# MRI Spotlight: Katarzyna Rejniak, PhD

@Katarzyna Rejniak, PhD is a mathematical modeler and Associate Member in the **Integrated Mathematical Oncology (IMO) Department**. She leads a computational lab that models the mechanisms of interaction between tumors and their microenvironments in order to predict how tumors will respond to various therapies. Dr. Rejniak joined Moffitt in 2008 as one of the founding members of the IMO.

**How did you choose cancer research as a line of work? (Did you choose the job or did the job choose you?)**

I think everyone has been affected by cancer in one way or the other. I first started using math to model cancer cell processes during my postdoctoral position at the **Mathematical Biosciences Institute**. Since cancer is a complex phenomenon, mathematical modeling in the only way to delineate the role of multiple interacting cancer-related factors. I was driven to join Moffitt by the prospects to work closely with cancer biologists and clinicians, and together tackle tumor complexity.

**" Teaching is really rewarding when your students and their work are recognized and rewarded by our peers outside Moffitt. "**

-Katarzyna Rejniak, PhD

**It seems like you have moved around a lot; you must have had very unique experiences. To date, where is your favorite place to live or visit?**

I really liked **New Orleans**, where I studied for my PhD. More specifically, I like the food and the music, *not the climate*. I like colder weather!

**What do you like about New Orleans?**

The music and lifestyle; you can walk down the street and listen to people playing jazz and the blues. You never have to pay for concerts because there is one at every corner.

**Is there still a stigma regarding women in the STEM field? Do you see more women studying math? What has been your experience?**

I see more women coming in but we are still a minority. I am the only female faculty member in IMO, but we do have female post docs. A younger generation of women is coming into the field.

**Are there some advantages or disadvantages to being a woman in Mathematics?**

I never really look at it this way. In the Math Department in Poland, when I actually started, there were 75 students. The class was made up of half women and half men.

**Would you say the experience is different in a European setting vs. an American?**

That's a good question. I think the main difference is hierarchical. We had a 50/50 split between men and women when I started but when you go further in the education, there were no women who were Professors in Poland or in Scotland when I attended. So, entry into the field was initially even, but once you looked at the upper faculty level the ratio of women to men declined.

**What kind of advice would you give to a young woman thinking about coming into the mathematical field? Something that would make her stay on to obtain faculty level?**

Believe in yourself and what you are doing, and keep going.

**Can you share a lesson you learned while working at Moffitt?**

Whenever we work with clinicians, they always ask how we, the researcher, can help their patients. This "Patients First" perspective is something lacking in academia. To me this thought process is natural; as a researcher that's what we are supposed to be doing; helping patients. Being able to work with clinicians and patients on a daily basis and see your impact on that patient really makes a profound difference as a researcher.

**You mentor high school students as part of your role at Moffitt. Can you share a little more aout the program?**

I believe we're in the fourth year now. I mentor the students for the summer research projects. It's really uplifting because they are so interested and engaged. We have to teach them because they are high school students so they don't have background in the higher mathematics, so it's a challenge but it's really rewarding because they are really interested in researching the subjects and running the simulations and leading the presentations. I had students three years

ago who **co-authored a chapter in an encyclopedia!** My last post-doc, **Aleksandra Karolak** got a Marie Curie Fellowship in Europe! I am sad she left, but I am very proud of her. Teaching is really rewarding when your students and their work are recognized and rewarded by our peers outside Moffitt.


**Describe your latest project; what's new in your work-life?**

One of my recent projects is in **micro-pharmacology modeling.** Even the best anti-cancer drug is not able to exert a desired effect on the tumor, if it cannot reach each tumor cell in adequate quantity. Computer simulations allow us to test various drug properties and administration schedules to predict the most effective treatments. In our NIH-funded U01 grant, that is part of the Physical Sciences Oncology Network, we combine this approach with the organ-on-chip experimental system developed in the lab of our collaborators at Vanderbilt. The goal of this grant is to build an integrated experimental-computational system to determine most effective personalized treatment using patient-derived tumor organoids.

**What is your most memorable achievement, professional or personal?**

I developed the model called **IBCell model** (immersed boundary model of a cell). There is a group in Switzerland who picked up this model and made their own version that other people can use. Another group picked up the microPKPD model and used it for their research which was also published.

Scientifically, it is always great when other scientists are using the models that we have developed. This validates the importance of our approaches for the greater scientific community.

**As one of the founding members of the IMO department, what is your vision for Integrated Mathematical Oncology going forward?**

We want to bring computational models to the clinic and we just accomplished the first step in this goal, by becoming **a Center of Excellence.** We're really applying our research. In my research, I try to collaborate with biologists so that they can guide the biological experiments for this adaptive therapy that may be incorporated in the clinical trials. For the patients, we can take the data and then try to simulate how the treatment could be designed and change it as needed. That's where the adaptive therapy comes from.

Thank you Dr. Rejniak for the wonderful interview!

To learn more about Dr. Rejniak & her work visit:

- https://labpages.moffitt.org/rejniakk/index.html