

Nanoparticle Formulation for Selective Delivery of Drugs to Cancer Cells

Microfluidic nanoparticles encapsulate Vorapaxar for selective PAR1-targeted pancreatic cancer therapy.

Researchers at Purdue have developed a novel nanoparticle formulation from common reagents that can deliver the FDA approved drug Vorapaxar (VPX) to cells for the potential treatment of pancreatic adenocarcinoma (PDAC) tumors. Currently, VPX is used as a treatment to reduce the chance of cardiovascular issues such as strokes and myocardial accidents. Its potential as an anti-cancer drug targeting the PAR1 cell-membrane protein has been studied, however there has been difficulty in delivering the free VPX to the protein-of-interest, due to unique geometry of PAR1 protein configuration. The Purdue invention uses a microfluidic apparatus to both synthesize the nanoparticles and to encapsulate the free VPX within them in order to enhance the cell membrane permeability.

Technology Validation:

The cytotoxicity of the VPX-NPs was tested by treating PANC-1 and CAF19 pancreatic cancer cell lines with VPX-NPs. It was found that the VPX-NPs reduced the viability of the PANC-1 cells by 25% and the CAF19 cells by 50%. The encapsulation efficiency was found to be 75% and 70% for the VPX-NPs synthesized at 20.5 and 205 mL/hr, respectively. Finally, the drug loading efficiency was 55% and 50% for the 20.5 mL/hr and 205 mL/hr samples, respectively.

Advantages:

- Reduce the cell viability of the two tested pancreatic cancer cell lines by 25% and 50 % at 20 uM VPX.
- Can be synthesized at high flow rates within the microfluidic cell - Low polydispersity index (between 0.1 – 0.2) from lowest to highest flow rates.
- Materials to produce NPs are common and inexpensive.

Technology ID

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Applications:

- Pancreatic Cancer treatment
- Medical diagnostics
- Biological investigation of PAR1 protein

TRL: Pharmaceuticals

Intellectual Property:

NATL-Patent, N/A, Europe

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