Jeff Wereszczynski

I'm a Biophysicist

I'm an associate professor of physics at Illinois Institute of Technology. My areas of research are devoted to understanding how life works at the molecular level. As Richard Feynman, one of the 20th century's preeminent physicist, said "Everything that living things do can be understood in terms of the jiggling and wiggling of atoms." And it's true! At the most fundamental level, we are all composed of atoms that are following the same physical forces as everything else in the universe. What makes biological molecules special is how these atoms are arranged to execute specific functions. My group tries to understand this idea by using some of the largest computers in the world to model protein, DNA, and lipid molecules at the atomic scale to see how they move and interact with one another to execute their biological function.

Current Project

Why can identical twins have the same genetic code but different traits? To understand our physical characteristics, it's not enough to know what genes a person has, but we need to know how those genes are turned on and off. This is the study of epigenetics. In epigenetics, nature controls gene expression by multiple molecular mechanisms which either make genes easier or harder to read, thus tuning up or down the physical trait that these genes are linked to.

We are interested in how these epigenetic processes happen at the molecular level. To do this, we model the protein and DNA molecules that make up chromosomes, and we see how seemingly small changes to their physical and chemical properties make the DNA either easier or harder to read.

What do you think?

Can we use models of proteins interacting with drugs to understand why drugs have their effects on people? Can we use the same principles to develop new drugs that target established and new pathogens such as HIV and COVID-19?