

What is cancer immunotherapy?

SFB 1335 Aberrant Immune Signals in Cancer

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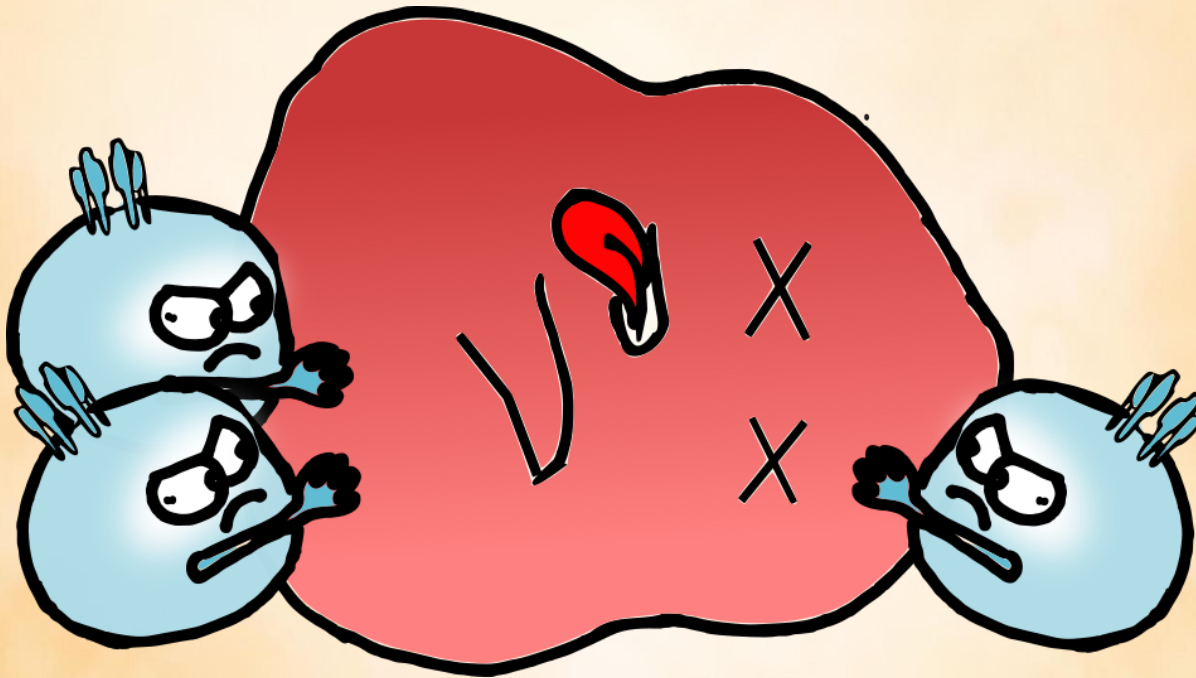
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School of Medicine

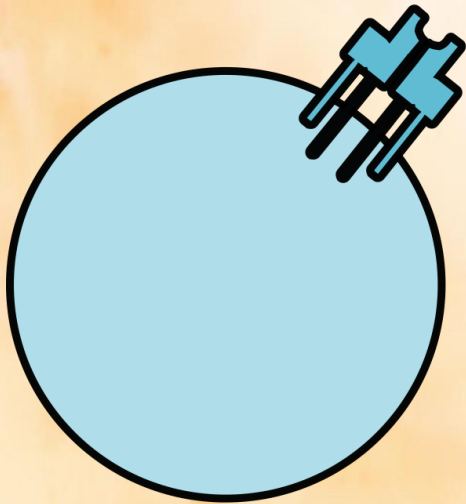
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Our immune system can fight cancer.
T cells are able to recognize and kill cancer cells.

