

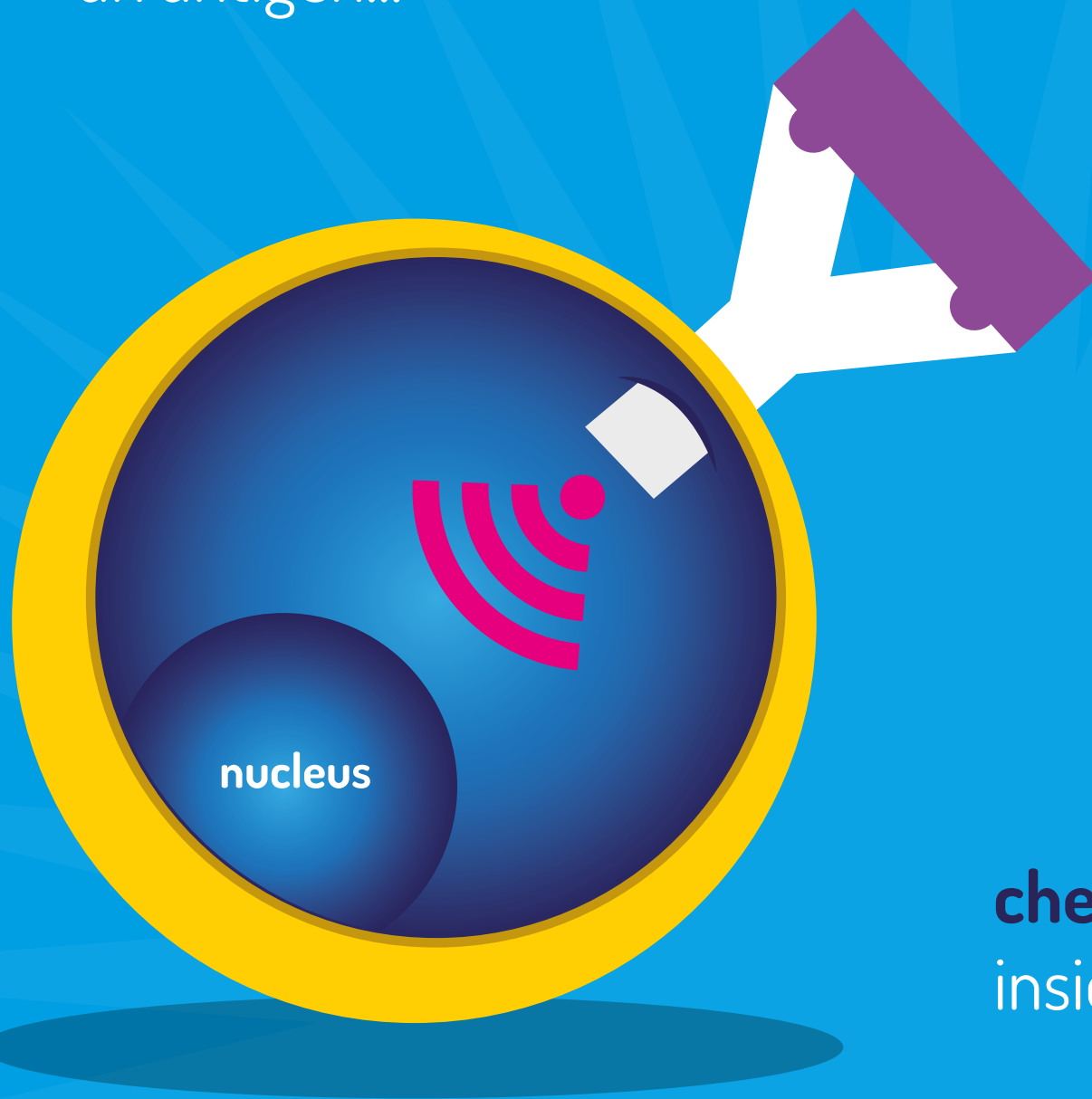
# The vital role of PI3K $\delta$ in Antibody Production



Antibodies on the B cell surface are called '**B Cell Receptors**'.

