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New tyramide signal amplification (TSA) reagents and methods to expand applications

Researchers at Stanford have developed methods and reagents to improve and expand the capabilities of tyramide signal amplification (TSA) for simultaneous detection of low abundance biomolecules. TSA is a very sensitive method for detecting low abundance biomolecules by immunocytochemistry (ICC), immunohistochemistry (IHC) or fluorescence in situ hybridization (FISH). However, TSA is limited in that it can only be used to detect a few epitopes (3 or less) at a time. This inhibits its use in fields such as clinical diagnostics. To overcome this limitation and expand the uses of TSA, the inventors have developed these methods and reagents. This technology provides TSA reagents that enable the analysis of biomolecules by mass cytometry, multiplex ion beam imaging (MIBI), fluorescence microscopy and electron microscopy. Further, these reagents enable the simultaneous analysis of many different epitopes. This technology provides new methods and reagents to expand the TSA tools available for multiplexed detection of low abundance biomolecules.

Stage of research
Validation studies show great promise. Additional development is ongoing.

Applications

- Research tool- label biomolecules for:
    - Mass spectrometry
    - MIBI
    - Fluorescence microscopy
    - Electron microscopy

Advantages

- Enables simultaneous detection of multiple targets
- Expands applications of TSA
- Improvements over current methods include:
    - Faster processing time
    - Better signal strength for low abundance targets
    - Reduced noise
    - Scalability for large numbers of single-cell analyses
    - Allows for quick analysis of bulk samples to identify heterogeneous cellular populations
- Can be used with cell culture or tissues
- Potential for use in clinical diagnostics

Patents

- Published Application: WO2020176534
- Published Application: 20220186296

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