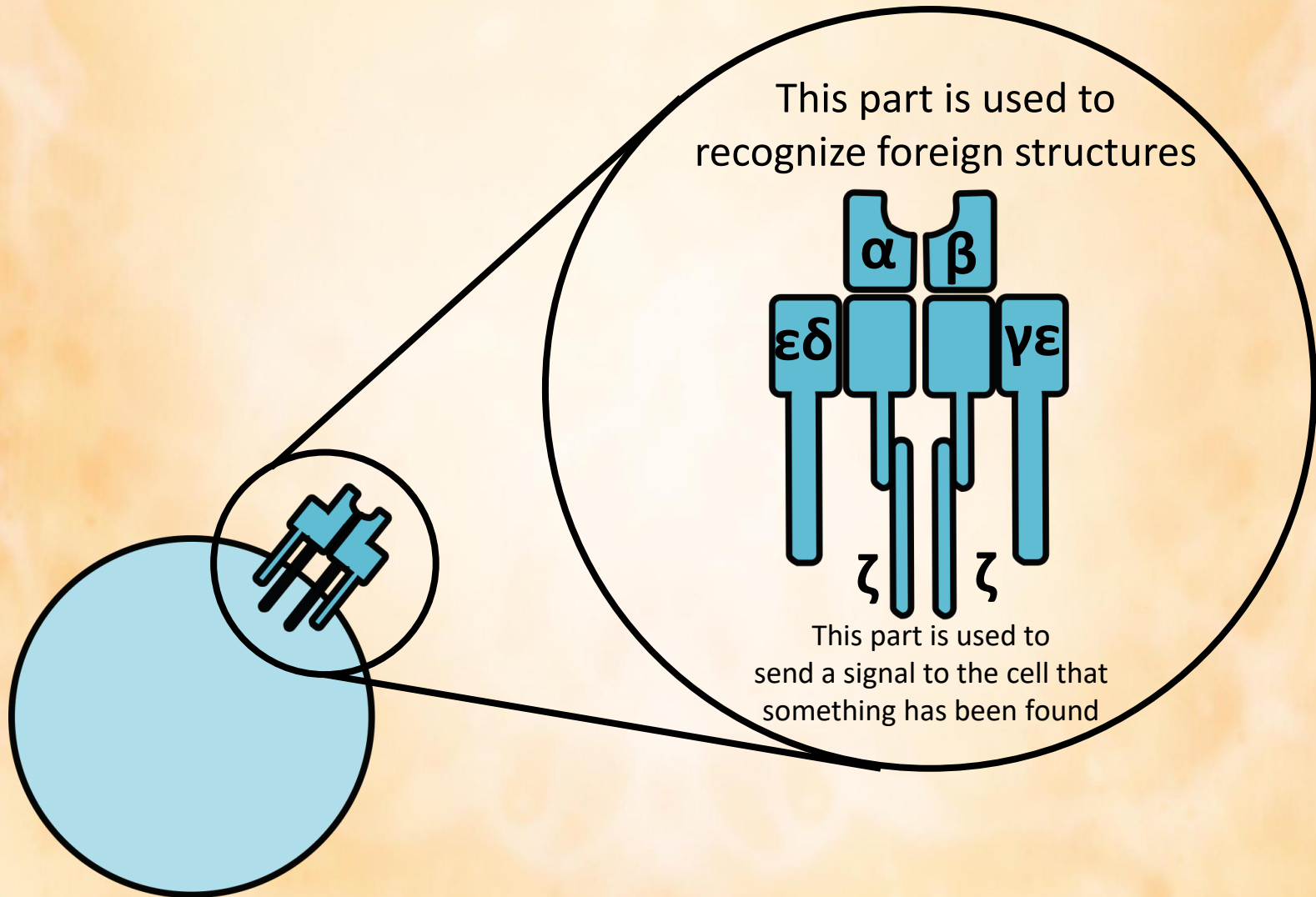


T cells are an important part of our adaptive immune system

- Every individual T cell recognizes a different structure- for example a protein on the surface of a virus
- We have many different T cells recognizing many different structures
- T cells can identify and kill virus infected cells or cancer cells and can support the function of other cells of the immune system



