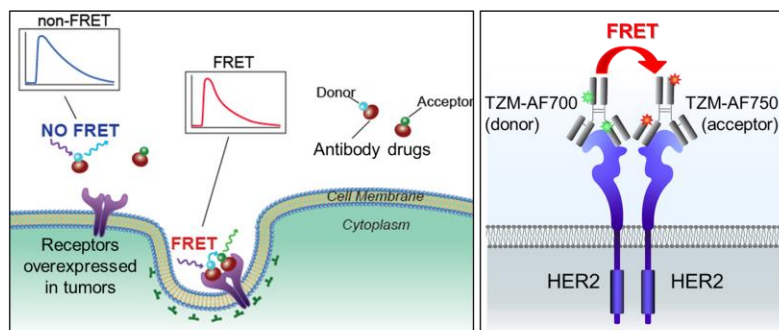


Real-Time FLIM-FRET-Based Assay for Monitoring Receptor Cycling

FLIM- FRET-Based Live-Cell Assay for Identifying Modulators of Membrane Receptor Cycling

Background:

Receptor cycling—the process by which cell-surface receptors are internalized, trafficked, and either recycled or degraded—is essential for proper cellular signaling. It regulates how cells respond to hormones, neurotransmitters, and drugs, and its dysregulation is linked to cancer, neurological disorders, and immune dysfunction. While initial work has centered on oncology, the technology is disease-agnostic. It is now being applied to quantify drug–target engagement in tumors, atherosclerosis, inflammatory conditions, and other tissue contexts, with broad relevance wherever membrane-bound receptors are therapeutic targets. Despite its importance, monitoring receptor cycling in real time remains challenging, as traditional methods are low-throughput, invasive, or limited to endpoint measurements. This underscores the need for a sensitive, real-time, and high-throughput-compatible assay to study receptor cycling and identify modulators of these processes.



FLIM FRET can quantify the binding of antibody drugs, such as anti-HER2 targeted therapy, e.g. trastuzumab (Herceptin) to surface receptors overexpressed in cancer cells such as HER2, since these binding events occur within the 2-10 nm range assayed by FRET.

Technology:

This invention advances intensity-based FRET microscopy into near-infrared (NIR) fluorescence lifetime FLIM-FRET, a platform that enables quantitative, spatially resolved mapping of drug–target engagement in intact tissues and ex vivo human samples. Unlike intensity-based approaches, lifetime readouts are robust to fluorophore concentration and scattering, ensuring reproducibility across complex tissue environments. The technology is compatible with clinically approved antibodies and nanobody probes, making it highly adaptable for oncology, cardiovascular disease, inflammation, and other therapeutic areas. By targeting membrane-bound receptors, the platform provides disease-agnostic applications for monitoring drug binding, receptor dimerization, and mechanism-of-action studies. Implementation and dissemination are supported by the Center for Translational Imaging (CTI) at Albany Medical College, which offers access, training, and collaborative opportunities for translational research and licensing.

Intellectual Property:

US8609329B2

Technology Readiness:

Ready for Licensing

Advantages:

- Live-cell compatible
- Highly sensitive to spatial changes in receptor location
- High-throughput ready
- Non-invasive
- Generalizable
- Can be integrated into automated imaging workflows.

Applications:

- Screen compounds for drug discovery
- Study dynamics of G-protein coupled receptors
- Analyze trafficking of receptors like EGFR in tumor progression.
- Investigate neurotransmitter receptor

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