

Immunotherapy with natural and genetically engineered cells

The "Lombardy is Research" 2023 award has been awarded to Steven Rosenberg and Carl H. June for their development of immunotherapy using natural cells and genetically reprogrammed cells. Immunotherapy is the treatment of tumors with the patient's own immune system cells, which act as killers against tumor cells. Depending on the type of cancer, a significant fraction of patients can achieve complete cure without relapses. Immunotherapy stands as one of the great successes of modern medicine.

Steven Rosenberg is a U.S. surgeon working at the National Institutes of Health in Bethesda, Maryland. He was the first to use immune cells to treat melanoma, a type of skin cancer for which there was no treatment at the time. The cells were extracted from patients, cultured in a laboratory, and then reinfused into the patients along with interleukin-2, a soluble molecule that activates anti-tumor cells. Some patients were completely cured using their own cells. The procedure described by Rosenberg in 2002 is known as adoptive cell transfer and was the first example of effective immunotherapy. The limitations of the treatment include the small number of responsive patients, the need for a large number of cells, and the presence of unwanted side effects. Carl June's studies have led to significant advancements.

Carl H. June is a U.S. oncologist and immunologist currently serving as a professor at the Perelman School of Medicine at the University of Pennsylvania. June successfully genetically modified T cells (immune cells that kill infected and tumor cells) to transform them into chimeric antigen receptor T cells (CAR T cells). This is an extraordinary invention because CAR T cells, which do not exist naturally, have the ability to selectively recognize and kill tumor cells while sparing normal cells. The initial clinical studies date back to the 1990s and are still in continuous development, with next-generation CAR T cells providing complete remission for patients with leukemias and lymphomas resistant to standard therapies. In 2017, two CAR T cell-based therapies, tisagenlecleucel (Kymriah) and axicabtagene ciloleucel (Yescarta), were approved for the treatment of acute lymphoblastic leukemia (B-ALL) and diffuse large B-cell lymphoma.

Immunotherapy with immune cells is still in its infancy, but thanks to pioneers like Rosenberg and June, it holds great promise for the treatment of cancer and other serious diseases.