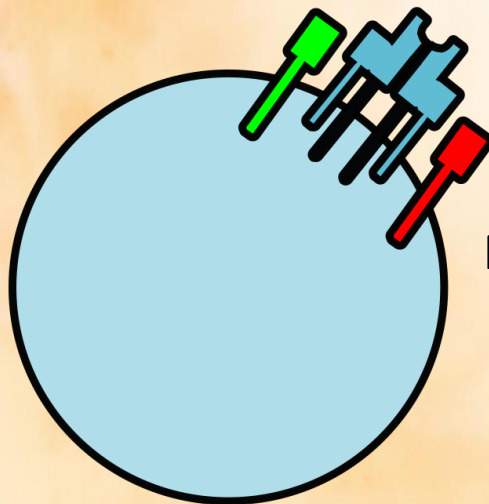
T cells use the “T cell receptor” to find infected cells or cancer cells



T cells use other receptors as well to get information

These receptors tell the cell to respond stronger:

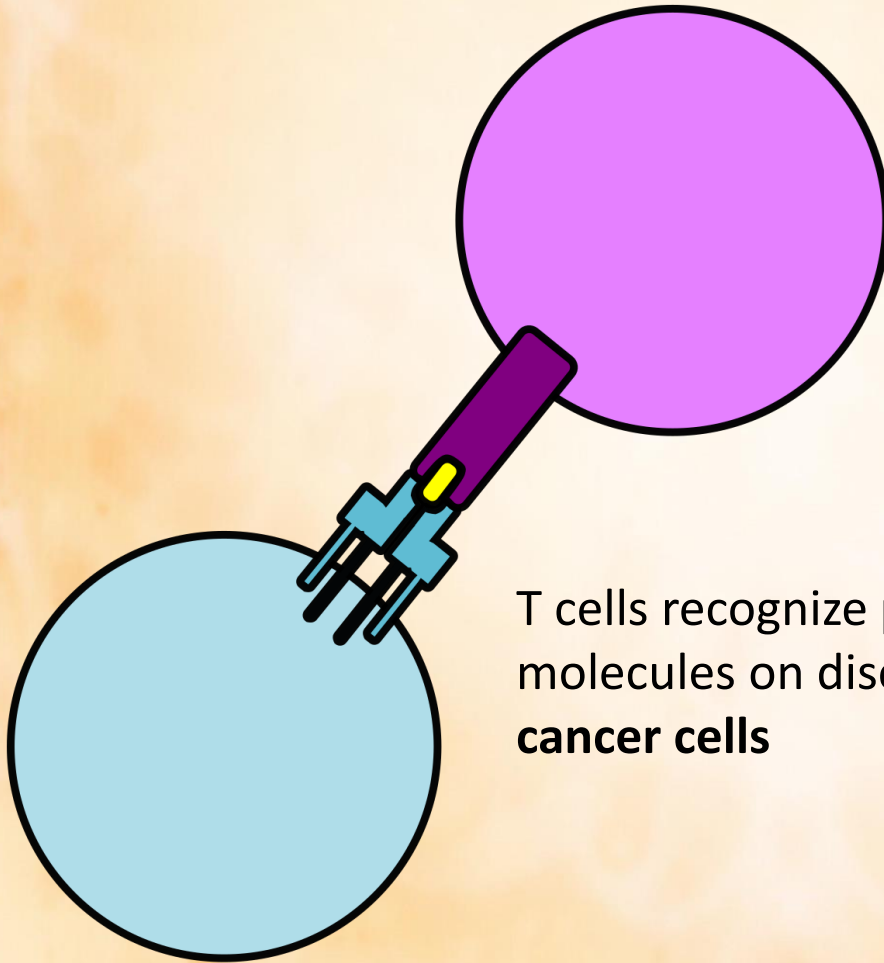
CD28, 4-1BB



These receptors tell the cell to respond weaker:

