Malgorzata Tyczynska Weh, PhD, MSc, MSc Eng (she/her)

Postdoctoral Fellow in Radiation Oncology, MD Anderson Cancer Center

Preferred name: Gosia Weh

Née: Malgorzata Anna Tyczynska

Email: MTWeh@mdanderson.org

Webpage: gosiaweh.com

APPOINTMENTS

Postdoctoral Fellow in Radiation Oncology, Enderling Lab — Houston, TX, USA
MD Anderson Cancer Center — *Oct 2025 – current*

Post-baccalaureate research assistant, Schnell Lab — Ann Arbor, MI, USA
University of Michigan Medical School — *Aug. 2018 – July 2020*

EDUCATION

PhD Integrated Mathematical Oncology — Tampa, FL, USA
USF: University of South Florida & Moffitt Cancer Center — *Aug. 2020 – Aug. 2025*

MSc: Master of Mathematical Sciences (Dual-degree) — Daejeon, South Korea
KAIST: Korea Advanced Institute of Science and Technology — *Feb. 2016 – Jan. 2018*

MSc Eng: Mathematical Modeling and Computation (Dual-degree) — Kgs. Lyngby, Denmark
DTU: Technical University of Denmark — *Feb. 2016 – Jan. 2018*

Exchange Semester: Applied Mathematics — Corvallis, OR, USA
Oregon State University — *Jan. 2015 – Jun. 2015*

BSc Eng: Mathematics and Technology — Kgs. Lyngby, Denmark
DTU: Technical University of Denmark — *Aug. 2012 – Jan. 2016*

PUBLICATIONS

Weh, M.T., Kumar P., Marusyk V. Marusyk A., Basanta D., *The adaptive state determines the impact of mutations on evolving populations* PNAS, June 2025, DOI:10.1073/pnas.2427070122

Ikami K, Shoffner-Beck S, **Weh, M. T.**, Schnell S, Yoshida S, Diaz Miranda EA, Ko S, Lei L. *Branched germline cysts and female-specific cyst fragmentation facilitate oocyte determination in mice*. PNAS, May 2023, DOI:10.1073/pnas.2219683120

Eilertsen, J., **Tyczynska, M. A.**, & Schnell, S. (2021). *Hunting ε: The origin and validity of quasi-steady-state reductions in enzyme kinetics*, SIAM J. App. Dyn. Syst., 2021, DOI: 10.1137/20M135073X

In preparation

Weh, M.T., Marusyk A., Basanta D., *Selection for mutator phenotype in novel environments*

Kumar P., Vander Velde R., **Weh, M.T.**, Basanta D., Marusyk A. *Acceleration of drug metabolism mediated by CYP3A4 enzyme activation provides a bona fide environmental resistance mechanism to targeted therapies*

DETAILED RESEARCH EXPERIENCE

Doctoral dissertation research — Tampa, FL, USA
Moffitt Cancer Center — *Aug. 2020 - Aug. 2025*

Title: The Only Constant Is Change: The Role of Genetic Diversification in Cancer and Beyond
PIs: David Basanta, PhD, and Andriy Marusyk, PhD
Committee members: Noemi Andor, PhD, Philipp Altrock, PhD, Joel Brown, PhD
Defense chair: Jacob Scott, MD, PhD

- Developed, analyzed, and interpreted Agent-Based Models (ABM) of mutation-driven tumor evolution
- Collaborated with experimental biologists to validate my in silico model with an in vitro model of Non-Small Cell Lung Cancer (NSCLC) (with Pragya Kumar, Marusyk lab, Moffitt Cancer Center)
- Developed, analyzed, interpreted and calibrated an ABM to analyze the adaptive limits of extra-chromosomal DNA (ecDNA) during tumor progression (with Andrea Ventura, MD, PhD, Ventura lab, MSKCC)
- Developed, analyzed, interpreted, and calibrated a pharmacometric (PK) model of increased metabolic conversion of Lorlatinib using experimental mouse data and patient data (with Pragya Kumar, Marusyk lab, Moffitt Cancer Center)
- Collaborated with biologists, clinicians, and other mathematical oncologists on clinical problems in breast cancer, NSCLC and bone-metastatic prostate cancer during IMO workshop in November 2022, 2023, 2024
- Prepared manuscripts for publication and presented my research at various conferences around the world

Research Associate Ann Arbor, MI, USA
University of Michigan Medical School *Aug. 2018 - Jul. 2020*

PI: Santiago Schnell, D.Phil.

- Developed, analyzed, and evaluated a mathematical model for the autocatalytic enzyme reaction kinetics; designed the illustrations and wrote the manuscript together with Dr. Justin Eilertsen (published in SIAM)
- Collaborated on the development, analysis, and evaluation of statistical models for cyst fragmentation during oocyte and testis formation ((published in PNAS)
- Analyzed statistically 50k+ data entries from the SABIO-RK database to infer the reproducibility of biochemical constants inferred from the common enzyme kinetic assays.

