



## Method and Device to Screen and Sort Cancer Immunotherapy Cells

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**WARF: P180292US02**

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**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  $\alpha_1$ . NAD(P)H  $\alpha_1$  can be measured by fluorescence lifetime imaging or spectroscopy systems. The device could also sort T cells based on NAD(P)H  $\alpha_1$ . 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  $\alpha_1$ . Using only this top feature,

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Additional Information

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#### 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

- [Classification of T-cell activation via autofluorescence lifetime imaging. Walsh AJ, Mueller KP, Tweed K, Jones I, Walsh CM, Piscopo NJ, Niemi NM, Pagliarini DJ, Saha K, Skala MC. Nat Biomed Eng. 2020.](#)

#### Tech Fields

- [Analytical Instrumentation, Methods & Materials : Microscopy.](#)
- [Medical Devices : Diagnostics & monitoring tools](#)

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