How to Improve Lives from the Molecular Level

Justin Siegel

Assistant Professor, Biochemistry & Molecular Medicine/Chemistry/Genome CenterFounder: PvP Biologics, Seattle, WAFounding Member: Bio Architecture Labs, Berkeley, CA

CURRENT RESEARCH

Developing novel enzyme catalysts to enable real-world solutions for issues in food, health, and chemical production

"Better Living Through Chemistry" is a classic tagline used to emphasize the role of chemistry in advancing technology. One way to achieve this reality is through computational enzyme engineering, looking at and taking tools from nature and utilizing them to solve problems in the modern world. Enzymes are the primary means by which biology performs chemical transformations, and naturally evolved enzymes have been optimized over long periods of time to address challenges biological systems face in nature. However, modern society faces additional challenges in food, energy, and health, and to address these challenges, novel catalysts are needed. Dr. Justin Siegel, Assistant Professor at the University of California, Davis, and his lab therefore focus on the use of computational, genetic, and chemical methods to design, build, and test enzyme catalysts tailored for applications widely beneficial for the society today.

Current research projects include:

- *Next Generation Therapeutics:* Proteins are the fastest growing sector of therapeutics. Dr. Siegel and his lab plan to generate the next generation protein therapies by developing enzyme catalysts with bioorthogonal functions. This will enable highly specific molecular reactions to be catalyzed in the human body with minimal side effects. They will focus on developing novel protein therapeutics that could potentially enable novel treatments for cancer, autoimmune disorders, diabetes, and obesity. For example, the Siegel lab has recently engineered an enzyme that has the potential to treat Celiac Disease and Gluten Intolerance. Significant breakthroughs could enable related solutions for a myriad of diet related...

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AFFILIATION

University of California, Davis

EDUCATION

- Ph.D. in Biochemistry 2011, University of Washington
- B.S. in Biochemistry 2005, University of California, Davis

AWARDS

- International Genetically Engineered Machine Competition: Grand Prize, 2014
- Alfred P. Sloan Research Fellow in Computational & Molecular Biology, 2014
- International Genetically Engineered Machine Competition: Grand Prize, 2011
- Fred Hutchinson Cancer Research Center Harold M. Weintraub Graduate Student Award, 2011
- International Genetically Engineered Machine Competition: Best Health and Medicine, 2010

RESEARCH AREAS

Technology, Chemistry, Computational Sciences / Mathematics, Nanotechnology

FUNDING REQUEST

Your contributions will support the continued research of Dr. Justin Siegel and his lab at the University of California, Davis as they develop new enzymes to tackle today's problems. Donations will help fund the highly diverse group to carry out both computational simulations and wet-lab experiments, designing, building, and testing proposed systems. Partner with them as they create solutions that are highly applicable to all of us today!