GDCB Promising Scientist Research Series

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Abbvie
Monday, March 22, 4pm

Multi-omic single-cell analysis uncovers tumor-unique immune programs distinct from inflamed tissue phenotypes

Immunotherapies to treat cancer have achieved remarkable successes, but major challenges persist. An inherent weakness of current treatment approaches is that the targeted immune subsets are not exclusive to tumors. In an effort to identify tumor-unique immunotherapeutic targets that are distinct from general inflammatory processes, we used complementary single-cell analysis approaches to compare the immune landscape in human tumors and non-malignant, inflamed tissues. We found that the immune infiltrate in inflamed tissues showed substantial congruence with the tumor. However, computational and machine learning analyses of multi-omic single-cell data allowed identification of tumor-unique subsets and predicted interactions of regulatory T cells (Tregs) and antigen-presenting cells (APCs). Subsequent experimental validation confirmed an intratumoral IL-1 network. Intratumoral Tregs were uniquely identified by ICOS and IL-1R1 cell surface expression, thus allowing for tumor-specific depletion.

Recent publications:

Seah YM, Chang AM, Dabee S, Davidge B, **Erickson JR**, Olanrewaju AO, Price RM. "Pandemic-related instructor talk: how new instructors supported students at the onset of the COVID-19 pandemic." JMBE in press.

Erickson JR, Mair F, Bugos G, Martin J, Tyznik AJ, Nakamoto M, Mortimer S, Prlic M. "AbSeq protocol using the nano-well cartridge-based Rhapsody platform to generate protein and transcript expression data on the single-cell level" STAR Protocols. (2020), https://doi.org/10.1016/j.xpro.2020100092

Mair F,* **Erickson JR**,* Voillet V, Simoni Y, Bi T, Tyznik AJ, Martin J, Gottardo R, Newell EW, and Prlic, Martin, A Targeted Multi-Omic Analysis Approach Measures Protein Expression and Low Abundance Transcripts on the Single Cell Level. Cell Reports. 2020 April 07; 31(1), p.107499. *These authors contributed equally to this work

Woodward-Davis AS, Roozen HR, Dufort MJ, DeBerg HA, Delaney MA, Mair F, **Erickson JR** , Slichter CK, Berkson JD, Klock AM, Mack M, Lwo Y, Ko A, Brand RM, McGowan I, Linsley PS, Dixon DR, Prlic M. The human tissue resident CCR5+ T cell compartment maintains protective and functional properties during inflammation. Sci. Transl. Med. 2019 Dec 4; 11(521). pii:eaaw8718. doi: 10.1126/scitranslmed.aaw8718. PMID: 31801887

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