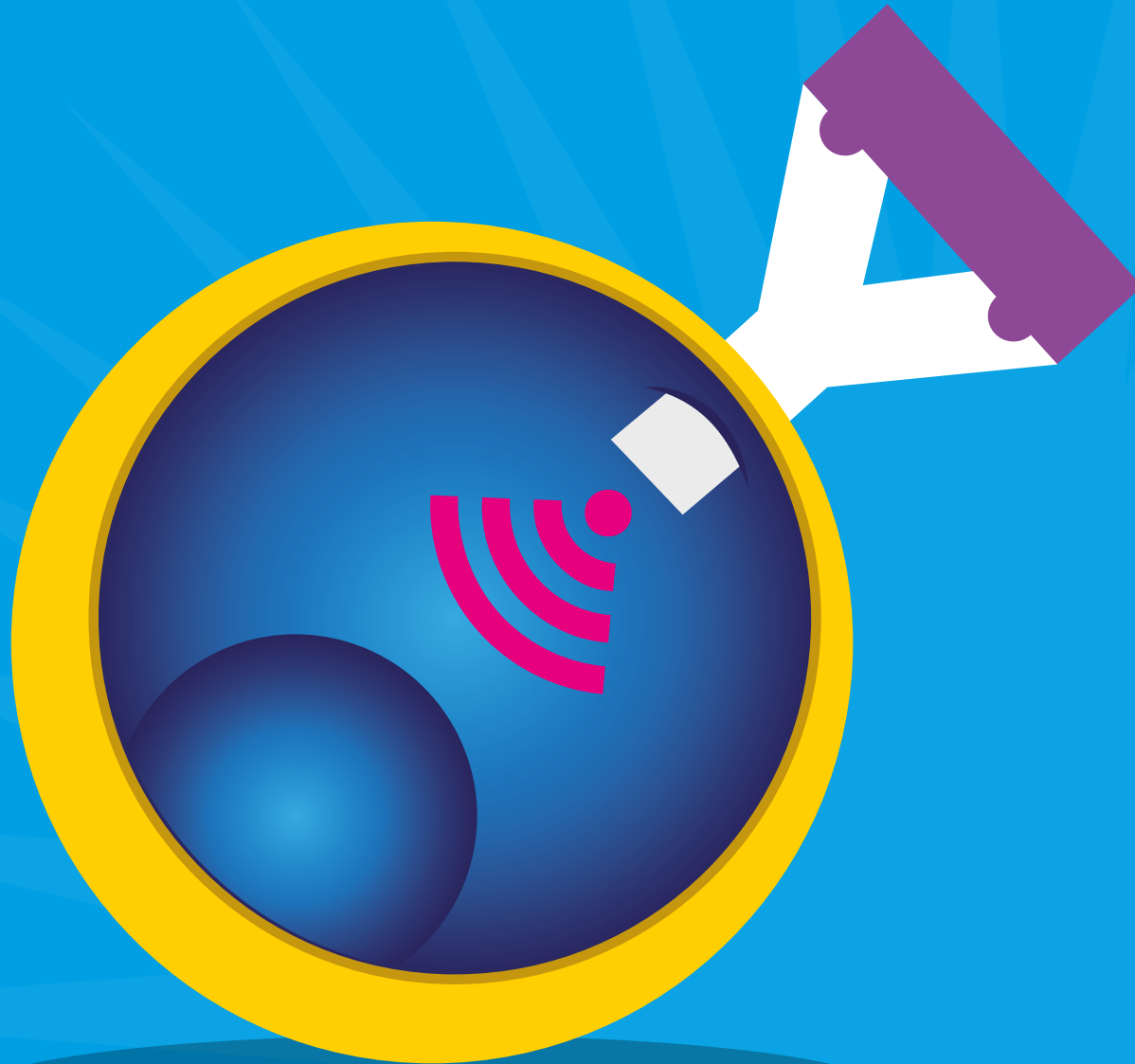


When a **B Cell Receptor** binds to an antigen...



**chemical signals** are generated inside the B Cell.

These signals can tell the B Cell to:



Stay alive!

