# Outwitting immunity to treat disease: Start-up raises 33 millions CHF

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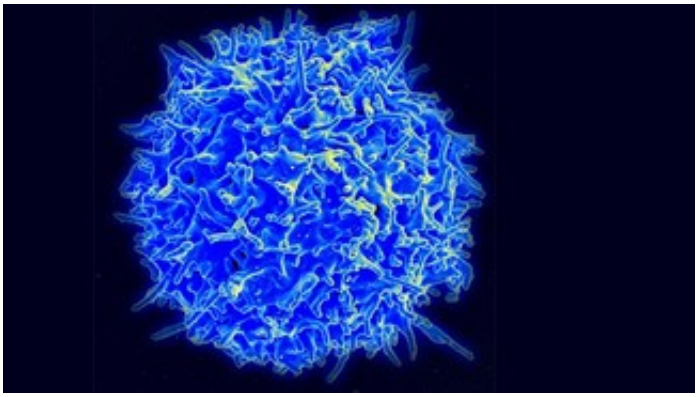

Human T-Cell. Credit: Creative commons NIAID/NIH

EPFL start-up Anokion has the immune system in its sights. The company has developed technology for retraining white blood cells that holds promise for treating autoimmune, allergic, and a number of other diseases. A group of private investors have pledged 33 millions Swiss francs (37 million dollars) into the young company.

What do multiple sclerosis, type I diabetes and food allergies have in common? All these conditions are caused by an abnormal immune response; white blood cells that attack their own body cells or overreact to external elements. In EPFL's Innovation Park, the start-up company Anokion is developing an extremely promising technology to treat autoimmune conditions and other maladies. The first clinical trials are

planned for 2017.

And the range of applications isn't just limited to autoimmune disease. The body also develops immune reactions to many protein drugs used to treat hemophilia and cancer, for example, and Anokion's approach may be able to prevent these reactions as well. Now, a group of venture capitalists specializing in pharmaceuticals (Novartis Venture Fund, Novo Ventures and Versant Ventures) has recognized the potential and injected 33 millions Swiss francs (37 millions dollars) into the young company.

## How to trick the immune system

Anokion's technology takes advantage of a behavior exhibited by white blood cells that is still not very well understood. These cells, the advance guard of the immune system, tend to calm down in the presence of cells that are dying normally at the end of their life cycle. Their cousins, the red blood cells, do just that in healthy individuals, turning over en masse on the order of 200 million per day.

The researchers developed a technique to attach the protein responsible for triggering the immune response onto these red blood cells. A bit like Pavlov's dogs, who learned to associate the sound of a bell with the appearance of food, the white blood cells associate the "foreign" protein with the millions of calming messages released every day by the red blood cells as they expire. The undesirable immune response disappears. In 2012, the EPFL laboratory led by Jeffrey Hubbell used this technique to prevent disease in mice that were developing type I diabetes. The research was published in *PNAS* and received an enormous amount of attention.

"The technology delivers proteins, be they autoimmune antigens or protein drugs, in a manner that re-trains the immune system to accept

them as the body's own," explains Hubbell "We are delighted that leading biotech venture funds have recognized the value of our approach, providing the necessary financial means to move forward."

Anokion's mission is to commercialize this discovery so that it can move out of the lab and into use as a treatment for disease. For now, the researchers are concentrating on a specific kind of white blood cell, T lymphocytes, that are implicated in many autoimmune and allergic diseases, including multiple sclerosis and type I diabetes.

The technology has a far wider potential, however. Protein drugs are used to treat diseases such as cancer and a number of genetic diseases such as hemophilia. Despite their effectiveness in treating these diseases, the body frequently recognizes these proteins as foreign and mounts an immune response against them, sometimes even after one or a few doses. After this, the body neutralizes the protein drugs that have been developed to heal it.

Using Anokion's technique, the drug could be administered over a much longer period by teaching the immune system to leave it alone. Multiple therapeutic molecules that trigger immune reactions have been withdrawn after clinical trials due to these immunogenicity challenges. The researchers think that many of these could be rehabilitated if the immune response of the T-cells during treatment could be controlled.

Anokion is planning clinical trials for 2017. They will initially test their technology in conjunction with a drug known to trigger strong immune reactions before moving on to autoimmune diseases.

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