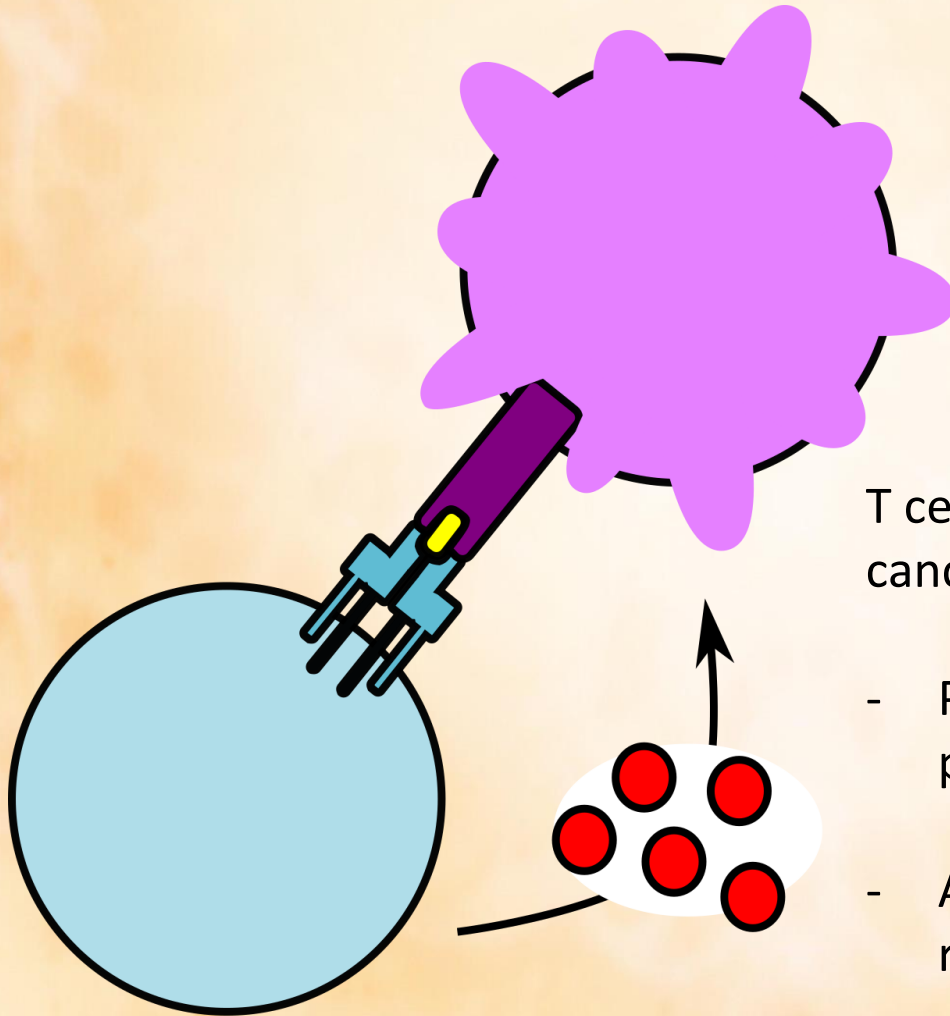
PD1, CTLA4

T cells “know” a cell is a cancer cell because it makes proteins that normal cells don’t make. The T cell can recognize these proteins with their T cell receptor.



T cells recognize peptides presented on MHC-I molecules on diseased cells: Virus infected cells, **cancer cells**

