Seminars in Biotechnology BTEC 591 & BTEC 691

"Protein Engineering Studies in Biotechnological Research"

Thursday, November 5, 2020
13:30

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Aslı Kutlu completed her undergraduate studies in 2012 at the department of Chemical and Biological Engineering at Koç University. In 2012, she started her PhD at the department of Molecular Biology, Genetics and Bioengineering. Sabancı University, under the supervision of Prof. Uğur Sezerman. Her research studies are about the protein engineering application of cellulase and lipase enzymes from the perspective of both experimental and computation point of view. After receiving PhD at 2017, she works as post-doctoral fellow at Acıbadem Mehmet Aydınlar University, Department of Medical Statistics and Bioinformatics, School of Medicine, where she again joined to Sezerman Lab. During the post-doctoral fellowship, she mostly focused on the investigation of rare disease mechanism through molecular dynamics (MD) studies to elucidate the roles of novel mutations. In 2019 February, she started to work at Biruni University as Assistant Professor. Now, she has joined to İstinye University, the department of molecular biology and genetics. Still, her research studies are about the investigation of rare disease mechanism through MD studies and the identification of novel genes as potential biomarkers for Head-and-Neck cancer and Cholangiocarcinoma. Aslı Kutlu is the author of 6 articles and she is a principle investigator of TUBITAK-1002 project and a researcher in several BAP-projects.

Abstract

As similar to the other fields of life science and engineering studies, there is always continuous demand for optimized processes in biological science, especially for chemical and biological reactions. This particular demand creates a need for optimized biological macromolecules such as enzymes, and here the basis for development of optimized biological macromolecule is to understand their structural and functional basis. Protein engineering tools enable us to understand the functional basis of enzymes, and further to perform the required modifications to obtain the better biological macromolecules displaying novel properties with respect to native counterparts. Moreover, these tools could be utilized to construct a theoretical basis about the roles of protein molecules in disease mechanism.

The experimental and computational studies in the field of protein engineering provide a complementary insight for each other, and both approaches enable to track the evolutionary pathway of proteins. In this talk, I will specifically talk about the roles of experimental studies, such as DNA-shuffling, and domain-swapping approaches performed with cellulase enzymes, and the computational studies such as molecular dynamics (MD) simulations used to construct a theoretical insight about working mechanism of lipases in non-aqueous environment. Lastly, the importance of computational studies to elucidate the roles of novel variants in disease mechanism is emphasized.