traxler H, Erdogan Y, Helms JA.

Journal of Periodontology. (2025) 96:1400-1412.

Patient-reported outcomes in bilateral prophylactic mastectomy with breast reconstruction: A narrative review

Ticha P, Sukop A

Breast. (2024) 73:103602.

Novel patient-reported outcome measures for the assessment of patient satisfaction and health-related quality of life following postmastectomy breast reconstruction

Ticha P, Wu M, Bujda M, Sukop A

Aesthetic Plastic Surgery. (2022) 46:1588-1599.

Animal Models Used in the Research of Vascularized Lymph Node Transfer: A Systematic Review

Stanek K, Jonas F, **Ticha P**, Molitor M, Mestak O

Journal of Surgical Research. (2022) 272:1-8.

Early postoperative complications of breast reconstruction by history of radiotherapy and reconstruction approach

Ticha P, Mestak O, Wu M, Sukop A

European journal of plastic surgery. (2022) 45:429-437.

Multiscale analysis of craniomaxillofacial bone repair: A preclinical mini-pig study

Ticha P, Pilawski I, Helms JA

Journal of Periodontology. (2022) 93:1701-1711.

Evaluation of the Number of Follow-up Surgical Procedures and Time Required for Delayed Breast Reconstruction by Clinical Risk Factors, Type of Oncological Therapy, and Reconstruction Approach

Ticha P, Wu M, Mestak O, Sukop A

Aesthetic Plastic Surgery. (2022) 46:71-82.

A novel cryo-embedding method for in-depth analysis of large mini pig bone specimens

Ticha P, Pilawski I, Yuan X, Pan J, Tulu US, Coyac BR, Hoffmann W, Helms JA

Scientific Reports. (2020) 10:19510.

Patient-reported outcomes of 3 different types of breast reconstruction with correlation to the clinical data 5 years postoperatively

Ticha P, Mestak O, Wu M, Bujda M, Sukop A

Aesthetic Plastic Surgery. (2020) 44:2021-2029.

Interspecies Comparison of Alveolar Bone Biology, Part I: Morphology and Physiology of Pristine Bone

Pilawski I, Tulu US, **Ticha P**, Schüpbach P, Traxler H, Xu Q, Pan J, Coyac RB, Yuan X, Bahat O, Tian Y, Liu Y, Chen J, Erdogan Y, Arioka M, Wu M, Helms JA

JDR Clinical and Translational Research. (2020) 6:352-360.

Interspecies Comparison of Alveolar Bone Biology: Tooth Extraction Socket Healing in Mini Pigs and Mice

Pan J, Pilawski I, Yuan X, Arioka M, **Ticha P**, Helms JA

Journal of Periodontology. (2020) 91:1653-1663.

Wnt-Responsive Stem Cell Fates in the Oral Mucosa

Yuan X, Xu Q, Zhang X, Van Brunt LA, **Ticha P**, Helms JA

iScience. (2019) 21:84-94.

Opportunities

We are always looking for enthusiastic and highly motivated individuals to join our lab. We welcome applicants from diverse scientific backgrounds, particularly biology, bioengineering, and clinical medicine, who are excited to work across disciplines and bridge fundamental biological research with clinically relevant questions. If you are fascinated by tissue mechanobiology, biomaterials, and reconstructive surgery and would like to pursue undergraduate, graduate, or postdoctoral research in our laboratory, please send your CV and a cover letter to pavla.ticha@lf3.cuni.cz.