DNA ORIGAMI: A VERSATILE CALIBRATION STANDARD FOR QUANTITATIVE SUPER-RESOLUTION MICROSCOPY

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Single molecule based super-resolution microscopy offers a unique opportunity for quantifying protein copy numbers at the nanoscale level [1,2]. While fluorescent proteins have been extensively characterized for quantitative imaging using calibration standards, similar calibration tools for small organic fluorophores used in conjunction with immunofluorescence based super-resolution techniques (such as stochastic optical reconstruction microscopy,STORM) are missing.
The development of a suitable calibration method represents the best way to address the challenges of molecular counting using super-resolution [3,4]. Within this project, we demonstrate that DNA origami in combination with GFP antibodies is a versatile platform for quantifying protein copy number in immunofluorescence based super-resolution microscopy. We show that this calibration method, besides quantifying the average protein copy number in a cell, allows determining the abundance of various oligomeric states. Furthermore, we apply this calibration method to quantify nucleoporins (NUP107) [5] and molecular motors (dynein intermediate chain) [6] in vivo. Overall, we provide a versatile strategy [7] for quantifying a large number of proteins of interest using various labeling approaches.

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