Illuminating Tomorrow's Drug Design Targets

Julie Mitchell
Professor, Mathematics & Biochemistry

CURRENT RESEARCH

Mathematics pairs with biochemistry to speed the process of drug design

Dr. Julie Mitchell, of the University of Wisconsin, Madison, is interested in the interface of biophysics and data science. By predicting the effects of amino acid mutations on protein binding, she and her team can highlight the amino acids that make the strongest contributions to bindings and therefore the best targets for drug design. This knowledge is used toward protein engineering based on naturally occurring molecules or to pinpoint regions in protein-protein interfaces that can be targeted with small drug molecules. More recently, she has combined her work with data on molecular evolution, gaining a deeper understanding of the underlying physics that allows the molecules to recognize one another. Through the development of Dr. Mitchell's predictive models and her strategies to utilize genomic data collected for other organisms within her prediction, she and her team are crafting the computational tools necessary for tomorrow's therapeutics.

As an avid collaborator, in the last year alone, Dr. Mitchell saw three important collaborations with experimental groups in which her computational tools helped to advance science towards translational applications. For instance, with a group from Oxford, she and her team helped assemble an immune signaling interaction that is implicated in autoimmune disorders. Such interdisciplinary and collaborative work has had a lasting impact on the scientific community. In fact, Dr. Mitchell's group was one of the very first to apply bioinformatic techniques toward questions in biophysics, an area that has recently exploded due to its success. Future research is directed toward the use of evolutionary data toward the improved understanding of the physics underlying molecular...

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AFFILIATION

University of Wisconsin-Madison

EDUCATION

- Ph.D., in Mathematics, 1998 , University of California, Berkeley

AWARDS

- Alfred P. Sloan Research Fellowship in Molecular Biology, 2006
- Steenbock Faculty Fellow, U.W. Madison, 2003
- La Jolla Interfaces in Science Postdoctoral Fellow, U.C. San Diego, 1998
- Regents Fellow, U.C. Berkeley, 1997
- Achievement Rewards for College Scientists (ARCS) Foundation Fellow, 1997

RESEARCH AREAS

Proteomics, Health IT, Technology, Computational Sciences / Mathematics

FUNDING REQUEST

Your contributions will support the continued research of Dr. Julie Mitchell, of University of Wisconsin-Madison, as she builds sophisticated predictive models that will help determine the geometry of protein assemblies and sites for drug design. Donations will fund the necessary $500K required for personnel, server equipment, and professional expenses, like travel along with students and postdocs necessary to build new predictive models. Be part of the explosion of bioinformatic techniques being used to develop biophysics.