

# Developing Infrastructure

## Managing patients with cancer undergoing CAR T-cell therapy

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**BACKGROUND:** The introduction of chimeric antigen receptor (CAR) T-cell therapy has created challenges and opportunities for nurses. Clinical nurses must be educated on new treatment modalities to recognize toxicity symptoms and to support the therapy moving forward.

**OBJECTIVES:** This article will discuss nursing leadership and interventions to standardize care and ensure patient safety while receiving CAR T cells.

**METHODS:** Using evolving experience, an inter-professional team created standards of care and identified common toxicities and best practices for their management. Electronic documentation forms were designed, which led to the development of a new research infrastructure to care for patients.

**FINDINGS:** The ability to safely manage patients on CAR T-cell treatments has improved. The new infrastructure supported clinicians and scientists in transforming the outcomes of diseases with bleak prognoses, which is possible only with strong nursing leadership.

### KEYWORDS

chimeric antigen receptor; CAR T cell; cytokine release syndrome; clinical research

### DIGITAL OBJECT IDENTIFIER

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**HISTORICALLY, WHEN DISCUSSING TREATMENT FOR CANCER,** healthcare professionals considered chemotherapy, surgery, or radiation; however, immunotherapy has emerged as a new treatment option. Some of the earliest immunotherapies were monoclonal antibodies, designed to mimic the human immune response to treat cancer (American Cancer Society [ACS], 2016). Today, one rapidly expanding immunotherapy treatment is adoptive cellular therapy (ACT), using a patient's T cells to combat his or her disease (ACS, 2016).

ACT involves collecting a patient's T cells through leukapheresis, in which white blood cells are filtered out from whole blood and the rest of the blood is returned to the patient. Then, the patient's T cells are taken to a laboratory, where a new gene is introduced into the cells using an engineered viral vector. Unlike normal viruses, viral vectors are modified so they cannot replicate; instead, they are used to efficiently transfer genetic cargo into a patient's cells. The gene introduced in ACT is the chimeric antigen receptor (CAR), which is carried by the vector and directs T cells to attack specific cancers (Abken, 2015). A CAR T cell produces a specific receptor on its surface to target a desired tumor marker.

In the inpatient hematology unit at a National Cancer Institute–designated cancer center, Memorial Sloan Kettering Cancer Center, healthcare professionals had a sense of urgency to find new treatment options for patients with relapsed or refractory B-cell malignancies because traditional therapies had been proven to have limited effect on survival. Research revealed that cluster of differentiation 19 (CD19), a protein found on the surface of most B cells, was a viable target for CAR T cells (Davila, Kloss, Gunset, & Sadelain, 2013). In the laboratory, CAR T cells directed against CD19 could efficiently recognize and kill B-cell targets in mice with B-acute lymphocytic leukemia (ALL), curing them. The results of these studies also suggested that CAR T cells can not only eradicate tumor cells but enhance long-term tumor stabilization (Davila et al., 2013). These findings showed promise for inducing remission in patients with relapsed or refractory CD19-positive B-cell malignancies. However, safely transitioning CAR T-cell treatments from the laboratory to the patient has required significant collaboration and innovation among principal investigators (PIs), clinical nurses, nursing leadership, and hospital administration.