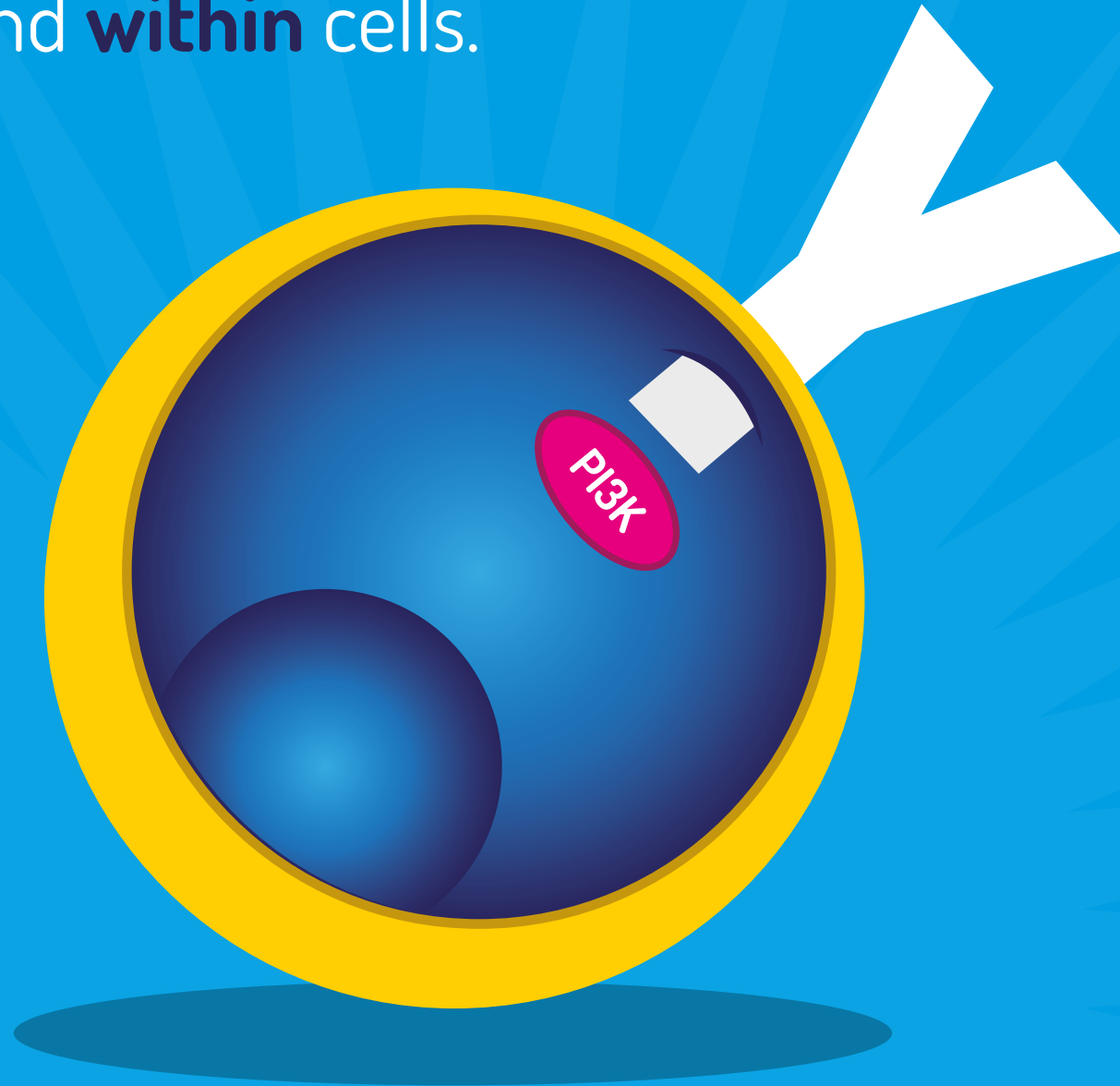


Continue to develop

