

The power of ONE: Immunology in the age of single cell genomics

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Immune cell functional diversity is critical for the generation of the different regulator and effector responses required to safeguard the host against a broad range of threats such as pathogens and cancer, but also from attacking its own healthy cells and tissues. In multi cellular organisms, dedicated regulatory circuits control cell-type diversity and responses. The crosstalk and redundancies within these circuits and substantial cellular plasticity and heterogeneity pose a major research challenge. Over the past few years, we have developed a collection of innovative single-cell technologies, which provide unprecedented opportunities to draw a more accurate picture of the various cell types and underlying regulatory circuits, including basic mechanisms, transitions from normal to disease states and response to therapies. I will discuss some of our discoveries and how they change the current dogma in immune regulation as well novel technologies that combine single cell RNA-seq with CRISPR pooled screens and demonstrate the power of these approaches to probe and infer the wiring of mammalian circuits, fundamental to future engineering of immune cells towards desired responses, including immunotherapy.