

# Method and Device to Screen and Sort Cancer Immunotherapy Cells

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#### WARF: P180292US02

Inventors: Melissa Skala, Alexandra Walsh

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing optical technology for sorting T cells by activation state. This non-invasive method uses the autofluorescence signals of NAD(P)H and FAD to determine T cell activation state without the use of contrast agents or requiring tissue/cell fixation.

### **Overview**

A new cancer treatment being studied at a few major centers including UW Health is CAR T (Chimeric Antigen Receptor T cell) therapy. CAR T therapy uses a patient's own cells and 'reengineers' them to fight cancer. The procedure starts with removing the patient's T cells from the blood and sending them to a lab where they are altered to produce cancer-fighting proteins called chimeric antigen receptors (CARs) on their surface. These 'supercharged' or activated T cells are multiplied at the lab, and then shipped back to the hospital where they are reinjected into the patient's blood.

Determining T cell activation is imperative for studying these cells in vivo and for quality control of cell therapies like CAR T. Current methods to determine T cell activation (e.g., flow cytometry, cytokine release assay) are either invasive, requiring the use of contrast agents and possibly tissue/cell fixation, or cannot capture population heterogeneity.

## The Invention

UW-Madison researchers have developed a highly accurate label-free method to non-invasively detect T cell activation by detection of free-NAD(P)H fraction, NAD(P)H a1. NAD(P)H a1 can be measured by fluorescence lifetime imaging or spectroscopy systems. The device could also sort T cells based on NAD(P)H a1. If increased accuracy of T cell activation is needed for a specific application, additional measurements of the other NAD(P)H and FAD autofluorescence endpoints can be obtained and used for classification.

# Applications

· Screening and sorting T cells

## **Key Benefits**

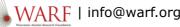
- · Non-invasive and contrast agent-free
- Classification accuracy exceeds 95 percent

# Stage of Development

Most of the difference between the activated and not activated T cells comes from one feature, NAD(P)H a1. Using only this top feature

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## **Additional Information**



#### For More Information About the Inventors

• Melissa Skala

### **Related Technologies**

• WARF reference number P190306US02 describes algorithms to classify T cell activation by autofluorescence imaging. These algorithms can be applied to NAD(P)H images taken with commercial imaging flow cytometers/sorters, and fluorescence microscopes.

### Publications

 <u>Classification of T-cell activation via autofluorescence lifetime imaging. Walsh AJ, Mueller KP, Tweed K, Jones I, Walsh CM</u> Piscopo NJ, Niemi NM, Pagliarini DJ, Saha K, Skala MC. Nat Biomed Eng. 2020.

### **Tech Fields**

- <u>Analytical Instrumentation, Methods & Materials : Microscopy</u>
- Medical Devices : Diagnostics & monitoring tools

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