

Fluorogenic cell surface labelling using fluorescent molecular rotor-labelled peptide boronic acid conjugates

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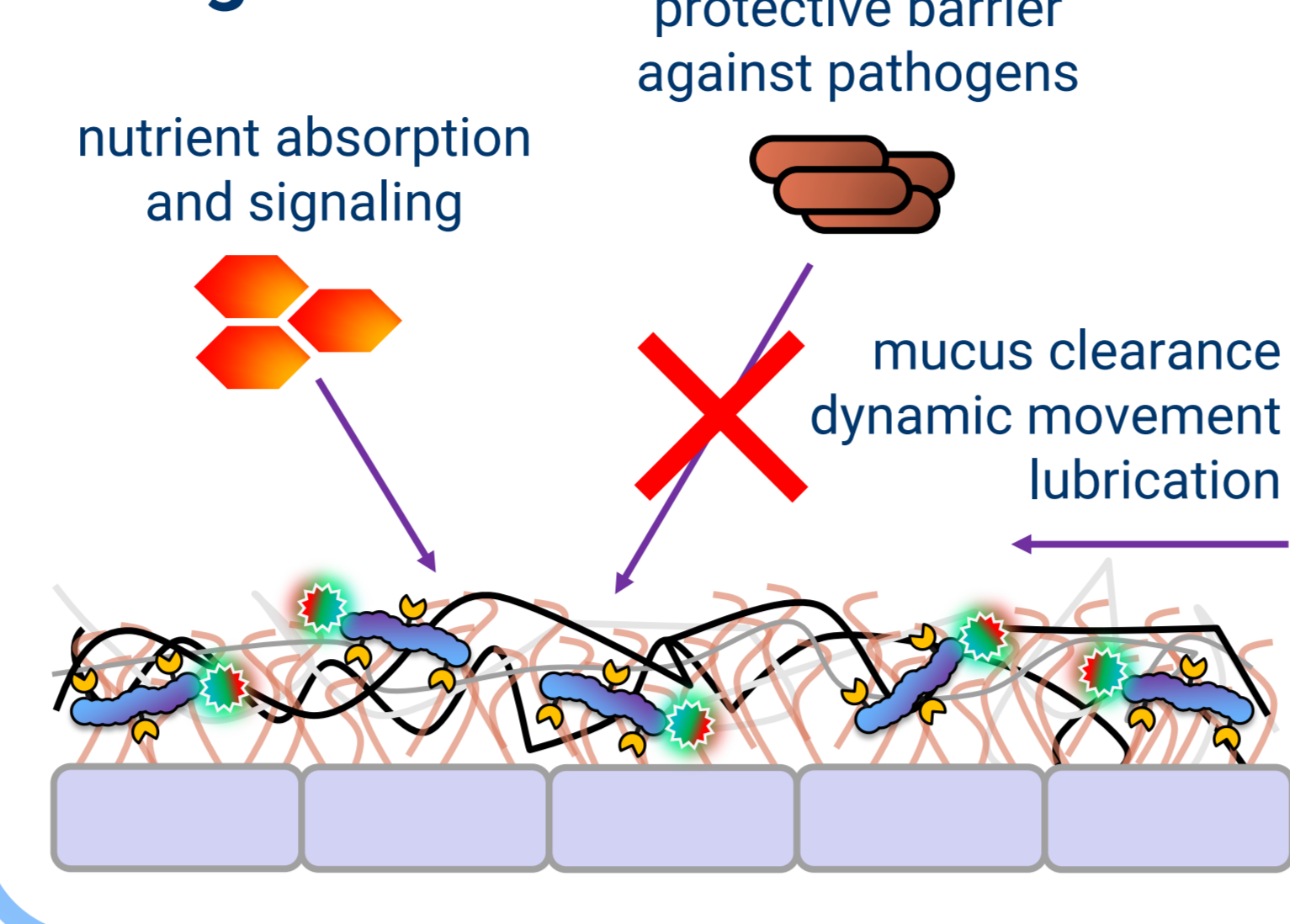