T cells can kill cancer cells



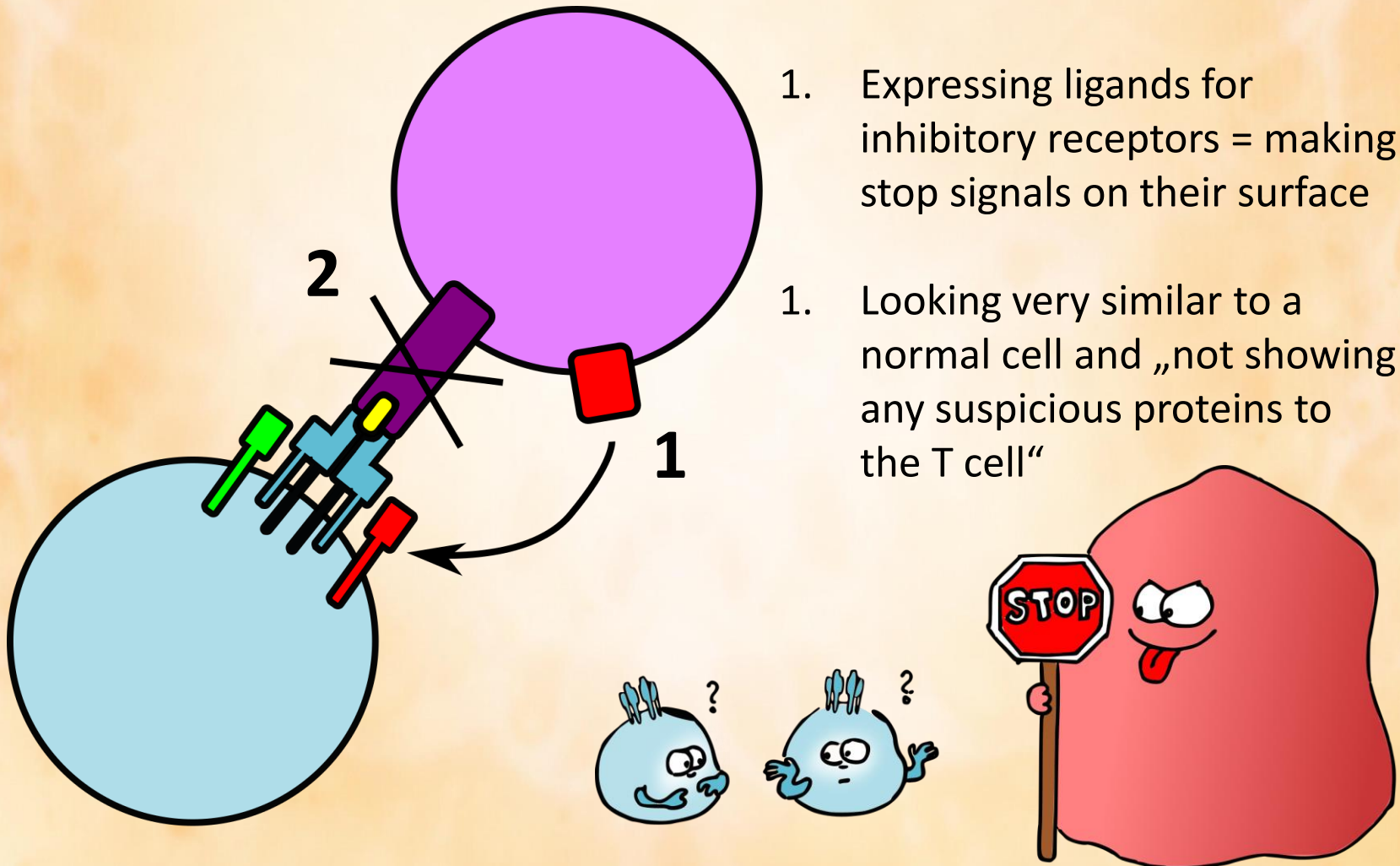
T cells can contribute to eliminating cancer cells by:

- Producing toxic proteins such as perforin and granzyme
- Activation of FAS (the „death receptor“) on the cell surface

Sometimes T cells fail to kill cancer cells

Cancer cells can evade the immune system by:

1. Expressing ligands for inhibitory receptors = making stop signals on their surface
1. Looking very similar to a normal cell and „not showing any suspicious proteins to the T cell“



How can we help the immune system fight cancer?

Different types of immune therapy:

