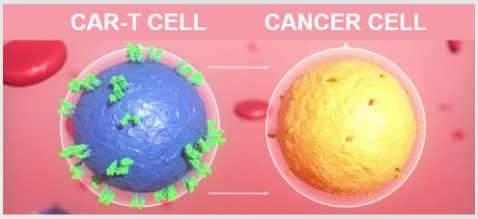
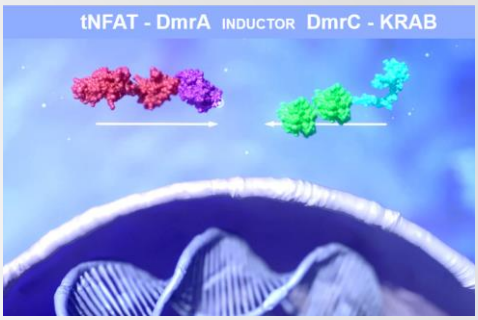
NATIONAL INSTITUTE OF CHEMISTRY

RESEARCH DOMAINS: Cancer Immunotherapy

INDUSTRIES: Pharmacy

EXTERNALL REGULATION OF CAR T-CELL ACTIVITY FOR A SAFER AND EFFECTIVE CANCER





Chimeric antigen receptor T cells (CAR T) cancer therapies are advanced and high-value therapies that enhance the immune response against tumor cells. Tumor specificity is achieved by genetically modifying T-cells. As of 2019, two of such therapies were available in the US and some EU markets, both targeting the CD19 antigen. The latter is expressed in cancers such as diffuse large B-cell lymphoma. The development of new CAR T-cell therapies is going towards new antigen targets and limiting the adverse effects. Using living cells brings complexity with manipulation, manufacture, and finally control. Off-target toxicity and cytokine storms are some of the serious and even life-threatening side effects, limiting these therapies to become a second or even a first line treatment. The activity and therapeutic effect of CAR T-cells could be regulated.

Technology

We developed a synthetic-biology based control over CAR T-cell by introducing an engineered transcription factor NFAT. The latter is regulated via different heterodimerization systems with external regulation based on simple addition of a small molecule. The cells can be switched on or off based on the current state of the patient. By influencing gene expression of a T-cell, we can regulate its therapeutic effect. The technology was tested primary T-cells and in T-cell lines.

Main advantages

- CAR T-cells can be activated or repressed via simple drug administration
- 3 combinations of small molecules to activate or repress CAR T-cell activity, one already clinically approved
- CAR T-cell activity can be controlled based on the current state of the patient thus increasing the safety of CAR T-cell cancer immunotherapy

Key words

CAR T-cells, NFAT, Cancer Immunotherapy

TYPE OF COOPERATION

R&D cooperation and technology licensing opportunity

INTELLECTUAL PROPERTY

PCT application, claiming priority date of EP19150168.3

DEVELOPED BY

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MORE INFORMATION ABOUT THE INVENTION

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