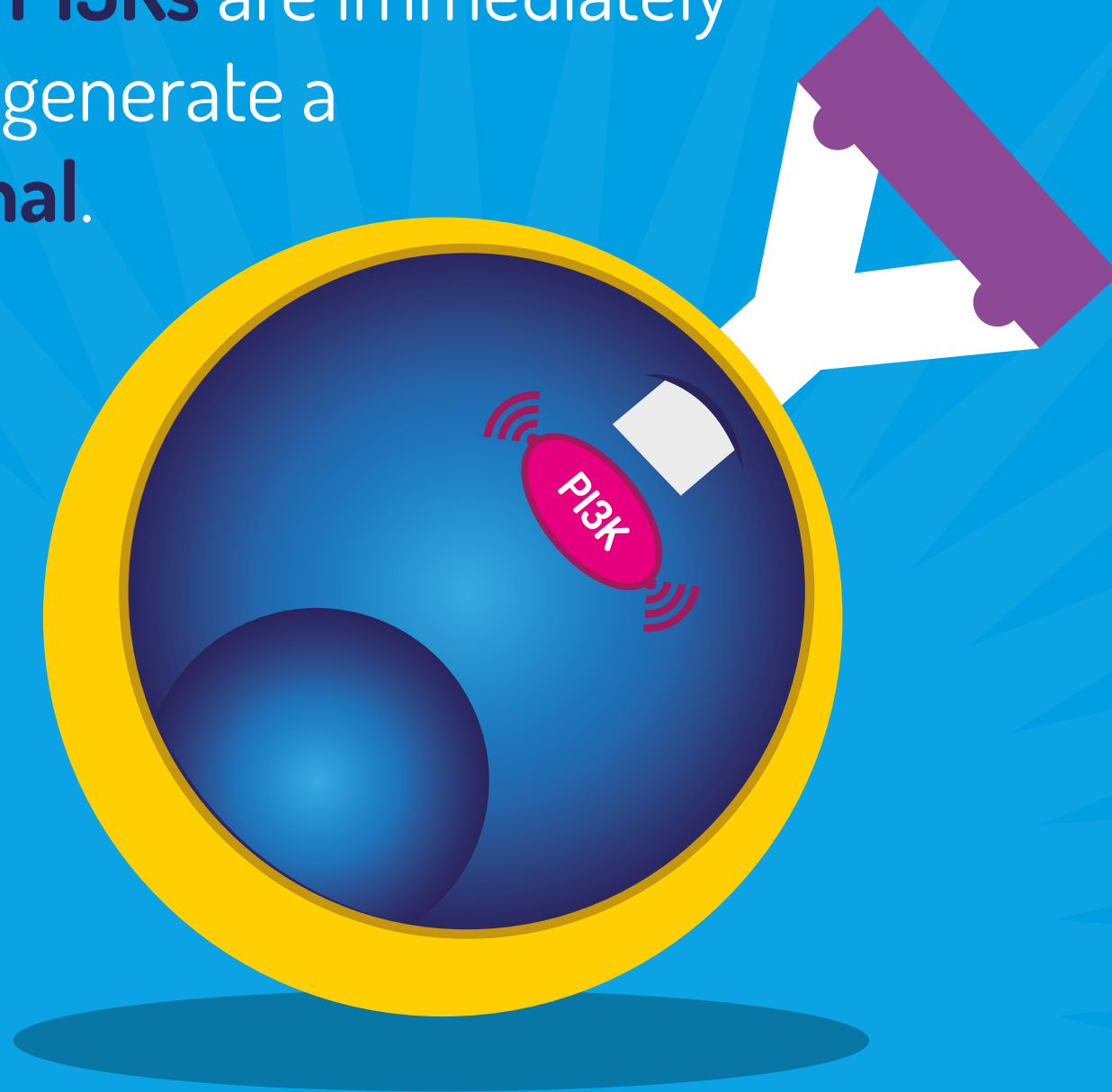


Make more antibodies

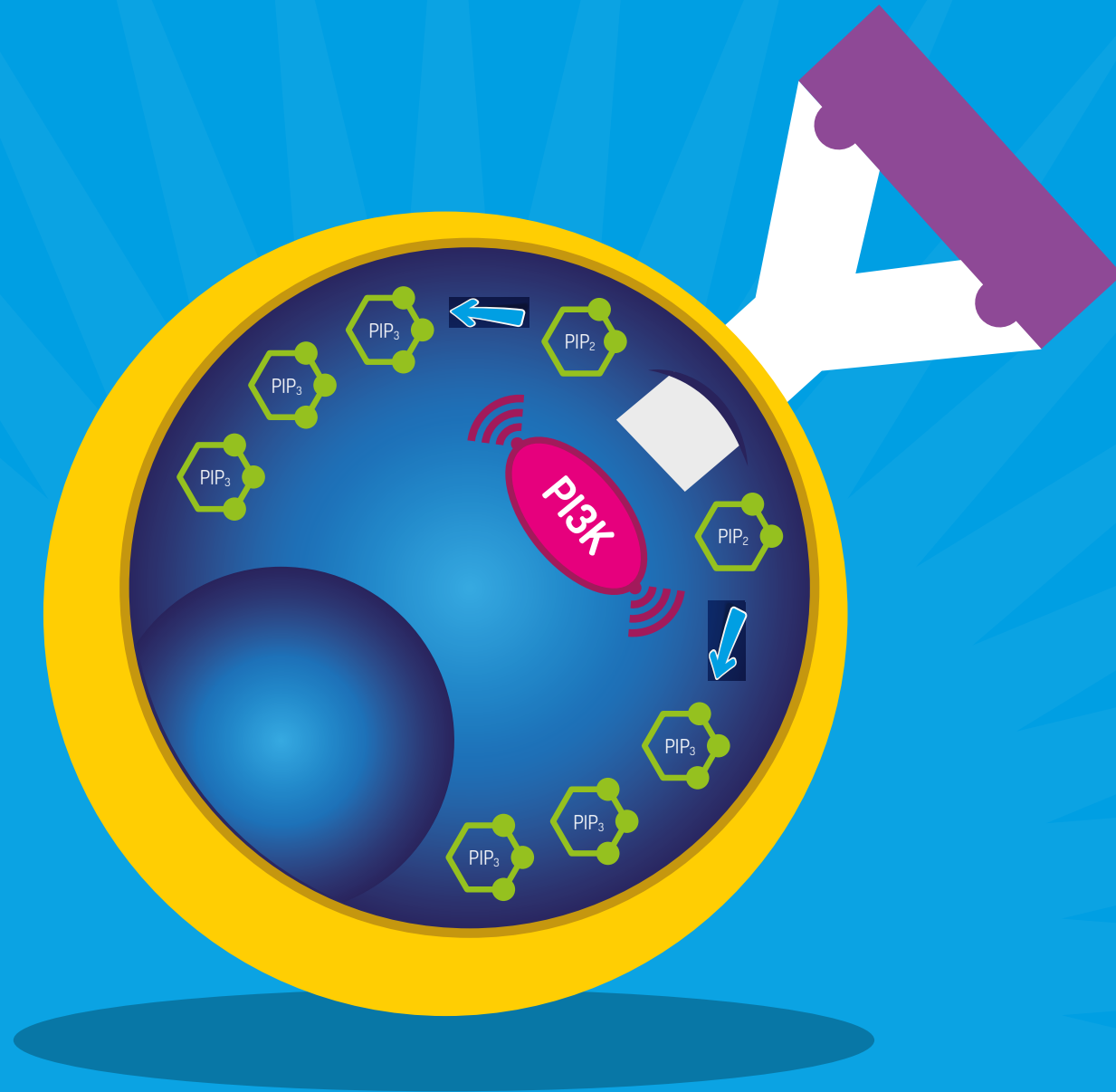
**PI3-Kinases (PI3Ks)** are a family of proteins found **within** cells.



