SINGLE CELL MULTIOMIC PROFILING OF THE ANTIGEN-SPECIFIC IMMUNE RESPONSE USING ANTIGEN SPECIFIC DCODE DEXTRAMER® (RIO) REAGENTS AND BD® ABSEQ REAGENTS ON THE BD RHAPSODY™ SINGLE-CELL ANALYSIS SYSTEM

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Background Understanding the specific T- and B-cellular immunity during an induced cellular immune response is important for development of anti-tumor immunity in personalized immunotherapy. Advanced single-cell genomics technologies have enabled researchers to do single cells immune profiling, by assessing cell surface proteins, the transcriptome and TCR and/or BCR gene clonotypes. However, understanding antigen-specific recognition at the immune synapse is key to understand the specific immune response in cancer. The dCODE MHC Dextramer® technology combines single-cell genomic profiling with antigen-recognition allowing deep analysis of antigen-specific T- and B-cells at the single cell level pairing TCR recognition adding to unveil the antigen specific immune response, in cancer and infectious diseases.

Methods We have combined two powerful technologies, Immudex®, dCODE Dextramer® (RiO) Reagents and the BD Rhapsody™ Single-Cell Analysis System, to detect and characterize low-frequency antigen-specific T- and B cells, including the full sequences of the V(D)J gene segments of the antigen-specific T- and B cell receptors, as well as profile transcriptome and cell phenotyping by surface protein expression. We used a panel of dCODE Dextramer® (RiO) reagents directed against 10 virus-specific antigens + 6 negative control reagents, spanning MHC1 and MHCII, to profile two HPBMC samples, together with 15 BD® AbSeq immune related antibodies, and over 350 immune related genes.

Results We identified 10 different virus-specific T-cell responses over the two samples and revealed major clonotypes of all responses in the two samples, alongside with phenotypic activation profile using the BD® AbSeq reagents and immune target gene expression of the antigen-specific T cells identified by the dCODE® (RiO) Dextramer reagents. Data on antigen-specific B-cell responses is pending.

Conclusions Here we show an assay with the ability to analyze antigen-specific immune cells, by applying combined antigen-specific detection, with surface phenotyping, and gene expression, resulting in a deep phenotypic characterization of the immune cells in the donor. The ability to do high-resolution B and T cell profiling has broader implications and utility in immuno-oncology, infectious diseases, and autoimmunity.

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