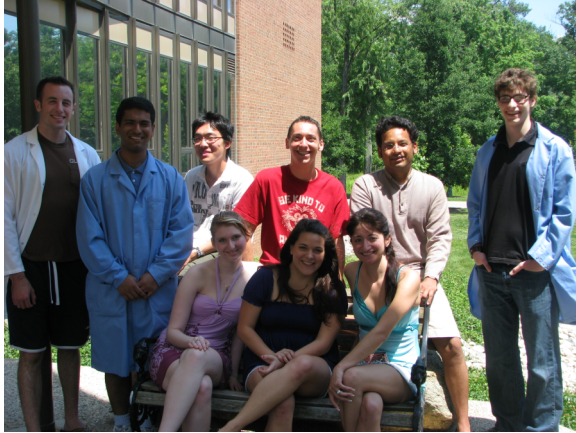


Dr. DebBurman's Lab in Focus

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Dr. DebBurman's Lab Group

Dr. DebBurman or Dr. D and his lab students are known for the tremendous effort and dedication they have put into researching Parkinson's disease. Many students are curious not only about the research and discoveries themselves but are also interested in learning what led Dr. D to pursue a passion in the particular field and what role his undergraduate students play in the research process. His students say that the greatest part about doing research is that you don't know what you'll do next! Parkinson's disease is very complex. To make a real difference you need to focus on one disease. Other neurodegenerative disorders have similar mechanisms. Therefore, the students constantly use the discoveries made from other diseases in order to make further progress on their own. For example, one link between autophagy and neurodegenerative diseases was first discovered in Huntington's disease but they were able to apply it to Parkinson's disease. That is why the students are constantly reading about other diseases and participating in Journal Club while doing research.

When Dr. D began his search for a teaching position, he looked for a nationally reputed liberal arts college that was located by a big city and that had a history of successfully combining teaching with research. Lake Forest College had an excellent tradition of both teaching and research. He promised himself that he would go to a college where if he would walk around campus he would see student diversity within the first hour and he did at Lake Forest.

Although it might come as a surprise, Dr. D did not participate in undergraduate research in college. As a senior, he was a biology and economics major. He did, however, attend a physiological psychology class about neuroscience that inspired him and committed him to learn that there was still much that he could understand about the brain. Dr. D was accepted into Northwestern University for graduate school, which had a very good neuroscience program and moved to Chicago. The brain is truly the most exciting organ to study because it controls all bodily functions and behavior.

At Northwestern, Dr. D studied what regulates protein shapes in neurons as they communicate with each other. Some proteins need to change shape in order to

become active. But sometimes, proteins change shape that can be toxic and further precipitate into fibers which is linked to neurodegenerative diseases. In the late 90's people were just starting to understand protein misfolding. Dr. D went to Dr. Susan Lindquist's lab in order to learn from the best. She was working with yeast which is one of the most powerful organisms to study cell biology. They studied prion diseases which are an unusual set of infectious neurological disorders caused by a misfolded protein; however, by this time Dr. D had decided he wanted to become a college professor, inspired by his own college teachers, and knew he could not continue this work at a small college setting because of the possibility of infections. As he was finishing his post doc, scientists had discovered that a misfolded protein synuclein was aggregated in Parkinson's disease, which was perfect timing for them to examine this protein's toxicity.

Currently, his lab wants to know what causes Parkinson's disease and how to prevent it. They are trying to find ways to destroy the protein α -synuclein more quickly which is involved in protein misfolding, so that it does not build up and aggregate. They are trying to get cells to increase self-cannibalism (autophagy). The lab members use the evolutionary preserved pathway, autophagy, or self-eating, in order to get rid of synuclein. It is difficult to plan too far ahead for the future. After all, most exciting ideas come from understanding the literature. For example, just recently, Dr. D received an email that said that the entire genome of fission yeast had been manipulated for knockout of every single gene. They did not have this tool a few months ago! Now they can ask specific questions, and find out which gene can affect the model of Parkinson's disease in this organism. The program for three years ahead did not include that but now it does which is very exciting.

But what qualities should a good researcher possess and why are Lake Forest College students so successful? In order to be successful, students need to be critical, open-minded, hard-working, persevere, and not get disappointed too quickly. In addition, they need to listen but not always agree and really try to think on their own. You do not have to be an A student in the classroom. The skills for a good scientist are not necessarily the same for excelling in the classroom. There has been exceptional success in a diverse range of students because they have these attributes.

In addition, it is very important for scientists to be able to vigorously train undergraduates to think like a scientist. Dr. D trained over 30 students at both Lake Forest College and Kalamazoo College over the last ten years. A majority of these students are either in MD or PhD programs, contributing to the scientific community. He has published numerous papers with his students. The icing on the cake is that some of these students are already post doc or medical residents and are truly successful professionals in biomedical careers. And although Dr. D has aided a number of students be successful through research, teaching is his first priority and greatest enjoyment. He enjoys research because it makes him a better teacher and a lifelong student of science. Research enables him to explain the textbook information even more effectively because he has carried out countless of those kinds of experiments with his own students.

For Dr. D, the best part about doing research is working side-by-side with undergraduates. Their mind is truly like a sponge. They are looking to absorb and transform information. He loves motivating and challenging students. They sometimes ask questions that he might not think about.

Every year they think of new questions and ideas, thus changing the research's path. The students help him apply for successful grants for the research, with their ideas really contributing to knowledge. His students agree that the best part about doing research is that it is hands on and the lab is the only place where the students can actually apply the knowledge that they learn in the classroom!

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