Monday, November 9, 2020

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WEBINARS

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Multiphoton Autofluorescence Imaging of T-Cell Function

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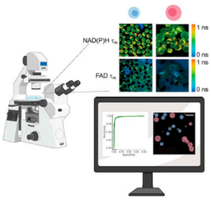
.: About This Webinar



Immune cells, including T cells, have a range of functions depending on activation state and subtype. However, current methods to assess immune cell function use exogenous labels that are limiting for T-cell manufacturing and for time-course studies of immune cell behavior in tumors. Label-free optical imaging is an attractive solution.

In this webinar, Melissa Skala, Ph.D., will explain the use of multiphoton autofluorescence imaging of NAD(P)H and FAD, co-enzymes of metabolism, to monitor T-cell activation and function. Skala will demonstrate how this is a powerful method for label-free, nondestructive monitoring of T-cell metabolism within single cells. This method could inform new immunotherapy approaches for cancer, enable nondestructive assessment of T-cell manufacturing, and monitor in vivo T-cell behavior in mouse models of cancer.

Skala will reference her associated study in which T cells were isolated from the peripheral blood of human donors, activated or polarized to functional subsets, and subjected to tumor-like media (low pH, low glucose, high lactic acid). NAD(P)H and FAD fluorescence intensity and lifetime were monitored on a single-cell level over time. Logistic regression models and random forest models classified T cells according to activation state with 97% to 99% accuracy, and according to activation state (quiescent or activated) and subtype (CD3+CD8+ or CD3+CD4+) with 97% accuracy. From this study, significant differences in autofluorescence were observed between functional T-cell subsets in tumor-like media conditions compared to standard media conditions, reflecting metabolic adaptations to the tumor microenvironment.

The hardware, optics, and analytical algorithms of multiphoton autofluorescence imaging are readily integrated into a variety of quantitative imaging technologies, such as flow and image cytometry or intravital microscopy.

The webinar will conclude with a Q&A.

Who should attend:
All those investigating solutions for label-free, nondestructive imaging, especially for monitoring T cells in biomedical applications. Specialists and students in the life sciences seeking a better understanding of cellular imaging, specifically multiphoton fluorescence lifetime imaging.

About the presenter:
Skala received her B.S. in physics at Washington State University in 2002, her M.S. in biomedical engineering at the University of Wisconsin-Madison in 2004, and her Ph.D. in biomedical engineering at Duke University in 2007. Her postdoctoral training was also in Biomedical Engineering at Duke University, from 2007-2010. From 2010-2016, she was an assistant professor of biomedical engineering at Vanderbilt University. Since 2016 she has been an investigator at the Morgridge Institute for Research. She is also a professor of biomedical engineering at the University of Wisconsin-Madison. Her lab develops new methods to understand and combat cancer using photonics-based technologies.

Illustration credit: Alex Walsh.

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