Dynamic Excimer (DYNEX) Imaging of Lipid Droplets

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The cellular microenvironment is a complex medium due to high concentration of proteins and an intertwined framework of cellular organelles, usually hindering the robust and reliable employment of quantitative, luminescent biosensors. In this work, we took advantage of previously synthetized and photophysically characterized acridone derivatives[1, 2] to develop an innovative imaging method. This new DYNamic EXcimer (DYNEX) imaging method involves the sensitive detection of nanosecond-scale dynamic molecular contacts of the acridone-based sensor and reveals the cell microenvironment polarity. The detection and measurement of excited-state excimer formation of fluorophores with nanosecond resolution in living cells has not been previously used in time-resolved fluorescence imaging techniques. Using our method, we specifically tracked cell lipid droplets in fibroblast colon carcinoma cells. DYNEX imaging provides the inner polarity of cell lipid droplets, which can be related to lipid contents and metabolic dysfunctions. This new methodology will inspire novel multidimensional fluorescent sensors that are able to provide target-specific and orthogonal information at the nanosecond scale.

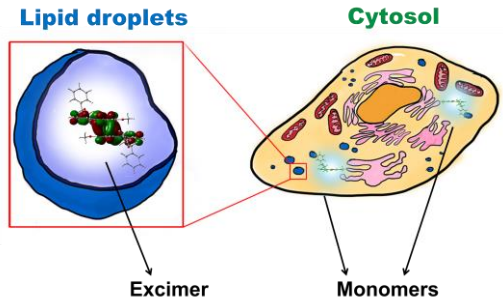

Figure 1. *Scheme of DYNEX concept: selective formation of dynamic excimers of dye in lipid droplets.*

References

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