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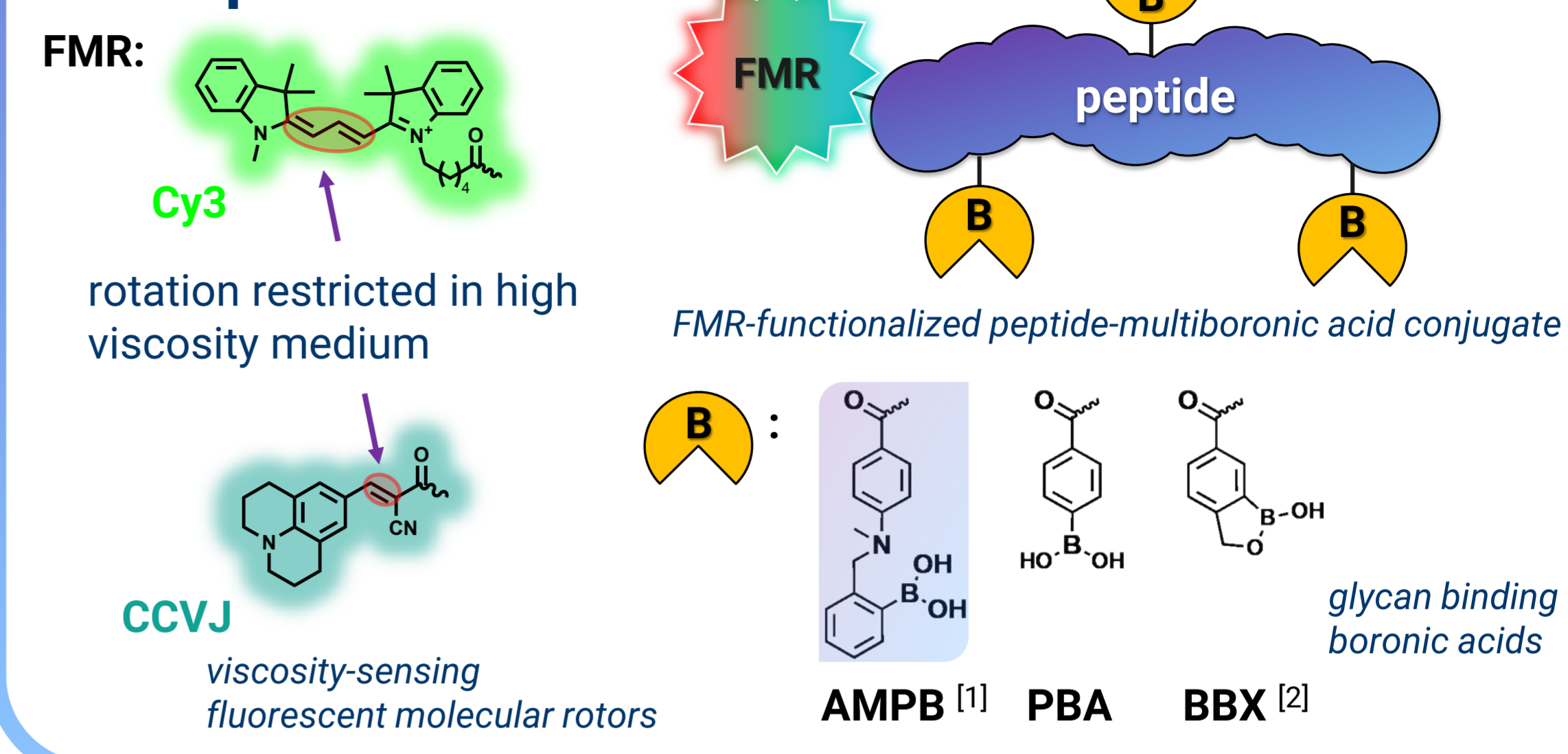
Abstract

Abnormally viscous mucus hydrogel layers represent the key pathological characteristic of chronic, muco-obstructive respiratory and gastrointestinal disorders such as Cystic Fibrosis (CF), Chronic Obstructive Pulmonary Disease (COPD) and Inflammatory Bowel Disease (IBD). To date, quantifying and mapping spatial nanoviscosity on living cells/tissues poses a major challenge. Our aim is to probe viscosity by anchoring fluorescent molecular rotor (FMR) dyes to cell surface glycans. For this purpose, the FMRs are attached to peptide-multiboronic acid conjugates. We show the development of fluorogenic probes that have high affinity for cell surfaces and demonstrate ratiometric imaging with an FMR and a non-FMR probe to characterize cell surface nanoviscosities.

