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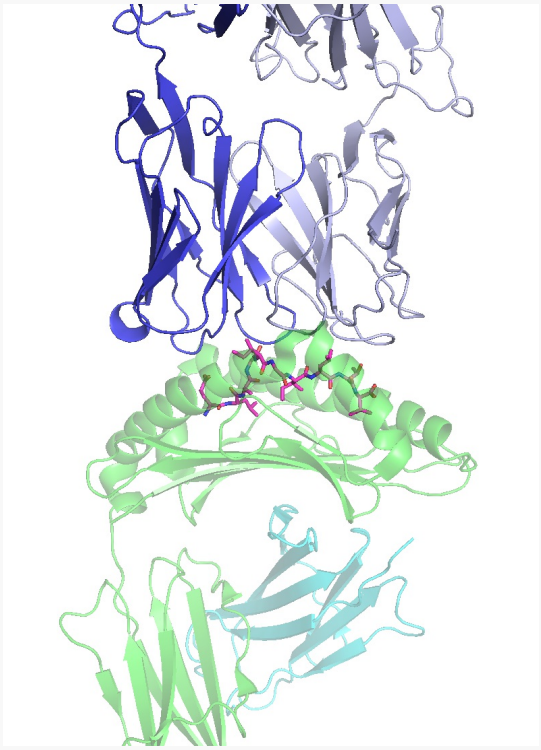
IBBR Receives $1.2M NIH Award to Develop 3D Modeling Tool That Could Lead to New Immunotherapies



DMF5 TCR, shown in complex with its target, has been in clinical trials for melanoma immunotherapy. Pierce and collaborators redesigned this TCR to improve its tumor targeting.

New computational tool supports the engineering and development of cancer immunotherapies by predicting how T cell receptors recognize and bind to their targets

(Rockville, MD, October 3, 2018) The Institute for Bioscience and Biotechnology Research (IBBR) has been awarded a $1.2M National Institute of Health (NIH) grant to generate a robust modeling and design framework to predict the structures of T cell receptors (TCRs) from sequence, model antigen recognition, and design new TCRs with desired targeting capabilities that can be applied in therapies against cancer and other diseases. Dr. Brian Pierce, IBBR Scientist and Assistant Professor, University of Maryland Department of Cell Biology and Molecular Genetics, is the project's principal investigator. Pierce is also an investigator in the University of Maryland Marlene and Stewart Greenebaum Comprehensive Cancer Center's Tumor Immunology and Immunotherapy Program.

"TCRs are fascinating due to their implications in our understanding of molecular recognition and specificity, as well as their importance as therapeutics for various diseases, including cancer," said Dr. Pierce. "This work is highly collaborative, and we are looking forward to working with experimental researchers, including those at IBBR, who can validate our computational approaches and provide critical input data."

In addition to its incredible power to fight infectious disease, the human immune system can be protective against cancer. Key to these important functions are immune system warrior cells called T cells. On the surface of T cells, each human possesses a vast repertoire of unique TCRs ready to recognize and lead an immune response against a vast array of viruses, bacteria, and mutant human proteins on cancerous and abnormal cells. Scientists have determined the DNA sequences of millions of TCRs, but predicting their 3D structures and fully understanding how those structures lead to specific recognition of targets are continuing challenges.

Pierce's group recently developed, and made publicly available to the scientific community, a web server called TCRmodel, which creates high-resolution models of TCR structures from protein sequences entered by users. The NIH award will allow Pierce and his colleagues to refine their algorithm, extending the tool's abilities to include modeling exactly how individual TCRs recognize and bind their targets. Accurate models, verified by collaboration with experimental laboratories, will enhance understanding of T cell immunity, opening the door to new and better immunotherapies for cancers, as well as autoimmune and infectious

diseases.

“Cell-based immunotherapies are recognized as the next frontier of cancer treatment,” said Dr. Thomas Fuerst, IBBR Director. “TCRmodel is an example of IBBR’s pioneering research to generate innovative solutions to important scientific and medical challenges.”

Initial funding for Pierce’s research was provided through a seed grant from the University of Maryland Strategic Partnership: MPowering the State, a program designed to leverage the strengths and missions of the University of Maryland College Park and the University of Maryland Baltimore.

About IBBR

IBBR is a joint research enterprise of the University of Maryland College Park, the University of Maryland Baltimore, and the National Institute of Standards and Technology. The Institute sits at the nexus of academic research and commercial application, bringing together critical elements necessary inspire transformative discoveries in the field of biotechnology that provide innovative solutions to major scientific and engineering challenges important to society. IBBR researchers seek to advance the fields of disease pathways and biomolecular targets, biomolecular measurements sciences, and biomolecular engineering including structure-based design of vaccines and therapeutics. The Institute also serves to expand the economic base of science and technology in the State of Maryland and at the national level. For more information, go to https://www.ibbr.umd.edu/.

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