What is cancer immunotherapy?

SFB 1335 Aberrant Immune Signals in Cancer

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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

This part is used to recognize foreign structures

This part is used to send a signal to the cell that something has been found
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 contribute to eliminating cancer cells by:

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

Sometimes T cells fail to kill cancer cells
How can we help the immune system fight cancer?

Different types of immune therapy:

- Checkpoint inhibitors
- CAR T cells
Mechanism of action:
Prevent cancer cells from sending stop signals

Examples:
Anti-PD-1, anti-PD-L1, anti-CTLA-4
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.