Seminar/Talk

Super-resolution Microscopy Developments for Tomorrow's Cell Biology

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Host: Johann Danzl

Super-resolution optical microscopy has become a powerful tool to study the nanoscale spatial distribution of molecules of interest in biological cells, tissues and other structures over the last years. Imaging these distributions in the context of other molecules or the general structural context is, however, still challenging. I will present two recent developments from my lab that tackle this challenge: first, pan-Expansion Microscopy is a new sample preparation technique which expands a fixed cell or tissue sample physically by about a factor of 20 in all three dimensions, thereby making small structures resolvable with just a standard confocal microscopes. Since most proteins are retained in our expansion process, proteins and other cellular components can be labeled in bulk. This provides ultrastructural context to the nanoscale organization of proteins and thereby presents an all-optical imaging alternative to complex correlative light/electron microscopy [1,2,3]. Second, FLASH-PAINT introduces a novel type of fluorescent labels that allow for spectrally unlimited multiplexed imaging (super-resolution or conventional) in a rapid, highly efficient, and gentle way without any need for washing steps [4,5]. It allows super-resolution imaging of more than 10 labels in the same sample and can equally be applied in spatial omics applications with the potential to image hundreds of markers.Financial Interest Disclosure: J.B. is co-founder of panluminate, a startup company related to Expansion Microscopy.[1] M'Saad, O., Bewersdorf, J. "Light microscopy of proteins in their ultrastructural context". Nature Communications (2020). https://doi.org/10.1038/s41467-020-17523-8[2] M'Saad, O., et al. "All-optical visualization of specific molecules in the ultrastructural context of brain tissue". bioRxiv (2022). https://doi.org/10.1101/2022.04.04.486901[3] M'Saad, O., et al. "Unclearing Microscopy". bioRxiv (2022). https://doi.org/10.1101/2022.11.29.518361[4] Chung, K.K.H. et al. "Fluorogenic DNA-PAINT for faster, low-background super-resolution imaging". Nature Methods (2022). https://doi.org/10.1038/s41592-022-01464-9[5] Schueder, F., et al. "Unraveling cellular complexity with unlimited multiplexed super-resolution imaging". bioRxiv (2023)

Thursday, August 31, 2023 02:00pm - 03:00pm
Mondi 2, Central Building

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