

Completely new approach to cancer vaccines proves successful in early studies

Cancer Research UK scientists at the University of Leeds, UK, have used a library of DNA to create a vaccine that could be used to treat cancer, according to a study published in *Nature Medicine*.



(Image: Aaron Logan, via Wikimedia Commons)

Before now, 'gene therapy' vaccines have often delivered just one gene to stimulate the immune system. It produces a protein, called an antigen, which activates the immune system to destroy cancer cells.

It has been difficult to develop successful cancer vaccines because each tumour has specific proteins and identifying the right antigens has been a huge challenge.

Scientists have also tried to boost the effectiveness of vaccines by using several genes to increase the chances of producing successful antigens. However, a worry has always been that the immune system's response would be too strong for the body to handle.

Finding the answers in mice

Now researchers, working with the Mayo Clinic in Rochester, US, have solved this problem in experiments involving mice.

They used doses of a vaccine made from a virus which contained a 'library' of DNA, containing multiple fragments of genes and therefore many possible antigens. This approach did not send the immune system into overdrive, which had been a concern. Instead the range of DNA meant the vaccine was able to target the tumour through many routes.

Importantly, the DNA library was harvested from the same organ as the tumour. This meant that the immune system 'self-selected' the cancer antigens to respond to and did not react against other healthy parts of the body. In addition, the process of self-selection was triggered when the vaccine was injected into the bloodstream, an approach to vaccination that is far more practical than injecting directly into tumours.

The researchers delivered a library of DNA taken from healthy prostate tissue in mice. When delivered in a virus, the vaccine successfully treated mice with prostate cancer.

A first success

Professor Alan Melcher, author of the study based at the Cancer Research UK Centre at the University of

Leeds, said: "This is the first time we've been able to use a whole library of DNA in a viral vaccine successfully.

"The biggest challenge in immunology is developing antigens that can target the tumour without causing harm elsewhere.

"By using DNA from the same part of the body as the tumour, inserted into a virus, we may be able to solve that problem."

The vaccine was made by putting the DNA library inside a vesicular stomatitis virus (VSV), which stimulates an immune response that can then track down and kill tumour cells.

Professor Peter Johnson, Cancer Research UK's chief clinician, said: "This is an interesting and significant study which could really broaden out the field of immunotherapy research.

"Although the vaccine didn't trigger the immune system to overreact and cause serious side effects in mice it will need to be further developed and tested in humans before we can tell whether this technique could one day be used to treat cancer patients."

Source: Cancer Research UK

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