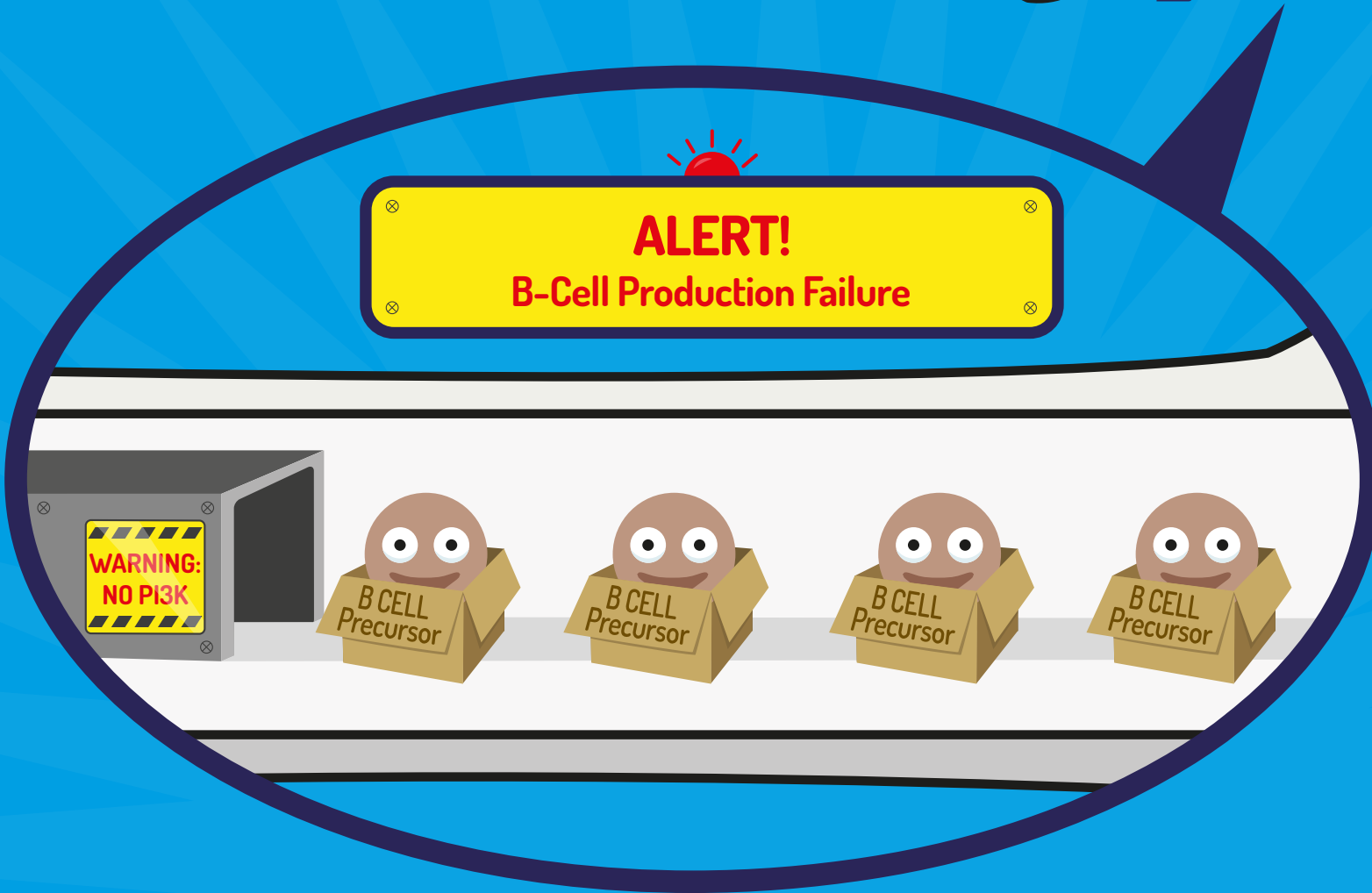
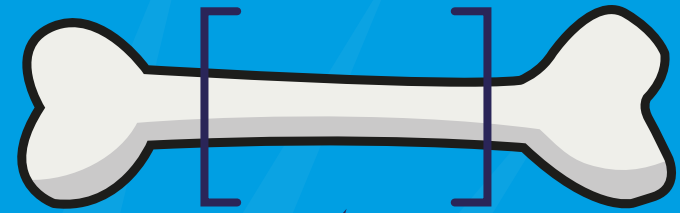
When the B Cell Receptor detects an antigen these **PI3Ks** are immediately activated and generate a **chemical signal**.



