

DIAGNOSTIC ASSESSMENT OF IMMUNOLOGICAL HISTORY BY HIGH-THROUGHPUT TCR SEQUENCE ANALYSES

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During an immune response T-cells expressing unique T-cell receptor DNA rearrangements undergo clonal expansion. We hypothesized these unique TCR sequences can serve as diagnostic classifiers, providing information of immunological exposures. We used high-throughput sequencing to identify TCR β sequences in separate cohorts of mice after smallpox vaccination and after Monkeypox virus (MPXV) infection. From millions of sequences in the peripheral blood we identified 315 TCR sequences associated with post-vaccinated samples. Vaccine-associated TCR sequences (VATS) were used as diagnostic classifiers and were used to correctly identify 100% of naive and post-vaccinated samples. The VATS were also 98% accurate at identifying samples from the independent cohort of samples infected with a highly related MPXV. The reproducibility of this method was verified repeating the analyses after identifying MPXV-associated TCR β sequences (MATS). MATS distinguished infected/vaccinated samples from naive (98% accuracy). The data show that computational identification of vaccine/pathogens expanded TCRs is a sensitive and specific method for determining exposure and can be used to track pathogen specific immune cells with unprecedented sensitivity.

BIOGRAPHY

Richard J DiPaolo is currently working as a Professor in Molecular Microbiology and Immunology at Saint Louis University, USA. He has pursued his Postdoctoral fellowship from NIAID, National Institutes of Health, PhD from Washington University in Saint Louis in 2002 and BA at University of Chicago in 1995. His research interest is in establishing mouse models of human diseases to develop strategies to suppress chronic inflammatory diseases. He currently has an on-going project to examine the T and B cell responses to vaccine and infections and his goal in this project is to understand which immune receptors are used to recognize different vaccines and infectious agents. He had several publications as well as he is a principal investigator in American Gastroenterological Association, American Cancer Society, Washington University, and Arthritis National Research Foundation.

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