Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

1475 N. Scottsdale Road, Suite 200
Scottsdale, AZ 85287-3538
Phone: 480 884 1996 Fax: 480 884 1984

Case ID:M23-238L
Published: 4/26/2024

Inventors

Shaopeng Wang
Nanxi Yu
Chao Chen
Xinyu Zhou
Januario Castro

Contact

Jovan Heusser
jovan.heusser@skysonginnovations.com

Optical Imaging Platform for POC CAR T-Cell Therapy Assessment

Chimeric antigen receptor (CAR) T-cell therapy is a type of immunotherapy which uses altered T-cells to target cancer cells more effectively. As such, it has dramatically changed the treatment landscape for cancer patients. However, it has limitations including cytokine release syndrome (CRS), neurological events (NE), lack of response (which occurs in roughly 50% of patients) and overwhelming logistics, particularly in monitoring and follow up. Unfortunately, these limitations contribute greatly to the extremely high cost associated with CAR T-cell therapy. Rapid, point-of-care quantification of CAR T-cells and cytokines could improve safety, simplify management, and reduce costs, but the platforms for detecting CAR T-cells and cytokines are expensive, not easily accessible, and most importantly are not amenable to POC rapid testing to support real-time clinical decisions.

Researchers at the Biodesign Institute of Arizona State University, in collaboration with clinicians from The Mayo Clinic, Arizona, have developed a rapid optical imaging-based platform to simultaneously quantify circulating CAR T-cells and therapy-related cytokines from a drop of blood. This POC compatible platform is centrifuge free, separates white blood cells and plasma, uses optical imaging and machine learning to count CAR T-cells, and also quantifies cytokine levels with high sensitivity and precision. It is also rapid, cost-effective and has the potential to improve patient outcome.

This innovative and cost-effective platform can be integrated into a handheld device suitable for POC use to significantly benefit the clinical management of cancer patients being treated with CAR T-cell or other immunocellular therapeutics.

Potential Applications

- Counting CAR T-cells and quantifying cytokines
  - Monitoring and managing patients getting CAR T-cell therapies or other cellular/immuno therapies

Benefits and Advantages

- Integrates separation, collection and detection in a single chip, eliminating the need for centrifugation, staining or professional interpretation
  - Separates white blood cells and plasma

    - Helps prevent the sensing surface from getting blocked by RBCs
- Counts CAR T-cells and quantifies cytokines to help clinicians manage patient responses
    - High sensitivity and precision
- The machine learning model is able to identify and not count non-specific cells
- Can be integrated into a handheld device suitable for POC applications and communicate with smart devices to compute imaging findings
- Does not require specialized laboratory-based equipment or expertise
- Provides clinicians with a tool to make data-driven decisions, improve patient safety and reduce costs associated with cellular immunotherapies

For more information about this opportunity, please see

Jing et al – ACS sensor – 2021

Jing et al – ACS nano – 2019

Wang et al – ACS sens - 2020

For more information about the inventor(s) and their research, please see

Dr. Lee's departmental webpage

Dr. Wang’s laboratory webpage