

A NanoBioLab Symposium 2021 Webinar

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VISUALIZING BIOMOLECULES IN THEIR NATIVE CONTEXTS WITH SABER



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ABSTRACT

Approaches such as genomics, transcriptomics, and proteomics can provide rich information about the presence and abundance of biomolecules in large populations of cells and more recently even in single cells. However, both the ensemble and single-cell versions of these techniques require the dissociation of complex structures like tissues during their experimental workflows, resulting in a loss of spatial information. Multiplexed imaging approaches capable of visualizing multiple DNA, RNA, or protein species in the same sample can provide a valuable complementary approach to the “-omics” methods, particularly in the context of tissues. We have introduced SABER—Signal Amplification by Exchange Reaction. SABER enables the multiplexed amplification of DNA and RNA fluorescent in situ hybridization (FISH) and immunofluorescence signals in fixed cells and tissues, allowing spatial patterns of gene and protein expression and chromosome organization to be mapped in their native contexts. As a proof of concept, we have performed cell-type mapping in mouse retinal tissue based on RNA and protein expression patterns and demonstrated 17-color imaging of human chromosome conformation. The SABER workflow is simple, inexpensive, and can sit on top of existing histological protocols.

ABOUT THE SPEAKER

Brian Beliveau, Ph.D. is Assistant Professor, Department of Genomics at the University of Washington, USA. His laboratory is focused on the development and application of quantitative microscopy techniques for the study of chromosome biology and the regulation of gene expression in individual cells. In particular, they utilize programmable “Oligopaint” fluorescent in situ hybridization (FISH) probes as a platform for the visualization of target genomic regions and RNA molecules in fixed samples. Efforts include improved computational design of these probes and the development of novel multiplexing and signal amplification strategies to enable a broad range of biological questions to be investigated using imaging. They are applying highly multiplexed FISH, single-molecule localization microscopy, and other advanced imaging approaches to study the folding conformations that chromosomes adopt in single cells in their native contexts. They also have initiated interdisciplinary collaborations with researchers working in the fields of optical engineering, developmental biology, chemistry, and evolutionary biology. More info can be found at <https://www.gs.washington.edu/faculty/beliveau.htm>.

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