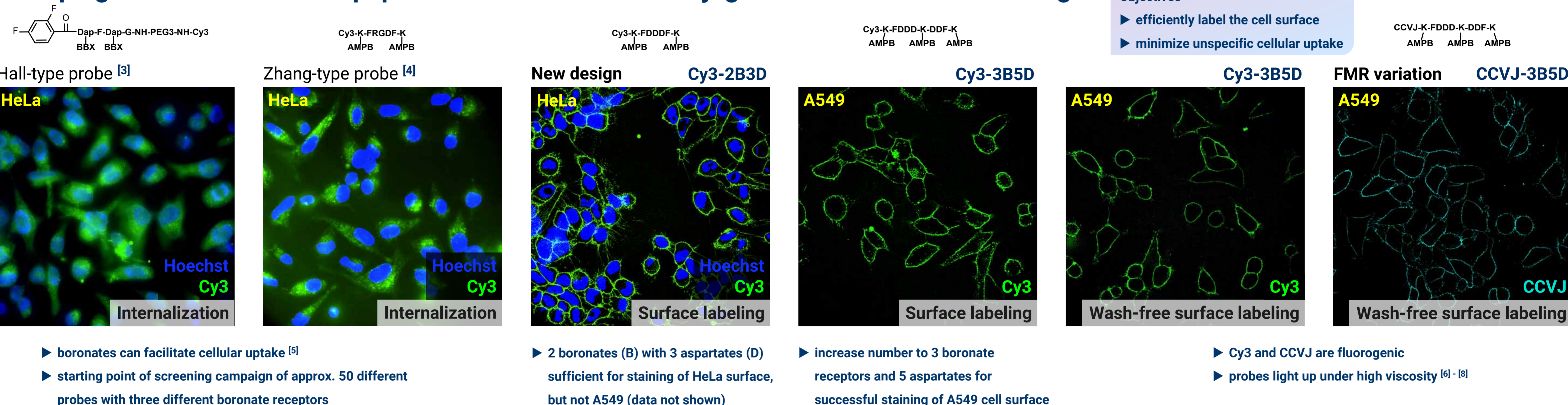
Background



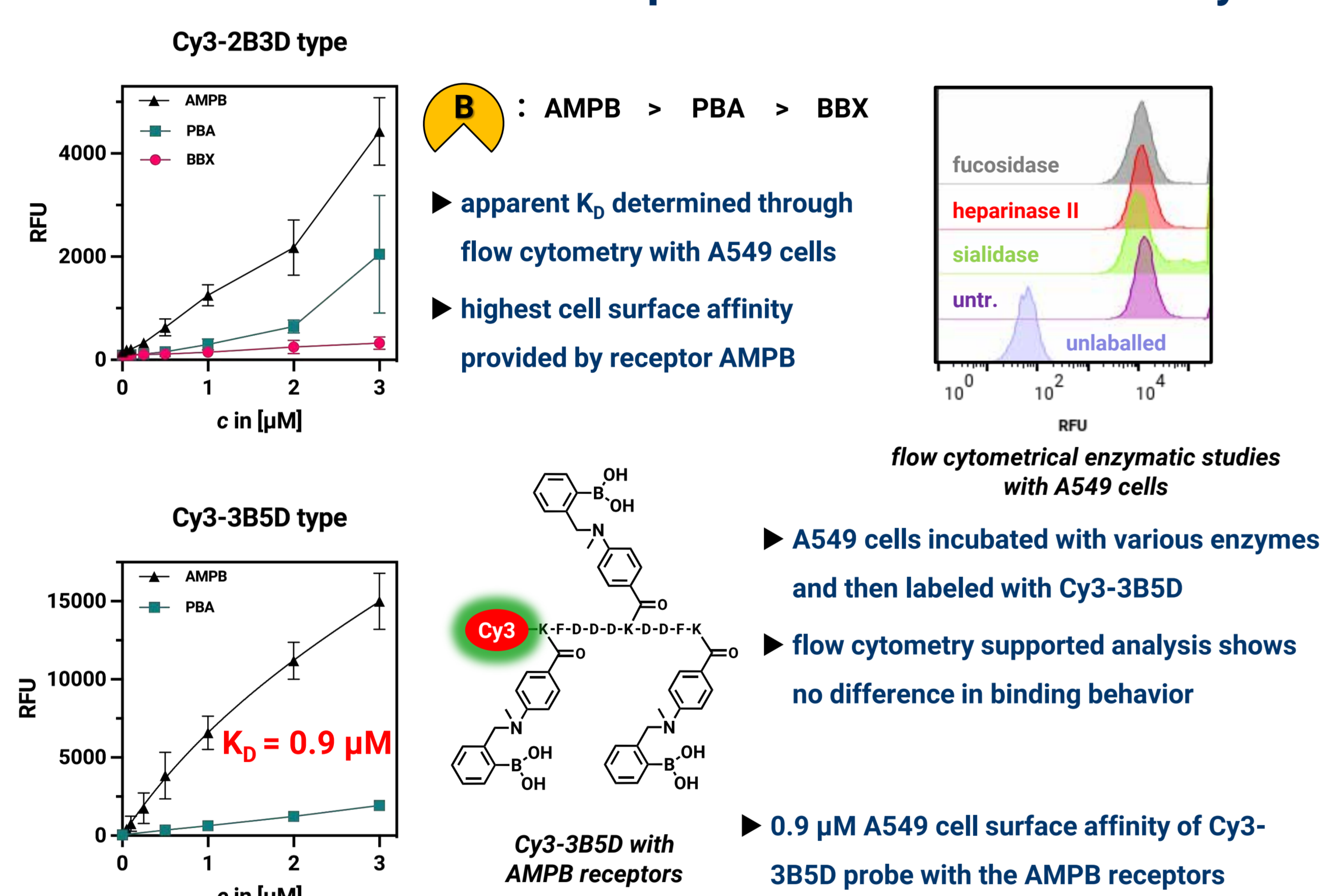
Concept



