

Malgorzata Tyczynska Weh, Ph.D., M.Sc., M.Sc. Eng. (she/her)

Ph.D. in Integrated Mathematical Oncology

Preferred name: Gosia Weh

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EDUCATION

Ph.D. Integrated Mathematical Oncology <i>USF: University of South Florida & Moffitt Cancer Center</i>	Tampa, FL, USA Aug. 2020 – Aug. 2025
M.Sc.: Master of Mathematical Sciences (Dual-degree) <i>KAIST: Korea Advanced Institute of Science and Technology</i>	Daejeon, South Korea Feb. 2016 – Jan. 2018
M.Sc. Eng.: Mathematical Modeling and Computation (Dual-degree) <i>DTU: Technical University of Denmark</i>	Kgs. Lyngby, Denmark Feb. 2016 – Jan. 2018
Exchange Semester: Applied Mathematics <i>Oregon State University</i>	Corvallis, OR, USA Jan. 2015 – Jun. 2015
B.Sc. Eng.: Mathematics and Technology <i>DTU: Technical University of Denmark</i>	Kgs. Lyngby, Denmark Aug. 2012 – Jan. 2016

PUBLICATIONS

Weh, M.T. , Marusyk A., Basanta D., <i>Selection for mutator phenotype in novel environments</i> [in preparation]
Kumar P., Vander Velde R., Weh, M.T. , Basanta D., Marusyk A. <i>Acceleration of drug metabolism mediated by CYP3A4 enzyme activation provides a bona fide environmental resistance mechanism to targeted therapies</i> [in preparation]
Weh, M.T. , Kumar P., Marusyk V. Marusyk A., Basanta D., <i>The adaptive state determines the impact of mutations on evolving populations</i> 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. <i>Branched germline cysts and female-specific cyst fragmentation facilitate oocyte determination in mice.</i> PNAS, May 2023, DOI:10.1073/pnas.2219683120
Eilertsen, J., Tyczynska, M. A. , & Schnell, S. (2021). <i>Hunting ε: The origin and validity of quasi-steady-state reductions in enzyme kinetics</i> , SIAM J. App. Dyn. Syst., 2021, DOI: 10.1137/20M135073X

RESEARCH EXPERIENCE

Doctoral dissertation research <i>Moffitt Cancer Center</i> <i>Contact: David Basanta, Ph.D., david@cancerevo.org</i>	Tampa, FL, USA Aug. 2020 - Aug. 2025
<ul style="list-style-type: none">- 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 Lortatinib 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

University of Michigan Medical School

Contact: Santiago Schnell, D.Phil., santiago.schnell@umich.edu

Ann Arbor, MI, USA

Aug. 2018 - Jul. 2020

- 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

KAIST & DTU

Daejeon, South Korea & Kgs. Lyngby, Denmark

Jan. 2017 - Jan. 2018

Title: Detecting Causality in Oscillatory Systems

Contact: Dr. Jae Kyoung Kim, jaekkim@ibs.re.kr

Dr. Lasse Engbo Christiansen lsec@ssi.dk

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.

Bachelor thesis research

Technical University of Denmark

Kgs. Lyngby, Denmark

Sep. 2015 - Dec. 2015

Title: Modeling of Chemotaxis and Aggregation of Biological Cells

Contact: Dr. Mads Peter Soerensen

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

Technical University of Denmark

Corvallis, Oregon

Apr. 2015 - Jun. 2015

Contact: Dr. Malgorzata Peszynska

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

RESEARCH AWARDS

Featured Poster

Moffitt Scientific Symposium

Tampa, FL, USA

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
Society for Mathematical Biology Annual Meeting

Seoul, South Korea
Sep. 2024

Student Travel Award
MathOnc23 Conference

Phoenix, AZ, USA
May 2023

Student Travel Award
Modelling Resistance Evolution Theoretical Methodology Symposium

Ploen, Germany
Apr. 2023

Landahl Travel Award
Society for Mathematical Biology Annual Meeting

Heidelberg, Germany
Sep. 2023

MENTORING EXPERIENCE

Nandita Nair (w. Matthew Froid)
Moffitt HIP IMO: high school internship program

Tampa, FL, USA
Jun. - Aug. 2023

TEACHING EXPERIENCE

Engineering Mathematics 2 (BSE level)
DTU Compute, Technical University of Denmark

Ballerup, Denmark
Feb. 2016 - May 2016

Mathematics and Technology (BSE level)
DTU Compute, Technical University of Denmark

Kgs. Lyngby, Denmark
Sep. 2015 - Jan. 2016

Engineering Mathematics 1 (BSE level)
DTU Compute, Technical University of Denmark

Kgs. Lyngby, Denmark
Sep. 2014 - Dec. 2014

PROFESSIONAL SERVICE

Main organizer: Spatial ecology, evolution, and methods journal club
H. Lee Moffitt Cancer Center & Research Institute

Tampa, FL
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)
USF & H. Lee Moffitt Cancer Center & Research Institute

Tampa, FL
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
USF & H. Lee Moffitt Cancer Center & Research Institute

Tampa, FL
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
Technical University of Denmark, DTU Compute Institute (webpage)

Kgs. Lyngby, Denmark
Sep. 2014 - Jun. 2018

was one of three selected students in the DTU Compute administrative group; the group was to manage, analyze, and evaluate the quality of the undergraduate and master's education, and the well-being of students.

Social tutoring
Polyteknisk Forening (webpage)

Kgs. Lyngby, Denmark
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
Polyteknisk Forening (webpage)

Kgs. Lyngby, Denmark
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. 2nd 2018)
- **Polish:** Native proficiency
- **Danish:** Full professional proficiency
- **German:** Limited working proficiency