Master thesis research Daejeon, South Korea & Kgs. Lyngby, Denmark
KAIST & DTU *Jan. 2017 - Jan. 2018*

Title: Detecting Causality in Oscillatory Systems
PIs: Jae Kyoung Kim, PhD (KAIST), Lasse Engbo Christiansen, PhD (DTU)

Analyzed the applicability, accuracy, and sensitivity of mathematical algorithms to detect causality within oscillatory time series from 1) self-generated series of stochastic simulations of mammalian circadian rhythms and 2) neural activity recordings from the mammalian Suprachiasmatic Nucleus.

Industry Collaboration with Westrup ApS Kgs. Lyngby, Denmark
DTU and Westrup ApS *Feb. 2016 - May 2016*

Title: Optimization of Vibrations in Sorting Machines
PI: Poul Hjorth, PhD (DTU)

Analyzed the design of the seed sorting machines with a mathematical model to quantify the amount of damaging vibrations produced during machine operation. Then, proposed an optimization solution to minimize those vibrations.

Bachelor thesis research Kgs. Lyngby, Denmark
Technical University of Denmark *Sep. 2015 - Dec. 2015*

Title: Modeling of Chemotaxis and Aggregation of Biological Cells
PI: Mads Peter Soerensen, PhD

Developed, analyzed, implemented and simulated 2D PDE models for chemotaxis and aggregation of biological cells; a continuation from the OSU undergraduate project.

Undergraduate research project Corvallis, Oregon
Orego State University *Apr. 2015 - Jun. 2015*

PI: Malgorzata Peszynska, PhD

Developed, analyzed, implemented and simulated 2D PDE models for chemotaxis of *Staphylococcus Aureus*

Research awards

Featured Poster — Tampa, FL, USA
Moffitt Scientific Symposium — *May 2023*

Funding proposals

Cancer Biology and Evolution (CBE) pilot grant — **FUNDED**
Oct. 2023

Title: Understanding the impact of therapy-induced plasticity on therapeutic responses to targeted therapies in lung cancers.

Principal Investigators:

- Dr. David Basanta (1%)
- Dr. Andriy Marusyk (1%)

Key personnel:

- Alicia Bjornberg (50%)
- **Malgorzata Tyczynska Weh** (50%)

Travel awards

Cancer Biology Student Travel Award — Seoul, South Korea
Society for Mathematical Biology Annual Meeting — *Sep. 2024*

Student Travel Award — Phoenix, AZ, USA
MathOnc23 Conference — *May 2023*

Student Travel Award — Ploen, Germany
Modelling Resistance Evolution Theoretical Methodology Symposium — *Apr. 2023*

Landahl Travel Award — Heidelberg, Germany
Society for Mathematical Biology Annual Meeting — *Sep. 2023*

Mentoring Experience

Nandita Nair (w. Matthew Froid) — Tampa, FL, USA
Moffitt HIP IMO: high school internship program — *Jun. - Aug. 2023*

Teaching experience

Engineering Mathematics 2 (BSE level) — Ballerup, Denmark
DTU Compute, Technical University of Denmark — *Feb. 2016 - May 2016*

Mathematics and Technology (BSE level) — Kgs. Lyngby, Denmark
DTU Compute, Technical University of Denmark — *Sep. 2015 - Jan. 2016*

Engineering Mathematics 1 (BSE level) — Kgs. Lyngby, Denmark
DTU Compute, Technical University of Denmark — *Sep. 2014 - Dec. 2014*

Professional Service

Main organizer: Spatial ecology, evolution, and methods journal club — Tampa, FL
H. Lee Moffitt Cancer Center & Research Institute — *May 2024 – Nov 2024*

Organized a multi-departmental and cross-disciplinary journal club to discuss scientific articles related to the inference & interpretation of spatial patterns in cancer and normal tissues, to understand tumor ecology and evolution.

Vice-President, Cancer Biology Student Organization (CBSO) Tampa, FL
USF & H. Lee Moffitt Cancer Center & Research Institute *Sep. 2022 - Aug. 2023*

Performed leadership and administrative tasks typical for the US student organization; participated in meetings with the leadership of the Cancer Biology program.

Secretary, Cancer Biology Student Organization Tampa, FL
USF & H. Lee Moffitt Cancer Center & Research Institute *Sep. 2021 - Aug. 2022*

Performed administrative tasks typical for the US student organization; participated in meetings with the leadership of the Cancer Biology program.

Student representative, Education Administration Group Kgs. Lyngby, Denmark
Technical University of Denmark, DTU Compute Institute (webpage) *Sep. 2014 - Jun. 2018*

Student representative in the departmental education group with a purpose to 1) manage, analyze, and evaluate the quality of the undergraduate and master's education, and 2) the well-being of students.

