Precious metal flecks could be catalyst for better cancer therapies

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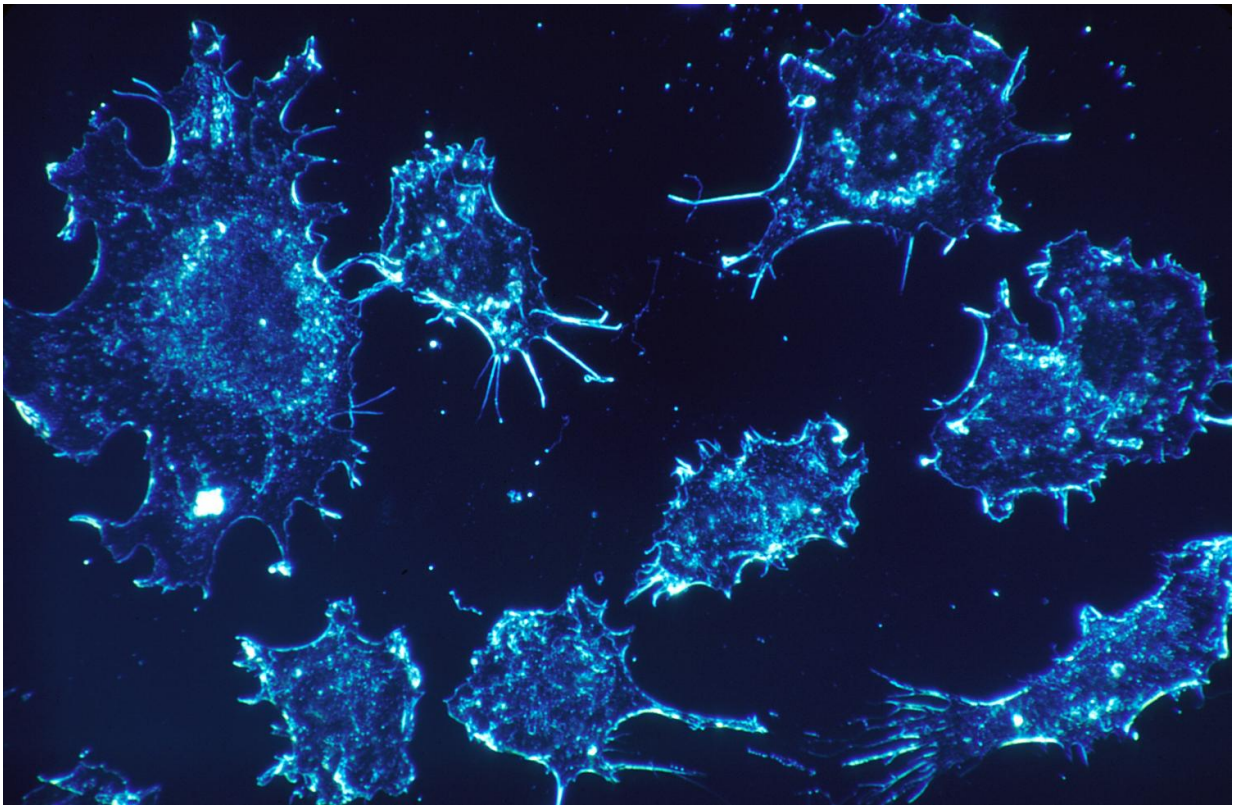

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Tiny extracts of a precious metal used widely in industry could play a vital role in new cancer therapies.

Researchers have found a way to dispatch minute fragments of

palladium—a key component in motor manufacture, electronics and the oil industry—inside cancerous cells.

Scientists have long known that the metal, used in catalytic converters to detoxify exhaust, could be used to aid cancer treatment but, until now, have been unable to deliver it to affected areas.

A molecular shuttle system that targets specific cancer cells has been created by a team at the University of Edinburgh and the Universidad de Zaragoza in Spain.

The new method, which exploits palladium's ability to accelerate—or catalyse—chemical reactions, mimics the process some viruses use to cross cell membranes and spread infection.

The team has used bubble-like pouches that resemble the biological carriers known as exosomes, which can transport essential proteins and genetic material between cells. These exosomes exit and enter cells, dump their content, and influence how the cells behave.

This targeted transport system, which is also exploited by some viruses to spread infection to other cells and tissues, inspired the team to investigate their use as shuttles of therapeutics.

The researchers have now shown that this complex communication network can be hijacked. The team created exosomes derived from lung cancer cells and cells associated with glioma—a tumour that occurs in the brain and spinal cord—and loaded them with palladium catalysts.

These artificial exosomes act as Trojan horses, taking the catalysts—which work in tandem with an existing cancer drug- straight to primary tumours and metastatic cells.

Having proved the concept in laboratory tests, the researchers have now been granted a patent that gives them exclusive rights to trial palladium-based therapies in medicine.

The study was funded by the Engineering and Physical Sciences Research Council and the European Research Council. It has been published in the journal, *Nature Catalysis*.

Professor Asier Unciti-Broceta, from the University of Edinburgh's CRUK Edinburgh Centre, said: "We have tricked exosomes naturally released by cancer cells into taking up a metal that will activate chemotherapy drugs just inside the cancer cells, which could leave healthy cells untouched."

Professor Jesús Santamaría, of the Universidad de Zaragoza, said: "This has the potential to be a very exciting technology. It could allow us to target the main tumour and metastatic cells, thus reducing the side effects of chemotherapy without compromising the treatment."

More information: Cancer-derived exosomes loaded with ultrathin palladium nanosheets for targeted bioorthogonal catalysis, *Nature Catalysis* (2019). DOI: 10.1038/s41929-019-0333-4 , nature.com/articles/s41929-019-0333-4

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