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Danish biotech company granted millions to develop custom-made cancer vaccine

BY ALBERT RØNNING-ANDERSSON
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Innovation Fund Denmark has granted a small Danish biotech company millions to develop a cancer vaccine targeting the unique cell changes in the individual patient. If the company succeeds, it will enter a billion-dollar market.

| Photo: Evaxion, PR

The Danish biotech company Evaxion has received approximately DKK 6 million (around USD 956,700) from Innovation Fund Denmark's DKK 30.8 million-budget. The money is to finance the development of a therapeutic cancer vaccine for making the immune system recognize unique changes in the individual patient's cancer cells.

By means of gene technology and artificial intelligence, the new immunotherapy will be customized the individual patient and eliminate the cancer cells more effectively and without the side-effects of existing therapies.

This is according to Niels Iversen Møller, CMO in Evaxion.

“In Evaxion, we have developed a technology platform that, by means of artificial intelligence, can identify promising antigens for vaccine candidates in infections and cancer diseases. Our role in the project is to identify the components to be used in these personalized vaccines, we believe we have found the formula for,” he says in an interview with MedWatch.

The project, to which he refers, is a new, recently initiated four-years research collaboration named NeoPepVac that is promoted by Statens Serum Institut (SSI) and funded by Innovation Fund Denmark.

Billions at stake

Besides SSI and Evaxion, which is specialized in developing vaccines by using artificial intelligence, the partnership consists of Center for Cancer Immune Therapy (CCIT) and Technical University of Denmark (DTU).

Niels Iversen Møller does not want to give details about the financial framework between the four partners as they are currently negotiating.

However, he confirms that Evaxion will have the commercial rights for the vaccine and moreover, be responsible for the continuation of the project.

“Evaxion is the commercial driver of the project. Of course, CCIT, DTU, and SSI also have commercial interests but they are primarily providers of technology,” says Niels Iversen Møller and adds that the four partners are currently working to find a fair basis of distribution based on what contributions and background technologies each part brings to the project.

“If the project succeeds, we are talking about billions of dollars. Our method can basically be applied broadly to all types of cancer – it is not limited to, for instance, breast cancer or colorectal cancer. So naturally, we are dealing with a billion-dollar potential,” says the CMO.

Evaxion is to manage the gene sequencing of the samples and the company is also the brain behind the artificial intelligence platform that enables researchers to identify the plausible vaccine antigens among the thousands of genetic variations in each cancer cell.

Custom-made vaccine

“The one size fits all-model for vaccines is no longer sufficient. Now, vaccines must be customized to individuals. By sequencing genes in cancer cells and healthy cells from the patient, we can identify genetic changes specific to exactly this patient’s cancer cells,” Niels Iversen Møller explains about the vaccine, which is not preventing but treating cancer.

“It is therefore called a therapeutic vaccine,” he adds.

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By identifying the individual cell changes, Evaxion can design vaccine antigens stimulating each patient’s own immune system to recognize and destroy cancer cells.

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What distinguish tumor cells from healthy cells are mutations leading to an uncontrolled growth of the cells. However, these changes differ from patient to patient and thus, developing a traditional vaccine targeting all cancer patients has not been possible.

The Evaxion technology is made for handling this problem.

“We use our artificial intelligence for identifying mutations in the cancer and design the vaccine. We focus on the cancer in the individual patients and based on their DNA sequence, we detect and design the components for the vaccine,” explains Niels Iversen Møller.

Evaxion’s artificial intelligence platform is developed to detect the difference between healthy DNA and cancer DNA. By identifying these differences, the company designs the individual vaccines.

“In the ongoing project, we are managing the process of sequencing the DNA, using our artificial intelligence platform, and producing the components – the peptides – to be injected in the patient,” says the Evaxion CMO.

Advantages in unique technology and knowledge

However, Evaxion is not the only company working with custom-made medicine as cancer therapy. These years, several firms are looking for solutions in personalized medicine, which is gaining ground in the modern drug development.

So, what makes Evaxion’s cancer vaccine candidate better than the rivals’?

“Our artificial intelligence platform, on which we have built our entire company. We have a unique technology allowing us to identify the relevant vaccine components very, very specifically. No one else can do it the same way and to the same extent as us,” answers Niels Iversen Møller.

He admits that Evaxion has not as such invented the wheel.

“We did not come with the idea for all this precision medicine. We have just developed a technology we consider capable of producing the most effective cancer vaccines,” he says and adds:

“And internally in the company, we are lucky to have some employees and consultants with a cutting edge and unique knowledge of bioinformatics. This is also distinguishing us from the rest and giving us an initial advantage.”

Can enter the market in six years

Even though NeoPepVac has just been kick-started, the project is already progressing rapidly and the goal is to market the new vaccine within 10 years.

First step is a clinical phase I trial with 25 cancer patients to evaluate the safety of the vaccine and establish a proof of concept.

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"We are working hard and the bioinformatics platform is ready and in the process of regulatory approval so we can initiate studies with samples from real patients in the beginning of January 2018 and patient cases from April. The phase I trial will begin in September," says Niels Iversen Møller. But he points out that the company still has work ahead:

"A lot of things have to fall into place but if we can prove the safety of the vaccine and its utility in a clinical work flow, we expect to initiate phase II trials in 2021, maybe 2020 if we work fast."

However, the process will speed up afterwards. Evaxion expects a pre-market approval from FDA already two years after the phase II trial.

"And when we get a hold on this approval, we can in principle market the vaccine in the beginning of 2024," says Niels Iversen Møller. He adds:

"However, we need to run a phase III trial parallelly with all this – mainly to confirm what we already know. But altogether, that means that we can be ready with the final cancer vaccine by 2027."

Potentially, a new collaboration in the making

A central point in Evaxion's strategy is to create technology synergies with other firms' technologies. Partly to test the scope of the technology's abilities but also to create a network in relation to potential commercial deals.

Thus, Niels Iversen Møller also emphasizes how happy he is about the partnership with CCIT, DTU, and SSI.

"Innovation Fund Denmark's grant of DKK 6 million is super important to us. But having found the right collaborators for this type of research is just as crucial to us. We are now a group of actors with a common goal and interest in developing and investing in this cancer vaccine," he says and adds:

"It makes the way to the market so much easier."

The collaboration strategy has, among others, led to a partnership with Bavarian Nordic about researching on multi-resistant bacteria. And Niels Iversen Møller discloses that another cooperation agreement might be coming up.

"I cannot say too much. But we might be having a dialogue with other companies about other projects in different disease areas to see if we can create synergies between our technologies. I can say that it might happen without revealing too much," he concludes.

English edit: Ida Løjmand

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