This signal is called '**PIP<sub>3</sub>**' and forms at the **cell membrane**.



B cells need PI3K signals to develop in the bone marrow.





Surprisingly, patients have been identified with **too much PI3K activity** inside their B Cells!

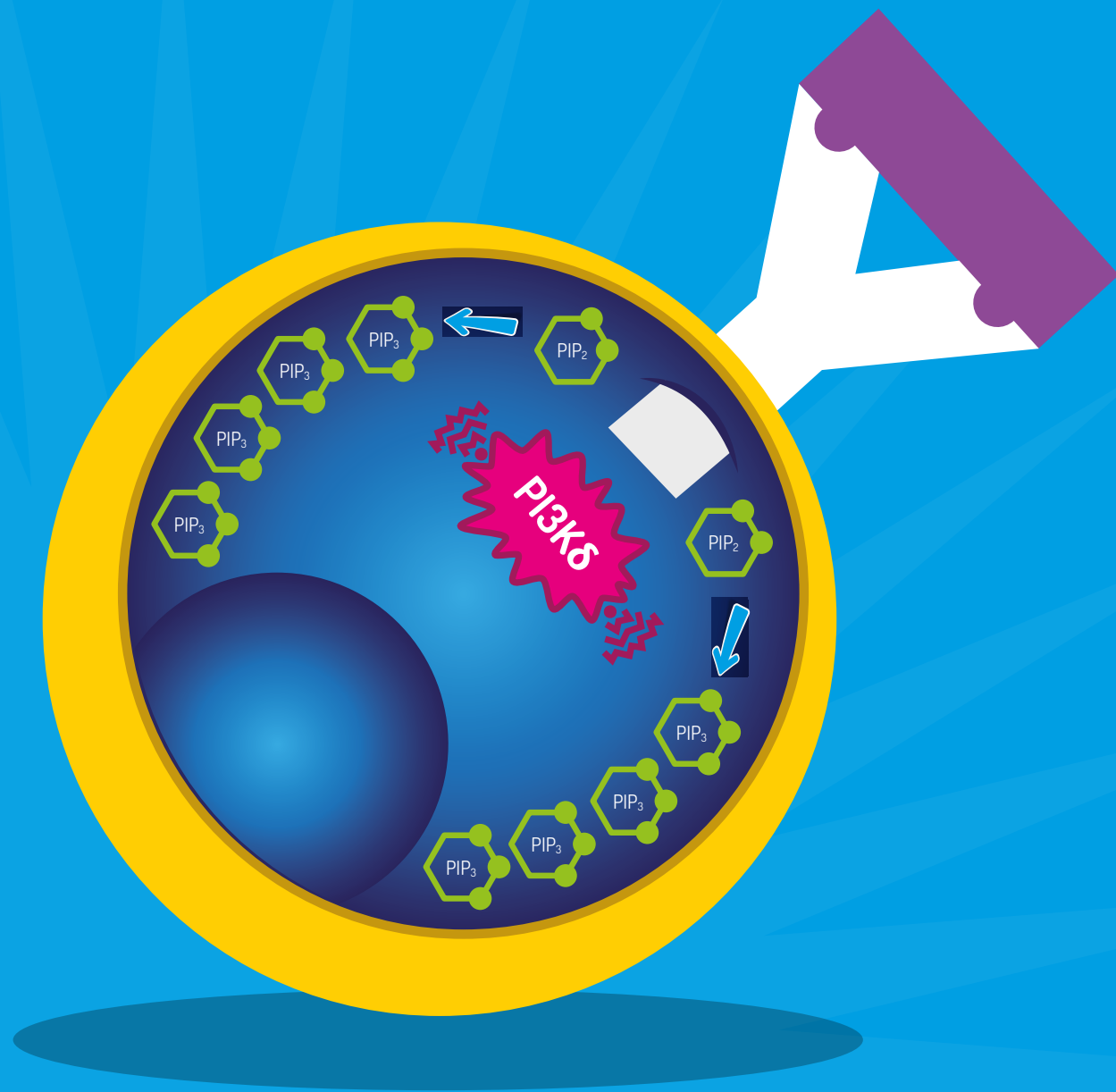


These B Cells are a bit frantic – like they've had too much caffeine.