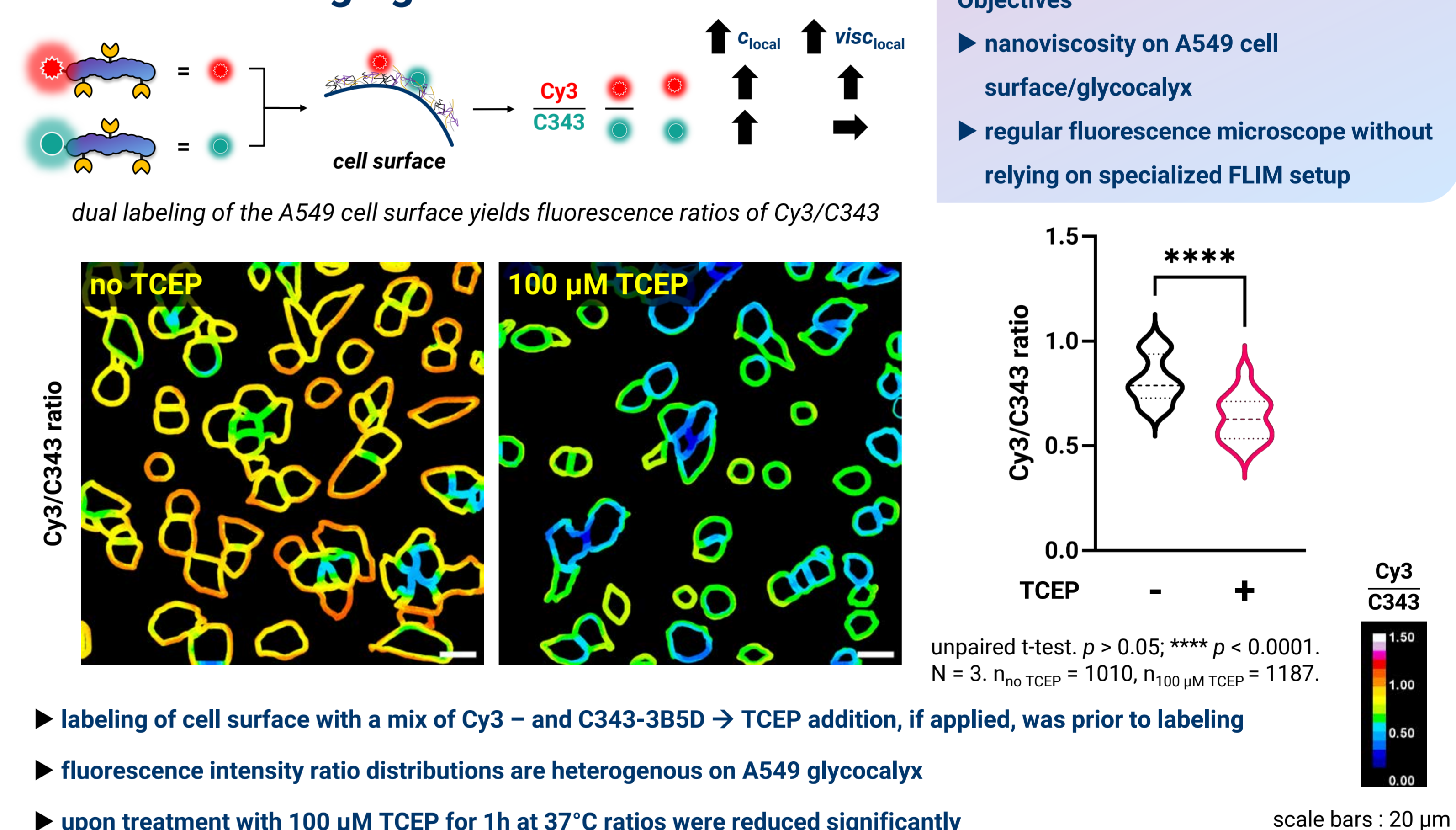
Developing FMR-functionalized peptide-multiboronic acid conjugates for cell surface labeling



