DNA ORIGAMI NANOCOMPLEXES FOR SELECTIVE DELIVERY ON CANCER CELLS

2022-CHOI-69914

PROBLEM

Pancreatic ductal adenocarcinoma (PDAC) poses a significant clinical challenge as shown by five-year survival rates of 13%. Researchers at Purdue University have developed a method by utilizing DNA Origami for selective imaging and targeted delivery of a therapeutic payload regarding KRAS-mutant pancreatic cancer cells.

SOLUTION

With this invention, anti-cancer agents can be included in the therapeutic payload via DNA Origami which can be selectively delivered to pancreatic cancer cells. This technology can also enable selective imaging such as carrying fluorescent species to the cancer cells in order to aid in medical diagnostics. With this invention, imaging and therapeutics regarding cancer cells can now have another great option.

VALIDATION

This technology has been validated in the lab to demonstrate the ability of the DNA origami nanostructures enter pancreatic cancer cells without any functionalization of targeting ligands.

ADVANTAGES

- Able to specifically target cancer cells
- Delivers nanoparticles selective to pancreatic cancer cells

APPLICATIONS

- Pancreatic cancer
- Potentially other cancer cells

INTELLECTUAL PROPERTY STATUS

Application Date: July 11, 2025 | **Type:** PCT-Gov. Funding | **Country of Filing:** WO
Application Date: July 12, 2024 | **Type:** Provisional-Gov. Funding | **Country of Filing:** United States

For more information on developing or commercializing this technology, contact:

Clayton Houck | *Senior Licensing Associate – Life Sciences*
cjhouck@prf.org

PURDUE INNOVATES

pH-ACTIVABLE FLUORESCENT PROBES FOR TARGETING CELL ORGANELLES

2021-CHOP-69413

PROBLEM

Traditional multi-step probes for live-cell organelle imaging requires more than a common intermediate probe. Additionally, only a few sensing and imaging technologies are commercially available that are responsive to pH; and activation or deactivation by pH can be used to improve targeting to specific cells and organelles.

SOLUTION

Researchers at Purdue University have developed new pH-activable fluorescent probes for targeting cell organelles in live cells. The robust probes created by Purdue researchers emit high fluorescence at the acidic pH of the organelle and negligible fluorescence at cytosolic neutral pH. The probes are soluble, cell-permeable, and readily taken up by target organelles. This platform uses a single molecular scaffold that can be implemented in a variety of applications in drug discovery and other investigations of cellular biology.

VALIDATION

The new pH-activable fluorescent probes have been used to measure A-beta(I-42) peptide activity, studying microglial uptake in specific cells and organelles.

ADVANTAGES

- pH Sensitive
- Can improve drug targeting

APPLICATIONS

- Drug discovery and development
- Bioconjugation reaction synthesis

INTELLECTUAL PROPERTY STATUS

Application Date: September 8, 2023 | **Type:** NATL-Patent | **Country of Filing:** United States
Application Date: March 8, 2022 | **Type:** PCT-Patent | **Country of Filing:** WO
Application Date: March 12, 2021 | **Type:** Provisional-Patent | **Country of Filing:** United States

For more information on developing or commercializing this technology, contact:

Clayton Houck | *Senior Licensing Associate – Life Sciences*
cjhouck@prf.org

PURDUE INNOVATES

SELECTIVE FLUORESCENT PROBE FOR THE IMMUNOPROTEASOME

2019-TRAD-68454

PROBLEM

As part of the molecular machinery of immune cells that have encountered inflammatory signals, a type of proteasome, the immunoproteasome, is a target of interest for autoimmune disease and cancer drug development. Current probes are not selective for iCP; they do not distinguish between this and other forms of the proteasome core particle.

SOLUTION

Researchers at Purdue University have developed a fluorescent probe, TBZ, which selectively targets the core particle of the immunoproteasome (iCP) and can be used to monitor its expression in live cells. This new probe that fluoresces upon cleavage by iCP is efficient, selective, and can be used in live cells. Within 15 minutes of incubating the cell with 31 micromolar TBZ, iCP was detected in Ramos, SK-MEL-2, and A549 cell lines. At 31 micromolar, TBZ retains 3:1 selectivity for iCP versus the standard core particle.

ADVANTAGES

- Selective towards iCP
- Can be used in live cells
- Higher fluorescence signal than commercial probe

APPLICATIONS

- Intracellular iCP pathway monitoring
- Investigative protein expression

INTELLECTUAL PROPERTY STATUS

Application Date: August 5, 2021 | **Type:** NATL-Patent | **Country of Filing:** United States
Application Date: January 29, 2020 | **Type:** PCT-Patent | **Country of Filing:** WO
Application Date: February 5, 2019 | **Type:** Provisional-Patent | **Country of Filing:** United States

For more information on developing or commercializing this technology, contact:

Clayton Houck | *Senior Licensing Associate – Life Sciences*
cjhouck@prf.org

PURDUE INNOVATES

FLUORESCENT PROBES FOR MONITORING SERINE UBIQUITINATION BY BACTERIAL ENZYMES

2020-DAS-69098

PROBLEM

The enzymes of the Legionella SidE family catalyze host protein ubiquitination events via a recently discovered mechanism distinct from ubiquitination by eukaryotic enzymes and are required for optimal Legionella infection. Contemporary methods to investigate the ubiquitination activity of SidEs include mass spectrometry and SDS-PAGE gel shift assays. These current techniques are not continuous, only measuring the end point of the reaction, and are not amenable to high throughput formats.

SOLUTION

Purdue University researchers have developed a fluorometric assay for real-time monitoring of ubiquitination events catalyzed by bacterial SidE enzymes in Legionella infections. They synthesized a fluorescently labelled synthetic substrate peptide for SdeA, a member of the SidE family, that displays a change in fluorescence polarization when ubiquitinated by the enzyme. This technology is amendable to high throughput screening and will assist in discovery of inhibitors for Legionella infection as well as identifying and characterizing SidE-like enzymes in other bacterial species.

ADVANTAGES

- Real-Time SidE ubiquitination analysis
- Amenable to high throughput screening

APPLICATIONS

- Legionella research
- Investigating ubiquitination events
- Fluorescence polarization

INTELLECTUAL PROPERTY STATUS

Application Date: June 18, 2021 | **Type:** Utility-Gov. Funding | **Country of Filing:** United States
Application Date: June 18, 2020 | **Type:** Provisional-Gov. Funding | **Country of Filing:** United States

For more information on developing or commercializing this technology, contact:

Clayton Houck | *Senior Licensing Associate – Life Sciences*
cjhouck@prf.org

PURDUE INNOVATES