



BME VIRTUAL SEMINAR SERIES

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Date: Monday, October 19th, 2020

Time: 1:30 p.m.

Location: Virtual – Zoom

Faculty Host: Reza Kalhor

Oligo-Based Technologies for Visualizing Nucleic Acids in Single Cells

Abstract: Mammalian cells package two meters of linear DNA into a nucleus whose diameter is on average only a few microns. This packaging must be done in such a way that DNA transactions such as transcription, replication, and repair can faithfully occur. We have established a powerful new platform for investigating 3D genome organization in single cells using microscopy. We have introduced the programmable ‘Oligopaint’ fluorescent *in situ* hybridization (FISH) approach that uses sets of bioinformatically designed oligonucleotide probes to create complex hybridization patterns in fixed samples. We have harnessed this technology to pioneer the use of single-molecule super-resolution microscopy to study chromosome structure on the nanoscale, introduced a technique capable of visually distinguishing homologous chromosomes, and also have developed an approach that facilitates the multiplexed amplification of fluorescent signals in fixed cells and tissues. Collectively, these tools provide an enhanced framework for mapping the causes and consequences of 3D genome organization in individual cells.

Bio: Brian Beliveau is an Assistant Professor of Genome Sciences at the University of Washington, Seattle. He is also a member of the Brotman Baty Institute for Precision Medicine and a Damon Runyon Dale F. Frey Breakthrough Scientist. He began his scientific training as an undergraduate and masters’ student in the lab of Brendan Cormack at the Johns Hopkins School of Medicine. He received his Ph.D. from Harvard Medical School under the supervision of Ting Wu and was a Damon Runyon HHMI postdoctoral fellow in the lab of Peng Yin at the Wyss Institute for Biologically Inspired Engineering and Harvard Medical School. The Beliveau lab develops and applies technologies to study the biology of chromosomes.