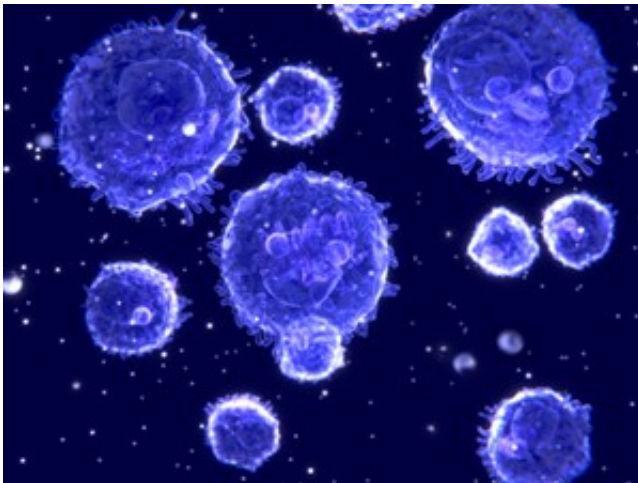


B cells use mechanical forces to pull antigens from other cell surfaces

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B lymphocytes. Credit: The Francis Crick Institute

Francis Crick Institute scientists have discovered that immune cells called B cells use mechanical forces to physically pull antigens such as viruses or toxins from the surfaces of other cells.

The work was carried out by Katelyn Spillane and Pavel Tolar of the Crick. Dr Tolar explains: "Long-term protection against infectious diseases requires the production of highly potent antibodies by B lymphocytes, or B [cells](#)."

"B cell responses start when they encounter foreign antigens on the surfaces of a type of immune cell called [antigen-presenting cells](#). The B

cell and the antigen-presenting cell form a tight contact, known as an immune synapse, from which the B cell can acquire the antigen for processing and presentation to helper T cells so it can be destroyed.

"To produce highly potent antibodies, B cells need to select the antigens that they bind to strongly."

Studying how B cells acquire antigens from the surfaces of other cells is difficult using traditional experimental approaches. This led the researchers to develop new DNA-based nanosensors that, combined with fluorescence imaging, allowed them to visualise how the process happens.

They discovered that the [mechanical forces](#) B cells generate to physically pull [antigens](#) from the surface of antigen-presenting cells cause B cells to respond differently based on the stiffness of the antigen-presenting cell. The scientists suggest that B cell responses, and therefore the production of potent antibodies during infection, may be supported by the physical properties of the [immune cells](#) involved.

Dr Tolar says: "Our work suggests that it should be possible to actively control B [cell responses](#) by manipulating physical cues received in the immune synapse. We hope that this research might eventually lead us to design and engineer vaccines with physical properties tailored to elicit the production of desired antibodies, for example by using nanoparticles of different stiffness."

More information: Katelyn M. Spillane et al. B cell antigen extraction is regulated by physical properties of antigen-presenting cells, *The Journal of Cell Biology* (2016). [DOI: 10.1083/jcb.201607064](https://doi.org/10.1083/jcb.201607064)

Provided by The Francis Crick Institute

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