Docket #: S10-105

Methods for Detecting and Measuring Malignant and Non-Malignant Lymphocytes

Stanford researchers have developed a method that not only detects B- and T-cell cancers but also is sufficiently sensitive to detect residual cancer in patients. Furthermore, it provides a useful tool to monitor immune responses after therapies or exposures that alter the immune system or in other patients who have diseases related to the immune system. More specifically, this new technology determines the clonality of immune cell populations by assessing the diversity of immune receptor loci. Unlike healthy immune systems, malignancies originating from B- or T-cells typically express a single dominant clonal immunoglobulin or T cell receptor. While surrogate measures for clonality can be obtained using capillary electrophoresis, such methods lack sensitivity and specificity. This newer method is specific and sensitive as it utilizes clonal expansion defined at the level of the nucleotide sequence to identify malignant lymphocytes and monitor healthy immune responses or immune-mediated diseases. In a single standardized and inexpensive assay, it can measure the quantity and diversity of B and T cells in small volumes of complex clinical samples. This inexpensive global method for monitoring immune responses with respect to B or T cells is unique and may be particularly useful in clinical trials of immunotherapeutics, vaccines, and other immune-system altering interventions. Furthermore, it may improve the diagnosis of autoimmune diseases, allergies and asthma, and other immune-mediated diseases.

Applications

- Detects T-cell and B-cell cancers
- Detects residual disease after patient treatment
- Monitors immune responses in patients with autoimmune disease, allergic illnesses, asthma, transplantation, transplant rejection, sensitization to

transfusion, and immunodeficiencies
- Measures immune responses of healthy or diseased people after vaccination, or other immune system alterations by therapies or environmental exposures

Advantages

- Highly sensitive
- Specific for malignancies with B- and T-cell originSmall sample sizes
- Single consistent assay
- Patient customization not required
- Measures quantity and diversity of B and T cells
- Inexpensive

Publications

- Boyd S, Marshall E, Merker J, Maniar J, Zhang L, Sahaf B, Jones C, Simen B, Hanczaruk B, Nguyen K, Nadeau K, Egholm M, Miklos D, Zehnder J and Fire A (2009) Measurement and Clinical Monitoring of Human Lymphocyte Clonality by Massively Parallel V-D-J Pyrosequencing. *Science Translational Medicine* 1: 12.

Patents

- Published Application: 20120220466
- Published Application: 20140235477
- Issued: 9,193,997 (USA)
- Issued: 9,068,224 (USA)

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