Docket #: S13-457

Single-cell T cell receptor sequencing and simultaneous phenotyping

Researchers in Dr. Mark Davis' lab have developed a patented method to perform multi-parametric phenotypic analysis and T cell receptor (TCR) sequencing from single sorted T cells. T cells have diverse functional activities that range from stimulating B cells to make antibodies, to inhibiting responsiveness. The TCR is central to the selection and function of a T cell as it determines the T cell's antigen specificity. The TCR also serves as a unique identifier of a T cell's ancestry. Insight into the specificities and functional characteristics of a T cell's response would be beneficial in diagnosing and treating a wide variety of diseases. Thus, there exists a real need for a way to effectively profile large numbers of individual T cells. To help meet this need, the researchers have developed this technology, which includes compositions and methods to sequence the TCR and simultaneously query multiple phenotypic parameters in single cells.

Stage of Research
Using this method, the inventors have shown excellent efficiency in attaining TCR alpha beta sequences and are able to perform extensive phenotypic analysis. Furthermore, they've demonstrated the utility of the technology in the analysis of tumor infiltrating lymphocytes (TILs) from a human colorectal cancer.

Applications

- **A powerful, accurate way to profile individual T cells**
  - Therapeutic development
  - Research: functional studies; ligand discovery

Advantages

- Low cost
- High throughput
- Accurate
- Single cell analysis
- Can identify multiple TCR alpha chains from single T cells
- Multiple phenotypic parameters can be analyzed in parallel with TCR sequence
- Can compare phenotypic and functional range of T cells that can arise from a single TCR clone
- Not as labor intensive as other methods - does not require purification or fixation
- Strategy can be customized or expanded

Publications

- Published US Patent App. No. 14/700,797
- Han, A., Glanville, J., Hansmann, L. et al. Linking T-cell receptor sequence to functional phenotype at the single-cell level. Nat Biotechnol 32, 684–692 (2014).

Patents

- Published Application: 20150337369
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