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Scientia Professor Katharina Gaus is an NHMRC Senior Research Fellow at the University of New South Wales and Head of the EMBL Australia Node in Single Molecule Science. She is also the Deputy Director of the ARC Centre of Excellence in Advanced Molecular Imaging (2014-2020). Katharina received her PhD from the University of Cambridge in 1999 and has led an independent research group since 2005. She was awarded the Gottschalk Medal from the Australian Academy of Science (2012), the New South Wales Science and Engineering Award for Excellence in Biological Sciences (2013) and the Khwarizmi International Award (2018).

ABSTRACT

T cell receptor clustering - a mechanism of signal transduction

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T cell receptor (TCR) signaling is essential for adaptive immunity. We use single-molecule localization microscopy (SMLM) and novel analysis to determine how spatial organization regulates signal initiation and propagation. For example, we mapped the organization of TCR-CD3 complexes and found that only TCR-CD3 complexes in dense clusters were phosphorylated, suggesting that molecular density within clusters initiates signaling (PNAS 2016). We also developed novel FRET sensors to monitor the rate of receptor clustering (Nat Commun 2017) and a sensor that reports membrane charges (Nat Biotech 2017) to understand how biophysical properties of the plasma membrane contribute to TCR signaling.

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