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Versatile Probes for Enhanced Protein Behavior Mapping

New biarsenical probes for fluorescence imaging provide added flexibility and dimension to monitoring the behavior patterns of proteins

Battelle researchers at Pacific Northwest National Laboratory (PNNL) have developed new probes that enhance the accuracy and flexibility of tracking protein activity, broadening the ability of researchers to understand things like cancer cells and other biological matter.

These new multi-use affinity probes (MAPs) are small-molecule biarsenical dyes that specifically bind to peptide tags, which are amino acid sequences engineered into any protein targeted for observation. They offer some distinct advantages over existing commercial products, with versatility and multi-dimensional analytical facilitation at their core.

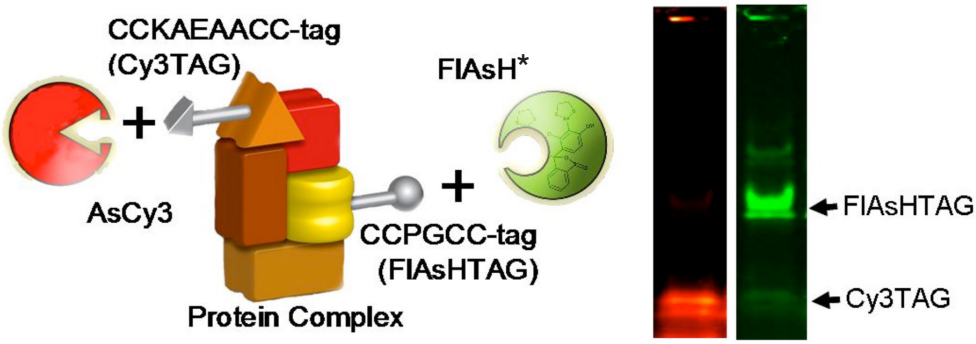
Fluorescence properties and small size allow observation of undisturbed natural processes

The fluorescence properties of the MAPs can yield information on various protein behaviors and protein-protein interactions within cells, including protein expression and protein location characteristics.

Other probes used for fluorescence imaging are often large when attached to a protein tag, and can potentially inhibit the activity of proteins as they attempt to shift within a site, interact with other proteins, or move across cellular membranes. Disturbing these natural processes can lead to inaccurate observations.

More colors and 'on-off' capability facilitate multi-dimensional analysis

The probes are available in different colors, affording observational flexibility for researchers to track and compare timeframes of behavior and visibly distinguish between proteins and protein behavior patterns being monitored concurrently. In addition, the same probes can include



Stylized figure of the molecular machine (protein complex) containing a protein (yellow) with the FlAsHTAG and a protein (orange) with the Cy3TAG. FlAsH (green) and AsCy3(red) bind specifically to the protein containing its cognate tag, as shown in the SDSPAGE gel, which is imaged using light at the two different wavelengths.

* FlAsH is available from Invitrogen Corporation.

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versatile appendages permitting deactivation and reactivation, as well as the study of protein interactions through protein complex isolation and targeted cross-linking.

Current commercially available probes are only useful for a single protein sequence, which limits their versatility for performing multiple simultaneous observations or observing different behaviors over prescribed timeframes.

No oxygen, no problem

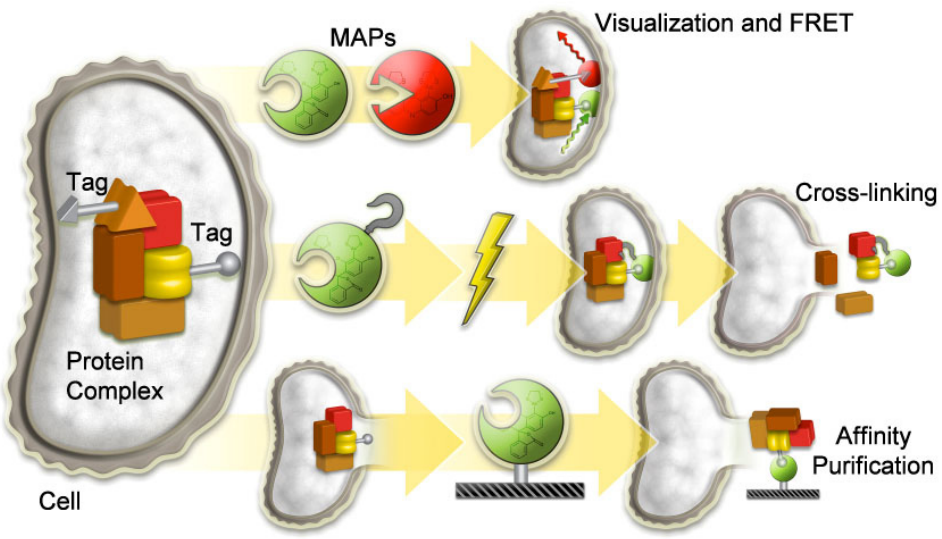
Bio-films and cancer cells often lack oxygen in their environment, making it difficult to observe cellular behavior using currently available imaging materials (i.e., fluorescent proteins which depend on oxygen for activation). These probes work even in the absence of oxygen.

Other technical features

- Bio-orthogonal
- Can be used simultaneously with FlAsH
- FRET acceptor for FlAsH and GFP
- Enhanced photostability

Potential Industrial Application Areas

- Pharmaceuticals
- Biotech
- Medical



Multi-use affinity probes represent a one-stop method for assessing cellular protein-protein interactions.

SUMMARY OF TECHNOLOGY ADVANTAGES

- **Provide a single material for numerous protein interaction research needs**
- **Soon to be available in multiple colors for multi-dimensional tracking, allowing researchers to better watch the lifecycle of proteins**
- **Small size allows the probe and labeled proteins to move more easily across cell membranes and affords the necessary space within a cell environment for protein interactions and behaviors to occur naturally without disruption**
- **Can be used to identify and select proteins for future observation**
- **Facilitate protein cross-linking for easier determination of otherwise difficult-to-capture protein interactions.**

For More Information
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