- Checkpoint inhibitors
- CAR T cells

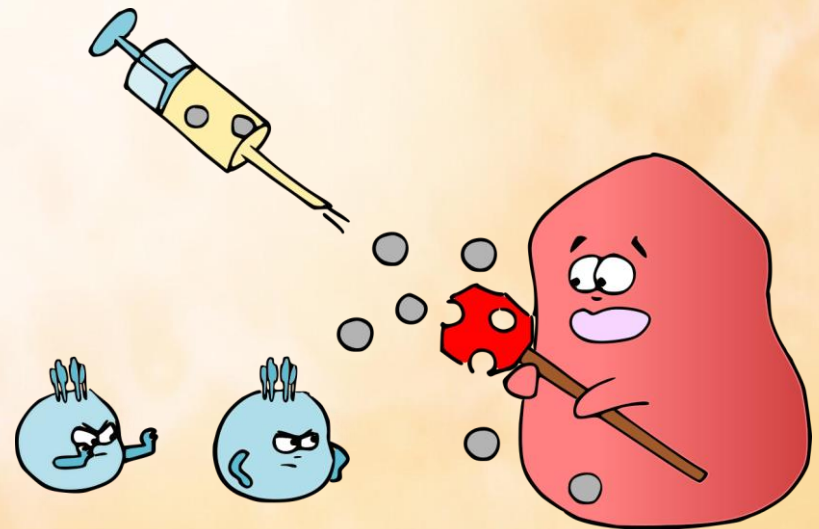
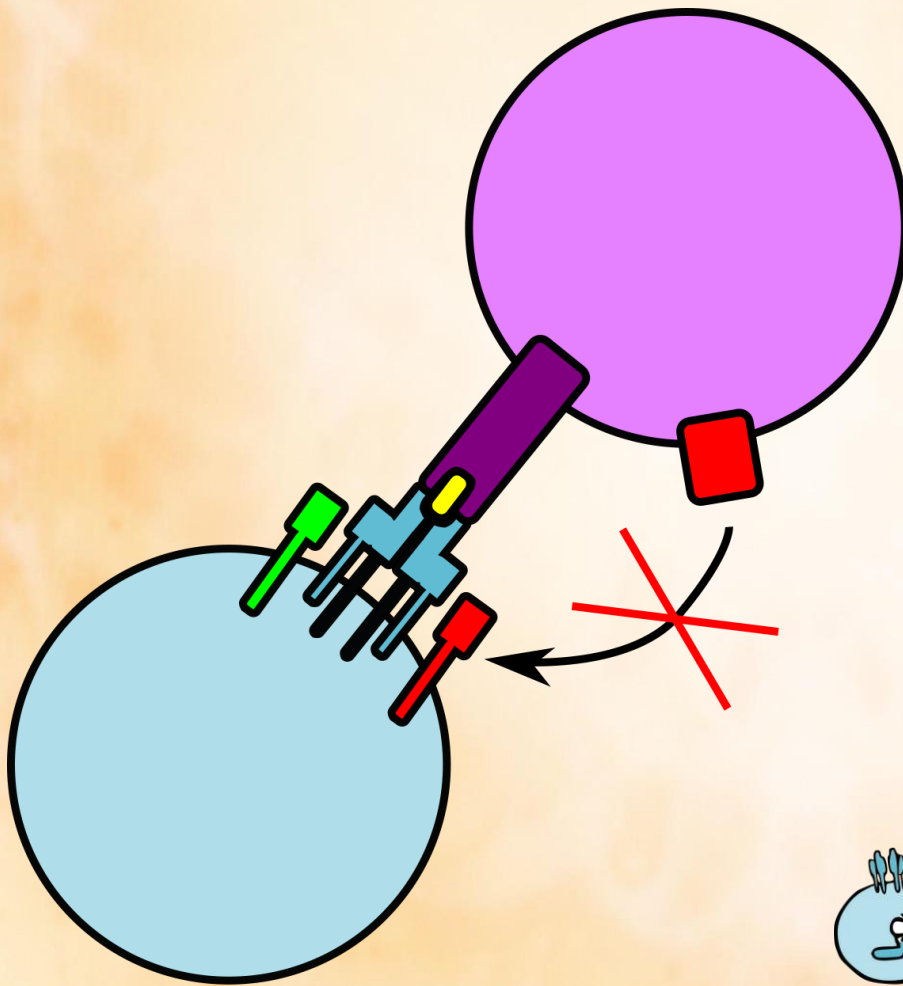
Checkpoint inhibitors

Mechanism of action:

Prevent cancer cells from sending stop signals

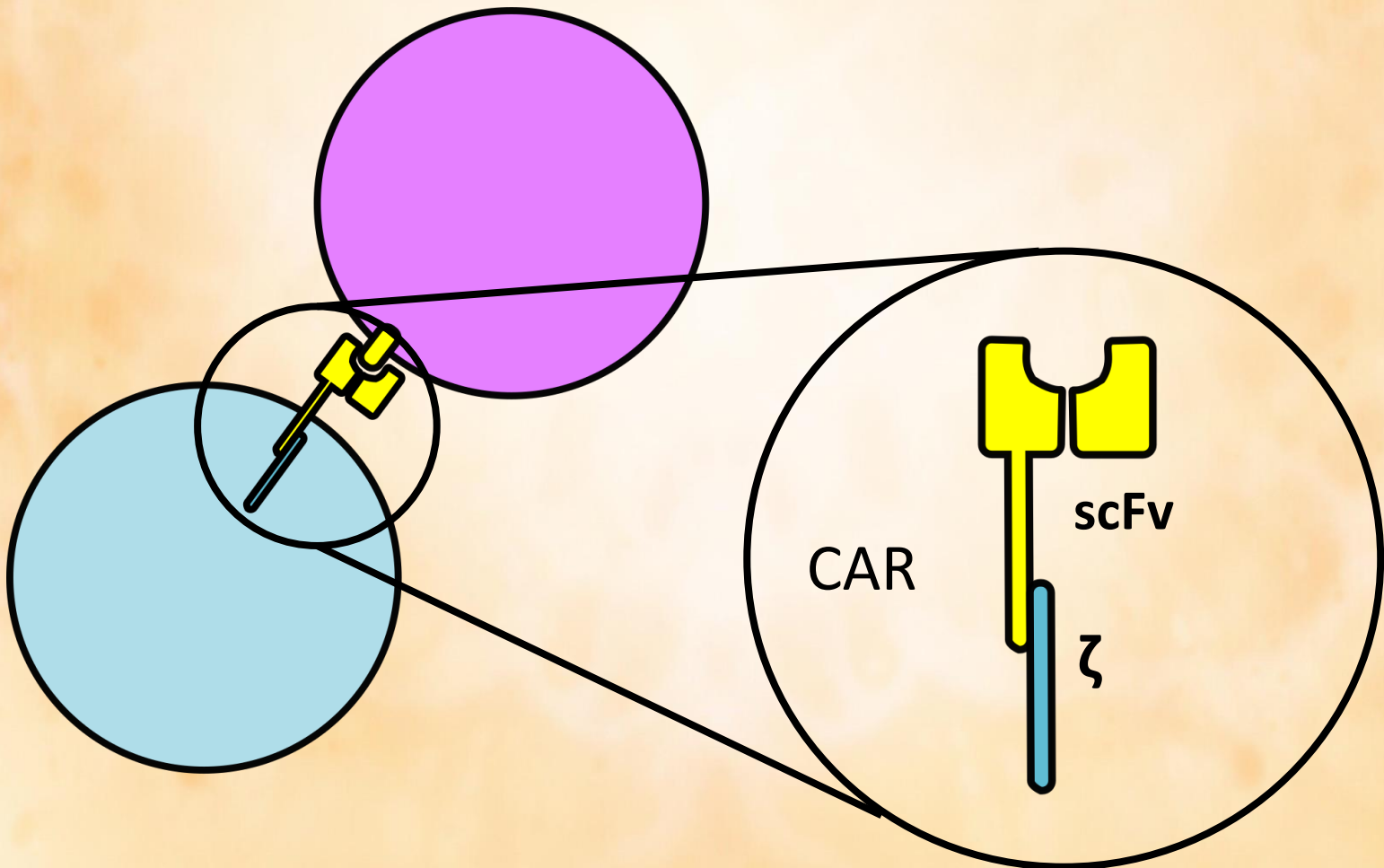
Examples:

Anti-PD-1, anti-PD-L1, anti-CTLA-4



CAR-T cells

New receptors are created by scientists to help T cells recognize cancer cells
These new receptors are called „chimeric antigen receptors“ i.e CAR



Research is focusing on making better and better CARs, which will boost T cell responses to cancer cells

