
Development of CAR T-cells: past, present and future

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Abstract

Chimeric Antigen Receptor (CAR) T-cells are T lymphocytes which have been genetically engineered to be "redirected" against tumor cells. CAR-T cells made a huge breakthrough in the treatment of hematologic malignancies. To date, different second generation CAR-T cells have been approved for the treatment of relapsed/refractory B-cell acute lymphoblastic leukemia, B-cell lymphomas and multiple myeloma. Despite a remarkable efficacy, their use is limited by the occurrence of resistances and/or severe toxicities. A better understanding of these mechanisms and improvements in molecular biology tools have led to the development of new generations of CAR-T cells, with enhanced efficacy and reduced toxicity. Here we will review the main clinical data, discuss resistance and toxicity mechanisms and highlight the ongoing ways of improvement.

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