New antibodies for cancer treatment

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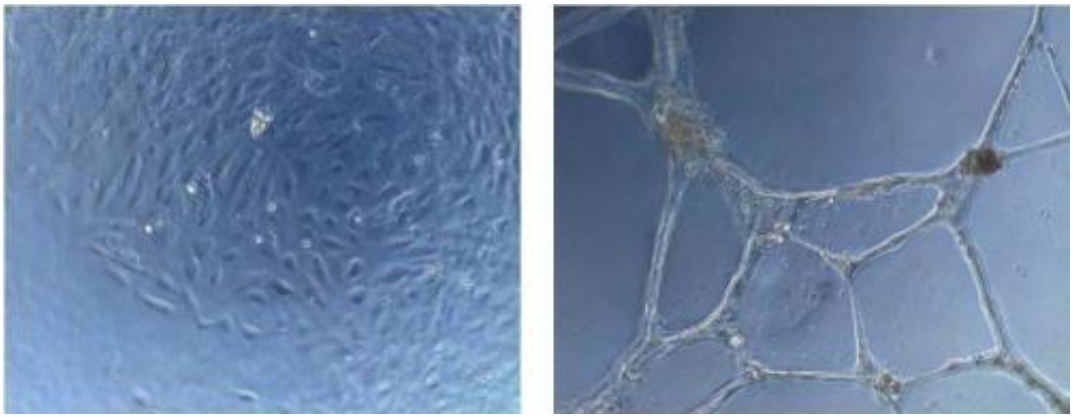

Human blood vessel cells (endothelial cells) grown outside the body. When endothelial cells are grown on a mixture of proteins that normally surround blood vessels, they form blood vessel-like structures (right photo). When recombinant antibodies are added, the cells are no longer able to form the blood vessel-like structures (left photo). Credit: Peter Kristensen

Out of a library with billions of artificial antibodies, researchers have identified ten that can possibly prevent cancer tumours from growing.

A research team at Aarhus University i Denmark has developed ten new antibodies that can possibly be used in the battle against cancer. They work by inhibiting the body's blood vessel formation close to the tumour, which is thereby cut off from oxygen and nutrient supply.

Up to now, the researchers have tested some of the antibodies on mice and, in the laboratory they have succeeded in using them to stop the

development of malignant tumours."The antibodies we've found prevent a cancer tumour from growing. They appear to work perfectly in the laboratory, and this means, of course, that they've got incredibly interesting therapeutic potential that we'll investigate further. However, we're still quite early in the experimental stage," says Associate Professor Peter Kristensen.

He is the main architect behind the new antibodies, but he stresses that the results are preliminary.

Antibodies stifle cancer

The antibodies neutralise the effects of signal substances released by carcinoma cells to get blood vessels to replicate, thus cutting off the blood supply to the tumour.

A cancer tumour deprived of oxygen and nutrients becomes dormant and is thereby made harmless. If it receives a supply from the bloodstream, however, it grows and spreads, and the researchers appear to be able to prevent this deadly process.

They are among the world's leading specialists in developing artificial antibodies for cancer treatment and, in recent years, they have worked on compositions of genes for a collection of several billion new types of antibodies. To date, they have actually identified ten that appear to be able to impede the development of cancer.

A small number of therapeutic antibodies already exist, some of which have the same effect as the antibodies developed by the Aarhus University researchers. However, the existing antibodies are extremely expensive to produce. The new antibodies are easier to extract, and they also appear to be more effective because they hit other - and possibly stronger - signal molecules from the cancer cells. The demand for

therapeutic antibodies for cancer treatment is steadily increasing. In 2013 alone, worldwide sales amounted to more than DKK 340 billion.

The art of finding a needle in a haystack

Establishing an extensive library of artificial antibodies is no major research achievement in itself. The difficulty is singling out the few that work, and this is something the Aarhus University researchers are good at.

"We've got a large library of antibodies that can supplement the body's own fight against disease. The major engineering challenge is identifying the ones that are relevant regarding the specific purpose. In this case, we've found those that have an inhibitory effect on blood vessel formation, and this is crucial for our better understanding of disease mechanisms and possibly developing new forms of therapy," says Associate Professor Kristensen.

The researchers isolated their antibodies from a library consisting of billions of different antibodies, and they subsequently analysed the ability of the individual antibodies to inhibit blood vessel formation. This sounds like incredibly extensive laboratory work, and it would have been far from possible just a few years ago. However, they used a biological technology for this purpose that they developed and published in Nature Protocols three years ago. It helps them to identify and extract the antibodies with specific binding properties regarding the surface proteins in blood vessel cells.

In the coming years, the researchers will work on gaining a more in-depth understanding of the ten antibodies.

"We're at the stage where we've identified some antibodies that bind something or other that makes blood vessel replication behave

differently. In the coming years, we'll study how they behave in different test systems. This will provide us with insight that can be valuable in the long term when developing new cancer drugs," says Associate Professor Kristensen.

Provided by Aarhus University