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## 'Multiple Waves' Nano Delivery System for Treatment Human Pancreatic Cancer

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### INVENTORS

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### OTHER INFORMATION

#### KEYWORDS

nanocarrier delivery system, Human  
pancreatic ductal adenocarcinoma  
(PDAC), pancreatic cancer, pericyte  
coverage, tumor stroma, multiple  
wave treatment strategy, vascular  
access, mesoporous silica  
nanoparticles

#### CATEGORIZED AS

- ▶ **Medical**
  - ▶ Delivery Systems
  - ▶ Disease: Cancer
- ▶ **Nanotechnology**
  - ▶ NanoBio

#### RELATED CASES

2013-534-0

## SUMMARY

UCLA researchers from the Department of Medicine have designed a treatment strategy to overcome stromal vascular obstruction in pancreatic ductal adenocarcinoma and enhance drug delivery.

## BACKGROUND

Human pancreatic ductal adenocarcinoma (PDAC) is the fourth leading cause of cancer-related death in the United States, with a medium survival period less than 6 months. A major reason for the poor prognosis of PDAC is the effective pericyte coverage surrounding tumor blood vessels, which block vascular access of chemotherapies, including both conventional agents and cancer drug-laden nanoparticles. To solve this problem, UCLA researchers have designed a multiple wave treatment strategy to overcome the stromal vascular obstruction and enhance drug delivery.

## INNOVATION

The pericyte coverage is targeted and removed during the first wave to have vascular access to the neoplastic cells. Access is accomplished by mesoporous silica nanoparticles (MSNPs) loaded with a small molecule inhibitor of TGF-beta. In the second wave, chemotherapeutic agents and/or nucleic acids are delivered as free drugs or encapsulated in nanocarriers. Preliminary *in vivo* data shows that the two-wave therapeutic approach leads to a more efficient and robust inhibition of cancer compared to treatments using free drug or conventional drug-laden nanoparticles alone.

## APPLICATIONS

- ▶ A novel engineered nanoparticle therapy approach for human pancreatic cancer treatment
- ▶ Applicable to other cancer types with a heavy stromal effect

## ADVANTAGES

- ▶ Dramatically improve the vascular access by reducing pericyte coverage
- ▶ Dramatically improve pharmacokinetics

## STATE OF DEVELOPMENT

This technology is now in the pre-clinical testing stage.

## PATENT STATUS

Country	Type	Number	Dated	Case
Belgium	Issued Patent	2964201	02/14/2024	2013-534
Switzerland	Issued Patent	2964201	02/14/2024	2013-534
Germany	Issued Patent	60 2014 089 483.6	02/14/2024	2013-534
France	Issued Patent	2964201	02/14/2024	2013-534
United Kingdom	Issued Patent	2964201	02/14/2024	2013-534
Ireland	Issued Patent	2964201	02/14/2024	2013-534
United States Of America	Issued Patent	10,828,255	11/10/2020	2013-534

## RELATED MATERIALS

- ▶ [Two-Wave Nanotherapy To Target the Stroma and Optimize Gemcitabine Delivery To a Human Pancreatic Cancer Model in Mice. ACS Nano \(2013\).](#)

## ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Development Of Surface Enhanced Graphene Oxide For Ubiquitous Antibacterial Coatings](#)
- ▶ [Safer-By-Design Doped Pyrogenic Silica Nanoparticles](#)
- ▶ [Mesoporous Silica Nanoparticle Based siRNA/Drug Delivery System](#)

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