In these patients the B Cells develop (they can be found in the blood) but they **don't make enough antibodies** – or their antibodies are **not specific enough** to fight infections.

We have called this disease **Activated PI3K Delta Syndrome (APDS)** because of the specific type of PI3K which is over-activated.

APDS is rare, but several individuals in the UK have been identified with this heritable disease.



Because there are **drugs** that can be used to **inhibit PI3K $\delta$  activity**, it is possible that APDS patients can be treated by taking such drugs.

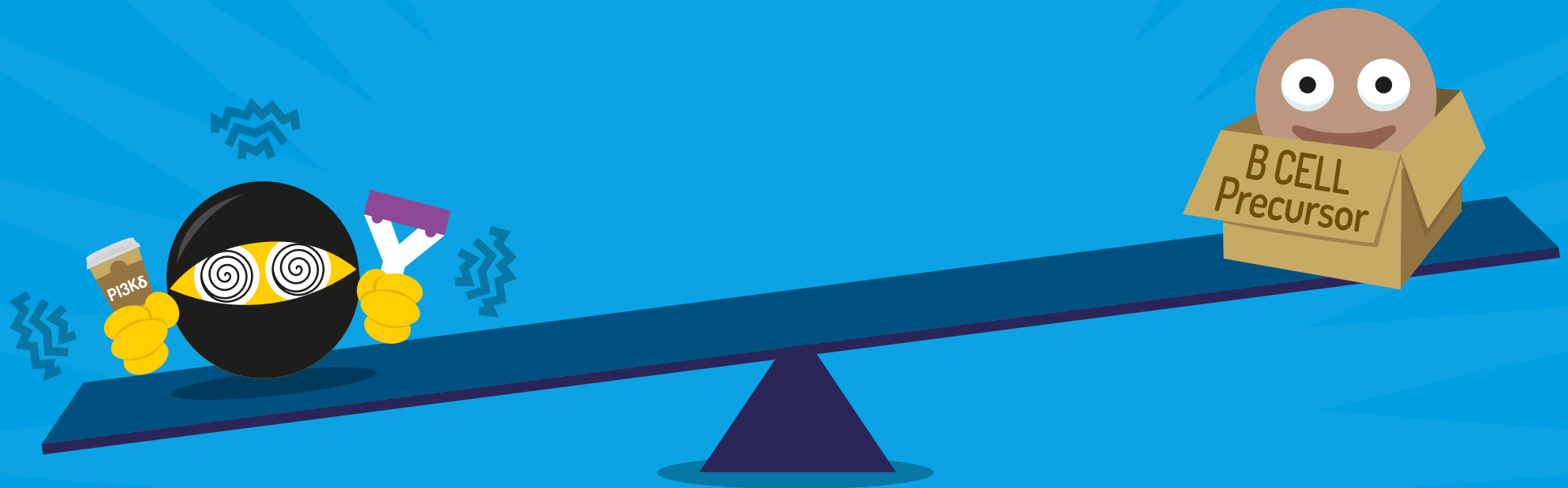


This is something we are actively exploring, starting with a mouse model of the disease.

# Summary

If you have too little, or too much, PI3K signalling in B Cells, the B Cells don't develop or function properly.

Much work at the Babraham Institute is therefore focussed on understanding precisely how PI3K activity is regulated in B Cells (and other cells) in health and disease.





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Research in the Okkenhaug Lab focuses on how a group of enzymes called PI3Ks are used by cells of the immune system.

[www.babraham.ac.uk/our-research/lymphocyte/klaus-okkenhaug](http://www.babraham.ac.uk/our-research/lymphocyte/klaus-okkenhaug)

For more information on APDS, please see:

[www.apdsyndrome.org/](http://www.apdsyndrome.org/)