How tiny metal beads could make chemotherapy more effective for brain tumours

August 31 2018, by Justine Alford

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Treatments for brain tumours aren't good enough. Only around 1 in 7 people will survive their disease for a decade or longer. And those in this small but fortunate fraction may also be left with lifelong reminders of their cancer in the form of side effects from their treatment.

But coming up with better ways to tackle these diseases is fraught with difficulty. This stems from the fact that brain tumours are hard to study in the lab. And their complex biology has held back the progress seen with treatments for other cancers.

For example, aggressive brain tumours, such as glioblastoma, quickly spread throughout the brain. This means surgery often won't be enough to treat the disease, because the operation can't remove all the cancer cells. It's then only a matter of time before these invasive cells seed the tumour's return, and from there the person's outlook sadly becomes exceedingly bleak.

So, what's needed to turn this harrowing situation around? Our scientists are on the case. And they've come up with an innovative idea that they believe could be a game changer for these patients.

A masked attacker

One way that doctors try to deal with the rogue tumour cells left behind after surgery is chemotherapy, often with the drug temozolomide. But chemotherapy drugs aren't specific to cancer cells – they target any cell that's growing quickly in the body. They can therefore cause serious side effects that limit how much of the drug can be given, and that limits their effectiveness.

Researchers at the Cancer Research UK Edinburgh Centre have come up with an idea to solve this issue – and we gave them one of our Pioneer Awards to get it off the ground.

Blending their complementary scientific skills, neurosurgeon Dr. Paul Brennan and chemist Professor Asier Unciti-Broceta are developing a new way to make chemotherapy more targeted, and therefore hopefully more effective.

Their two-pronged approach involves modifying the chemotherapy drug temozolomide and creating a harmless implant to be inserted into the brain. The modified drug and implant eventually work together at the tumour site to essentially become a mini drug-making factory.

They're tweaking the drug so that it's inactive when given to the patient. They essentially give it a 'mask', which means it can travel around the body without causing any unwanted harm to growing healthy cells that it meets.

That's until the drug reaches the implant: tiny beads made from the metal palladium. These would be placed inside the brain around the area where the tumour was removed during surgery. When the drug encounters the metal, it gets switched on in the perfect place to potentially kill any cancerous cells that might be left in the brain.

To find out more, we visited the team in Edinburgh. Watch the video below to see what they've been up to.

Beyond brains

By creating a localised attack, the scientists hope that side effects from the chemotherapy will be greatly reduced. That means more chemotherapy could be given, and hopefully that could mean a longer life for the patient.

It's early days and this approach is still being developed in the lab, so it could be some time before reaching patients. But the results from cancer

cells in Petri dishes so far have been encouraging, and the scientists now have their sights set further than brain tumours. Radioactive implants are sometimes used for prostate cancer, for example, so they've already started research in mice to explore its potential for this disease too.

While there's still much to be done, hopefully one day this bright idea will become something meaningful for patients.

Provided by Cancer Research UK

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