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A chemical approach to mine the immunoproteome for disease biomarkers

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The adaptive immune system reacts to foreign molecules or antigens through the amplification of antibodies. Therefore, antibodies represent easily accessed biomarkers for diseases that include cancer, autoimmune and neurodegenerative disease. Unfortunately, the most suitable capture agent for an antibody biomarker is the cognate antigen whichin many diseases is not known due to the limitations of conventional antigen discovery methods. We are developing unbiased antigen discovery platforms that take a novel chemical approach to discover new biomarkers. Using combinatorial chemistry, we identify small molecules that are capable of engaging the antigen-binding site of disease-associated antibodies from patient serum. If these abiological "antigen surrogates" bind with sufficiently high affinity and specificity, they are used to detect and enrich the disease antibody population in order to identify the cognate auto-antigen. This strategy has allowed us to uncover novel auto-antigens that are involved during the progression of type 1 diabetes mellitus. These new methods for biomarker discovery will be discussed in the context of identifying new autoantibody biomarkers for type 1 diabetes and their diagnostic application.

Biography

Todd M Doran completed his PhD under the guidance of Bradley Nilsson at the University of Rochester in 2012 and his Post-doctoral studies at The Scripps Research Institute working with Thomas Kodadek. His work focuses on the use of organic chemistry to create combinatorial libraries that serve as surrogates for unknown, disease-linked antigens. His improvements to the synthesis and screening of combinatorial libraries against human blood samples have led to several manuscripts and pending patents.

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