Researchers on the trail of a treatment for cancer of the immune system

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Infection with Epstein Barr means that the B cells, which are the primary memory cells of the immune system, are hi-jacked.

When the virus has penetrated, researchers observe an excess of a special bio-antenna, a receptor known as EB12, suddenly sprouting from the surface of the B cells. But why they do so remains a mystery.

The receptors are a vital component of the way cells communicate with their surroundings via hormones and other bio-molecules, for example, but in a body consisting of millions of cells and transmitters it can be hard to determine the part each molecule plays.

"It is possible that the large numbers of EB12 receptors could actually be the B cells response to the virus and an attempt to combat the infection. Another possibility is that the EB virus reprogrammes the cell for this explosive growth in the number of EB12 receptors. What we know for certain is that more EB12 receptors assist the B cell infected by the EB virus to multiply more rapidly thus spreading the infection faster," says postdoc Tau Benned-Jensen from the Faculty of Health Sciences, University of Copenhagen.

No fewer than 95 per cent of us carry the Epstein Barr Herpes virus.

We often encounter it as kids and it is normally harmless. Are we infected later in life EB virus may cause mononucleosis, and it seems to play a part in some forms of cancer, just as HPV affects the risk of

cervical cancer. But we have no drugs to combat the Epstein Barr virus, and no vaccines for it.

"Under normal circumstances our immune systems can keep the EB virus infection in a latent state and a truce or stand-off may arise between the immune system and the virus," explains Mette Rosenkilde, professor of pharmacology at the Department of Neuroscience and Pharmacology, University of Copenhagen.

"We cannot dispense with the infection and we carry it all life long, but to most of us it is harmless. For people whose immune systems do not function due to disease or because they are suppressed by drugs in conjunction with organ transplants it is a very different matter. Now the Epstein Barr virus is suddenly free to reproduce so uninhibitedly and dramatically that it may lead to cancer," says Mette Rosenkilde.

While researchers know that the B cell EB12 receptors play a part when the cell visits the lymph glands, the immune system's Central Station, we have not yet explained the exact role of the receptor.

So the Danish researchers started by mapping the bio-antenna molecule by molecule and then, as the first in the world, they made a blueprint of a tiny molecule they thought could bind to the B cell EB12 receptor.

"When we know what receptors react to, it tells us more about the part they play," Mette Rosenkilde explains, "and our tiny molecule, a ligand, blocks the EB12 receptor, preventing it from doing its job."

"In time this block may be able to help transplant patients. If we can restrain EB virus reproduction when the immune system is being medically suppressed, we may well be able to avoid cancer," Tau Benned-Jensen says.

"On the other hand the EP virus also appears to play a part in other immune diseases such as autoimmune disease, where the ability to adjust the immune system would be beneficial," says Mette Rosenkilde.

And shortly after the Danish researchers published their article on their ligand, the first articles appeared about natural substances in the body, which activate the EB12 receptor and direct the B cell to specific areas in the lymph glands.

"Our molecule can inhibit the activation of the new substances, and the next step in our research will be experiments to identify even more biochemical dials to twiddle and to help us develop new drugs," Tau-Benned says.

The discovery has just been published in the *Journal of Biological Chemistry*.

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