CAR T: The Most Up-to-date Cancer Immunotherapy Treatment with Potential for Subversion CAR T: The Most Up-to-date Cancer Immunotherapy Treatment with Potential for Subversion CAR T: The Most Up-to-date Cancer Immunotherapy Treatment with Potential for Su

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Abstract

CAR-T is a kind of cell immunotherapy, and it is currently the most emerging technology to treat tumors with subversive potential. It is also one of the most effective methods for the treatment of malignant tumors.

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Advantages and Characteristics of **CAR T Immunotherapy**

The essence of cellular immunotherapy is to attack the diseased tissue through the body's own immune system. The imported immune cells can be proliferated in the patient's body. The therapeutic effect is long-lasting and guaranteed, and the potential toxic and side effects are relatively controllable. Chimeric antigen receptor technology has shown good targeting effects, killing ability, and persistence in clinical trials. There has been a breakthrough in the treatment of hematological tumors, which is currently being applied to tumor treatment.

Traditional tumor treatment methods, such as surgical resection, radiotherapy and chemotherapy, small molecular targeted drugs, and stem cell transplantation, can easily stimulate gene mutation in tumor cells, produce drug resistance, or cause postoperative rejection. CAR-T therapy is more accurate, more flexible, and more lasting, which can overcome the immune escape of tumor cells, expand the scope of tumor original target, and also has long-term immune memory function.

Two CAR-T Products Launched a New Era

In 2017, Novartis's Kymriah (Tisagenlecleucel, CTL019) and Kite Pharma's Yescarta (axicabtagene ciloleucel, KTE-C19) were successively approved by the FDA. Kymriah is the world's first approved CAR-T treatment product for treatment acute lymphoblastic leukemia patients from 3-25 years old and adult patients with relapsed or refractory diffuse large B-cell lymphoma (DLBCL) has opened a new chapter in

immunotherapy for malignant hematological neoplasms and is of landmark significance. Yescarta is the world's second approved CAR T roduct for the treatment of adult relapsed or refractory B-cell lymphoma and is also the first to treat non-Hodgkin's lymphoma.

Kymriah and Yescarta are the second-generation CAR-T products targeting CA19 protein in B-cell leukemia and lymphoma. Their high stability and mature technology make Kymriah and Yescarta the current mainstream technologies. Some patients with Kymriah and Yescarta have severe symptoms of cytokine release syndrome and neurotoxicity, so the labeling of both products are tagged with CRS and a black box warning of neurotoxicity. The two will continue to study to find out the better plan for side effects. In the future, as the new structure is promoted and improved in clinical trials, there will be even better the third of the fourth generation for CAR-T products.

CAR-T Global Market Is Expected to Exceed $1.1 billion

The National Health Insurance Agency of the United States has formulated a reimbursement program for the high treatment costs of the two products. Since April of this year, Kymriah and Yescarta have reimbursed $50, 000 and $39,500 for dialysis patients aged 65 or older and young people with disabilities respectively. The patient had to pay $79,000 at his own expense. However, CAR T service may bring about life-threatening side-effects. Therefore, the patient needs to be hospitalized and the hospitalization cost is between US$100-1.5 million. However, the hospitalization reimbursement scheme has not yet been introduced.

According to the *Nature Reviews,* the global market for malignant hematologic neoplasms is expected to exceed $20 billion by 2026, of which the CAR-T market is expected to exceed US$1.1 billion. Children and young adults with acute lymphoblastic leukemia and diffuse large B-cell lymph tumor will occupy 44% and 46% market share, respectively. CAR-T will also occupy a small amount of market share in other hematological tumors, chronic lymphocytic leukemia, follicular lymphoma, mantle cell tumors, and multiple myeloma.

CAR-T therapeutic indications are expected to expand to other hematological tumors and solid tumors. Other hematological tumors currently undergoing clinical trials include follicular lymphoma, mantle cell tumors, chronic lymphocytic leukemia, multiple myeloma, etc. are expected to be approved in 1-3 years. Although CAR-T is slow in the treatment of solid tumors, it is expected to become the main therapeutic field in the future.

Clinical trials of CAR-T therapies are rapidly increasing worldwide. CAR-T, as a newly listed excellent therapeutic drug, is expected to be widely promoted and included in the scope of health insurance payments to benefit more cancer patients.

Author Bio
As a global company, Creative Biolabs has more than 200 talented and well-trained scientists located in different continents working closely with partners from the entire world to develop and produce medicines of tomorrow. Specifically, we are the established leading expert in TCR and CAR T&NK cell immune therapy

development, as we offer the one-stop custom services that cover the entire new drug development pipeline. Additionally, we also offer an exclusive line of ready-to-use TCR and CAR T&NK cell construction products, such as virus packaging, purification, expansion and titer determination kits. Furthermore, we have built up a unique unparalleled CAR construction and production platform for all four CAR generations.