Social tutoring Kgs. Lyngby, Denmark
Polyteknisk Forening (webpage) *Sep. 2013 - Jan. 2014*

Assisted ten students in securing their well-being at the DTU during their first year.

General Representative, Software, Mathematics, and AI Students' Council Kgs. Lyngby, Denmark
Polyteknisk Forening (webpage) *Jan. 2013 - Jan. 2018*

Participated in the monthly meetings to evaluate and improve the well-being of students at DTU Compute.

INVITED TALKS

Weh, M. T., Kumar, P., Marusyk, A., Basanta, D. *The only constant is change: diversification in cancer and beyond*, IMO research in progress, Tampa, FL, USA, Jan. 2025

Weh, M. T., Kumar, P., Marusyk, A., Basanta, D. *The only constant is change: diversification in cancer and beyond*, Invited Seminar, MD Anderson, Houston, TX, USA, Dec. 2024

Weh, M. T., Kumar, P., Marusyk, A., Basanta, D. *Cancer adaptation to treatment depends on the capacity to mutate*, Society of Mathematical Oncology Annual Meeting, Seoul, South Korea, July 2024

Weh, M. T., Kumar, P., Marusyk, A., Basanta, D. *Understanding cancer through the lens of evolvability*, IMO research in progress, Tampa, FL, USA, June 2024

Weh, M. T., Marusyk, A., Basanta, D. *Modeling selection for evolvability in the evolution of cancer therapy resistance*, Moffitt Scientific Symposium, Tampa, FL, USA, May 2023

Weh, M. T., Marusyk, A., Basanta, D. *Modeling selection for evolvability in the evolution of cancer therapy resistance* MathOnc23 Conference. Phoenix, AZ, USA, May 2023

Weh, M. T., Marusyk, A., Basanta, D. *Modeling selection for evolvability in the evolution of cancer therapy resistance* Modeling Resistance Evolution - Theoretical Methodology Symposium, Max Planck Institute for Evolutionary Biology. Ploen, Germany, Apr. 2023

Weh, M. T., Marusyk, A., Basanta, D. *Modeling evolvability during adaptation to treatment* IMO research in progress, Tampa, FL, USA, Apr. 2023

Tyczynska, M. A., Kim, J. K. *Detecting causal connections between neurons in Suprachiasmatic Nucleus* A3-NIMS joint workshop on interdisciplinary research connecting mathematics and biology. Daejeon, South Korea, May 2017

POSTER PRESENTATIONS

Weh, M. T., Kumar, P., Marusyk, A., Basanta D.. *Adaptation to cancer treatment depends on the cell's ability to mutate* Moffitt Scientific Symposium. H. Lee. Moffitt Cancer Center & Research Institute, Tampa, FL, USA, May 2024

Weh, M. T., Marusyk, A., Basanta D.. *Modeling selection for evolvability in the evolution of cancer therapy resistance.* Quantitative Science Division Meeting (Oktoberfest). H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL, USA, Oct. 2023

Weh, M. T., Marusyk, A., Basanta D.. *Modeling selection for evolvability in the evolution of cancer therapy resistance.* Society of Mathematical Biology Annual Meeting. Ohio State University, Columbus, OH, USA, Jul. 2023

Weh, M. T., Marusyk, A., Basanta D.. *Modeling selection for evolvability in the evolution of cancer therapy resistance* **(Featured Poster)** Moffitt Scientific Symposium. H. Lee. Moffitt Cancer Center & Research Institute, Tampa, FL, USA, May 2023

Tyczynska, M. A., Marusyk, A., Basanta D.. *Modeling the impact of cancer treatment scheduling on the selection of evolvability leading to resistance.* Society of Mathematical Biology Annual Meeting. Heidelberg University, Heidelberg, Germany, Sep. 2022

Tyczynska, M. A., Marusyk, A., Basanta D.. *Mathematical model of the impact of cancer treatment scheduling on the selection of evolvability leading to resistance.* OTOWIM: On the Trail of Women in Mathematics. Gdansk University of Technology, Gdansk, Poland, Sep. 2022

Tyczynska, M. A., Marusyk, A., Basanta D.. *Understanding Evolution of Resistance to Targeted Therapies using Agent-Based Modeling* Moffitt Scientific Symposium. H. Lee. Moffitt Cancer Center & Research Institute, Tampa, FL, USA, May 2022

PROGRAMMING LANGUAGES

- **Java, MATLAB, Python, LaTeX**:
  Using on a daily basis.
- **R**:
  Used it for my master's thesis, but haven't touched it in a while

LANGUAGES

- **English**: Full professional proficiency
  TOEFL ibt: 100/120 (from Nov. 2^{nd} 2018)
- **Polish**: Native proficiency
- **Danish**: Full professional proficiency
- **German**: Limited working proficiency