Innovations
UNIVERSITY OF COLORADO
ANSCHUTZ MEDICAL CAMPUS

DNA Barcodes to Track Antigen and Drug Uptake *In Vivo*

Product

DNA barcodes

Indication

Can be attached to an antigen or drug of interest and tracked *in vivo*

Value Propositions

- Antigens and drugs uptake can be tracked at the single cell level
- Amount of uptake and length of time retained can be quantified
- Tool is useful for *in vivo* systems

Market

- $1.1 Billion—Global targeted RNA sequencing market in 2020
- Market is expected to reach $6.3 billion by 2026 with a CAGR of 27.6%

Intellectual Property

- Patent pending
- Available for licensing

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Background on CU5259H

Establishing mechanisms and identity of cell subsets that uptake specific antigens and drugs within an *in vivo* system is important for the understanding of biological processes. Traditionally, flow cytometry has been used to identify cell subsets and transcriptional differences between cells. More recently, single cell RNA sequencing has allowed the identification of novel cell subsets and quantification of proteomic and transcriptional behavior *ex vivo*. However, tracking the *in vivo* uptake of antigen and drugs at the single cell level has been challenging.

Technical Innovation

The Dr. Tamburini and Dr. Hesselberth team have created DNA barcodes that can be linked to antigens or drugs of interest in order to track them within *in vivo* systems. Utilizing single-cell mRNA-seq on a 10x genomics platform and PCR, users can quantify both antigen/drug uptake as well as the length of time antigens/drugs are retained at the single cell level. To protect DNA barcode from exonuclease and endonuclease degradation, phosphorothioate linkages were incorporated into the oligonucleotide. Within murine models, the team was able to successfully track and quantify the uptake of a protein of interest (ovalbumin) into various cell types (Figure 1). The team found that the DNA tags successfully resisted degradation and did not impact immune response within their murine models. While ovalbumin was used in the team's research, other antigens or drugs could be attached to the DNA tag to understand uptake and delivery within an *in vivo* system. These quantitative analyses cannot be performed with currently available research tools.

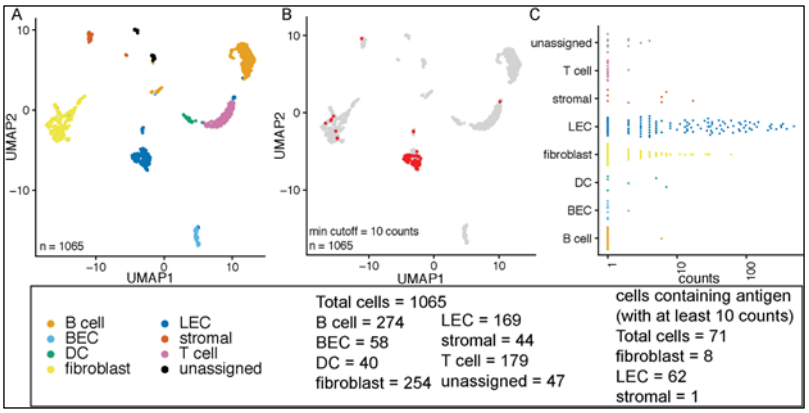

Figure: Shown are A) the cell types isolated B) cell subtypes with uptake of antigen-DNA tags and C) the number of antigen-DNA tags detected per individual cell and cell sub-type.