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 interprofessional 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

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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.