

# DCU team develops new way to treat pancreatic cancer

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Patients who develop pancreatic cancer that is resistant to drugs have been given new hope following a breakthrough by Irish scientists.

The scientists at Dublin City University (DCU) have found a way to successfully treat drug-resistant pancreatic cancer cells in laboratory experiments.

They have been able to get around the resistance using a new drug-delivery technology.

Pancreatic cancer affects almost 600 people in Ireland each year and it has a low five-year survival rate.

Lead researcher Professor Silvia Giordani, of the School of Chemical Sciences at DCU, discovered a method to more exactly deliver medicines to pancreatic ductal adenocarcinoma (PDAC) cells. This is a cancer cell type known for its aggression and its resistance to treatments.

"Despite a less common occurrence, with four or five cases per 100,000 people, PDAC poses a significant global challenge due to its typically late diagnosis and poor response to existing therapies," Prof Giordani said.

"The five-year survival rate is only 8pc and it is the fourth most frequent cause



of cancer-related premature mortality."

The new delivery system is based on "carbon-nano onions" which are tiny spheres made of carbon with several layers, similar to an onion.

Each sphere is extremely small – nano-sized – and it would take over

12,000 spheres, standing side-by-side, to reach the width of a single human hair.

"Carbon nano-onions are great for drug delivery because of their size and structure," Prof Giordani said.

"Their surface can be loaded with medication, and their small size lets

them travel easily within the body to reach specific areas. Also, they are biocompatible, meaning they can work well inside the body without causing harm or being rejected.

"The traditional methods of taking medicine, like pills and injections, can

**Dublin City University researcher Silvia Giordani has discovered a new method of drug delivery to treat pancreatic cancer**

be imprecise. They often affect the whole body instead of just the area needing treatment, which can cause side-effects.

"Our improved drug-delivery methods target specific areas of the body more accurately, reducing side-effects and potentially making treatments more effective."

She said the success of the carbon nano-onion delivery method opens the door for a similar approach to be used to treat other drug-resistant cancers, or other difficult-to-treat diseases.

The strength of this method is that drugs can be delivered directly to cells and bypass the resistance mechanisms.

"We can make an analogy that carbon nano-onions act as vehicles that deliver therapeutic cargo," Prof Giordani added.

"By carefully adjusting their surface chemistry, we can direct them towards a specific target; much like inputting a 'specific type of infected cell' into their GPS co-ordinates, we can precisely target various diseases, not just cancer."

The researchers' findings were published in the *Journal of Colloid And Interface Science*.

Pancreatic cancer can be treated with surgery, chemotherapy and radiotherapy.

Since incidence and mortality increase with age, the number of cases will rise in the future with population ageing and increased life expectancy.

Other than cigarette smoking, the risk factors are unclear.

Most patients present with advanced disease when curative treatment is impossible.

Identifying factors – either specific symptoms, or biomarkers – that might be able to pick up pancreatic cancer at an early stage is important.