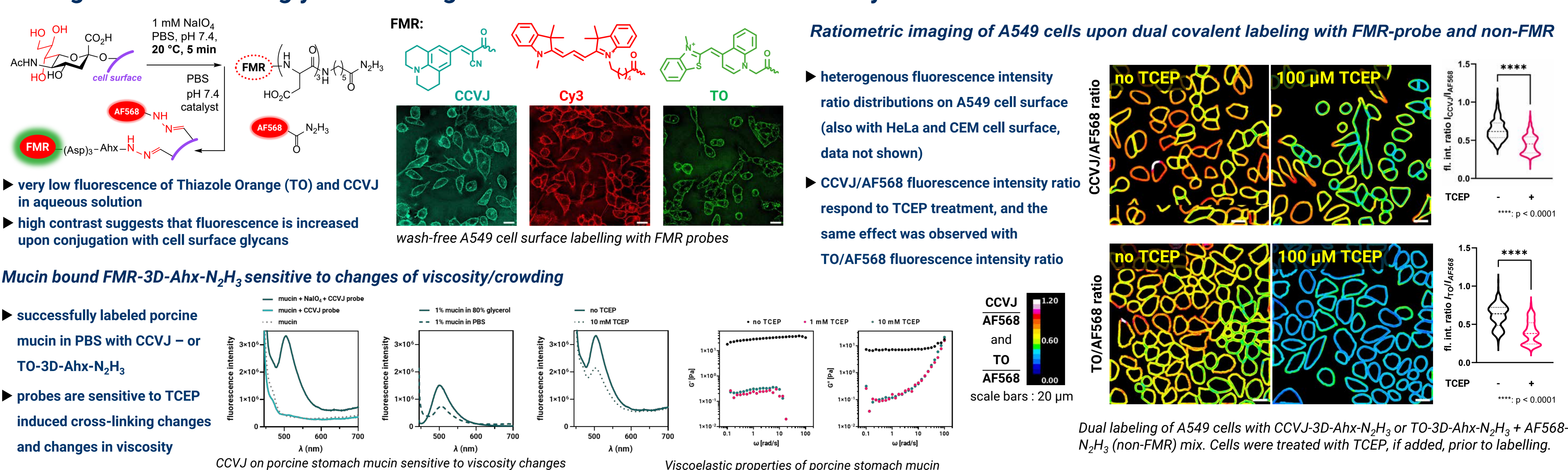
Influence of boronic acid receptor on cell surface affinity



Ratiometric imaging of A549 cell surfaces



Fluorogenic cell surface glycan labelling with fluorescence molecular rotor dyes and nucleic acid stains [8]



References

- G. Wulff, *Pure Appl. Chem.* **1982**, 54, 2093-2102.
- M. Dowlut, D. G. Hall, *J. Am. Chem. Soc.* **2006**, 128, 4226-4227.
- A. Pal, M. Bérubé, D. G. Hall, *Angew. Chem. Int. Ed.* **2010**, 49, 1492-1495.
- X.-D. Xu, H. Cheng, W.-H. Chen, S.-X. Cheng, R.-X. Zhuo, X.-Z. Zhang, *Sci. Rep.*, **2013**, 3, 2679.
- K. A. Andersen, T. P. Smith, J. E. Lomax, R. T. Raines, *ACS Chem. Biol.* **2016**, 11, 319-323.
- S. C. Lee, J. Heo, H. C. Woo, J. A. Lee, Y. H. Seo, C. L. Lee, S. Kim, O. P. Kwon, *Chemistry* **2018**, 24, 13706-13718.
- M. A. Haidekker, E. A. Theodorakis, *Org. Biomol. Chem.* **2007**, 5, 1669-1678.
- A. Koçak, A. K. Homer, A. Feida, F. Telschow, J. L. Gorenflós López, C. Baydaroğlu, M. Gradzielski, C. P. R. Hackenberger, U. Alexiev, O. Seitz, *Chem. Commun.* **2024**, 60, 4785-4788.