Cancer vaccine packaged in minute particles

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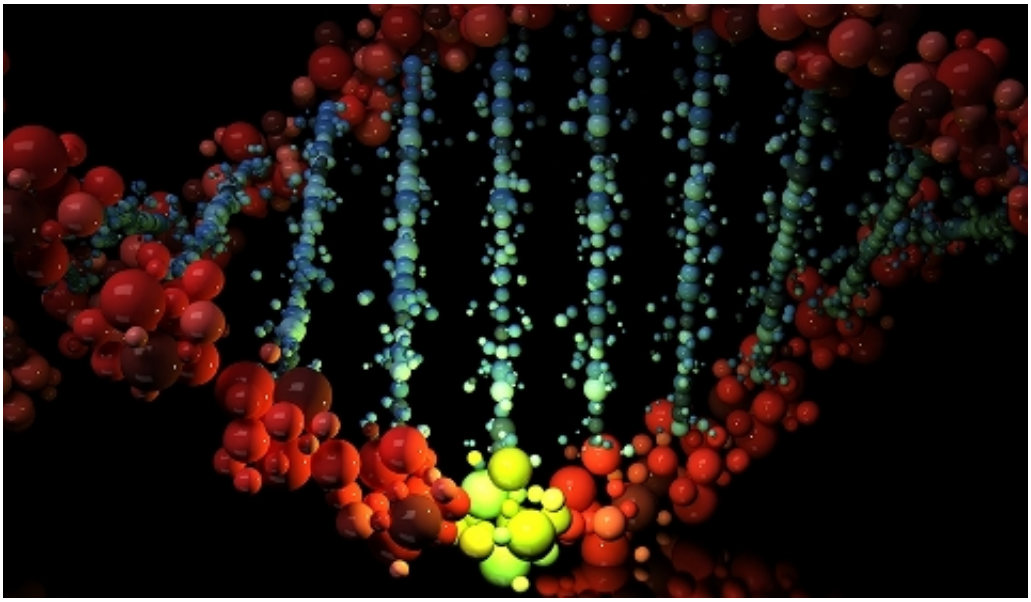

Leiden researchers have carried out successful tests using a new method of packaging a cancer vaccine in nanoparticles. The new vaccine has induced a strong immune reaction in mice. The researchers believe that this method can make an important contribution to the treatment of cancer. Their findings have been published in the *Journal of Controlled Release*.

Vaccination is a promising new treatment method for cancer patients. The method makes use of the way cancer develops, starting from minor errors in DNA. The body is able to recognise these mutations and

respond to them with an immune reaction. Vaccines have the same goal: to cause an immune reaction in the body so that it can recognise and dispose of cancer cells.

Not a matter of a simple injection

Researchers Ana Luisa Silva and Eleni Maria Varypataki from Leiden University and the LUMC are working on such vaccines. In particular, they are studying how synthetic peptides, derived from proteins that are characteristic for cancer cells, can be made into a vaccine. Synthetic long peptides do not work as vaccines if they are simply injected, because antigen-presenting cells of the immune system do not absorb them sufficiently to induce an immune reaction.

Tricks

This is why the researchers use tricks to smuggle the tumour peptides into the antigen-presenting cells of the immune system. To date, many tests have been done with peptides enclosed in water droplets that are combined with oil to form an emulsion. The system does, however, have some disadvantages: the body cannot decompose the components and they are not wholly effective.'

Nano-particles

The Leiden researchers are therefore focusing their attention on another, improved system: nanoparticles. The peptides are packaged in nanoparticles together with an adjuvant. The adjuvant stimulates the immune system to work even more effectively. The researchers tested two different particles: so-called PLGA particles and liposomes, artificial vesicles. The researchers knew from previous studies that these small particles are readily absorbed by antigen-presenting cells.

Trials

In trials with mice they compared the performance of peptides in the two nano-particles with conventional vaccines. In particular the liposomes seemed to cause a stronger immune reaction in the mice: they produced more T-cells, cells that are involved in destroying cancer cells in the body. 'Given their performance and their anticipated better safety profile, the newly discovered nano-particles could be a promising transport system for immunotherapy to fight cancer,' Varypataki concluded.

Tumour growth inhibited

In an as yet unpublished follow-up study, the researchers discovered that the vaccine introduced into the body via nano-particles clearly inhibited the growth of two different types of tumours. Varypataki: 'This finding again underlines the potential of using liposomes loaded with peptides as a candidate for vaccines.'

Patients

The Leiden researchers will be testing other peptides for their suitability as cancer vaccines. Varypataki hopes that, 'combined with other therapies, this could lead to treatments to combat melanonas, and colon and lung cancer.' The clinical development of the method has yet to start so there is still a long way to go before patients can be treated with liposomes combined with peptides.

Provided by Leiden University

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