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Smart Cells, Smarter Trials: How CAR-T Cell Therapy and Digital Health Are Changing Cancer Care

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What You Will Learn:

- Why CAR-T therapy is a game-changer in cancer care
- How digital tools (like patient-reported outcomes and real-time symptom diaries) make cancer trials safer and more equitable
- How patient voices are reshaping standards
- What the future holds for cell-based therapies

Imagining the Future, Now

Picture a patient with relapsed lymphoma who, after exhausting all standard therapies, receives CAR-T cell therapy. Within weeks, their scans show no evidence of disease.

While not every story is this dramatic, it captures the transformative promise of CAR-T, a frontier where cellular biology and digital innovation converge to change cancer care.

As of 2025, seven CAR-T therapies have FDA approval for various blood cancers. Our platforms supported clinical development for three of these therapies with advanced randomization, supply management, and digital assessments, meaning 42% of currently approved CAR-Ts worldwide benefitted from our digital solutions.

With 1,200+ CAR-T candidates in the global pipeline and emerging applications in solid tumors and autoimmune diseases, the field is at a true inflection point.

CAR-T Cell Therapy: Reprogramming the Immune System

CAR-T therapy is a revolutionary form of “living medicine.” Doctors collect a patient’s own immune cells (T cells), then genetically re-engineer them to express specialized chimeric antigen receptors (CARs) that enable the cells to target and destroy cancer.

What does "CAR-T" mean?

CAR-T stands for Chimeric Antigen Receptor T-cell therapy

- **Chimeric**: The receptor’s design is “chimeric”, fusing different protein elements for optimal targeting and activation.
- **T cells**: Patient’s own immune cells doing the work after being enhanced.
- **In short**: CAR-T therapy “reprograms” the immune system for more precise cancer elimination.

How does CAR-T therapy work?

1. **Leukapheresis**: Patient's T cells are collected from blood
2. **Genetic Engineering**: These T cells are modified in the lab to express a synthetic CAR that directs them to recognize specific cancer targets

   Most common CAR-T Antigen Targets:

   - **CD19**: Present on most B-cell leukemias and lymphomas; target for many approved blood cancer CAR-T therapies
   - **BCMA(B-cell Maturation Antigen)**: Highly expressed on multiple myeloma cells; targeted by myeloma-specific CAR-Ts
   - **CLDN18.2 (Claudin 18.2)**: Found on some solid tumors, like gastric and pancreatic cancer; focus on emerging experimental CAR-T treatments
3. **Expansion**: The engineered T cells are multiplied to reach an effective dose
4. **Infusion**: The CAR-T cells are infused back into the patient to seek out and attack cancer cells carrying the matching antigen

Every step, from collecting and modifying cells to delivering treatment and tracking results, is managed with digital platforms that monitor cell processing, treatment progress, and patient reporting.

Unmatched Clinical Impact

- **Complete Remission**: Up to 62% of patients with relapsed or treatment-resistant blood cancers have all signs of cancer disappear after just one month of CAR-T, compared to less than 10-20% achieving remission before CAR-T existed.
- **Remission across specific treatment-resistant blood cancers**:
  - **DLBCL (a common aggressive lymphoma)**: Median event-free survival with CAR-T is 7–12 months, and overall survival can reach up to 20 months for older adults. Previously, similar patients often lived just 4–6 months with standard therapies.
  - **Multiple myeloma**: Patients are reporting longer-lasting remissions and meaningful gains in daily quality of life. Before CAR-T therapy, remissions after standard therapies lasted just 3-4 months and deep responses were rare. CAR-T now delivers progression-free survival of 8-18 months or more and complete responses rates as high as 80% (Cilta-cel pivotal trial CARTITUDE-1 CR rate: 83%).

Key Terms At-a-Glance

- **Complete Remission**: No detectable cancer after treatment. This is a primary goal of therapy, not always a cure, but a major clinical achievement.
- **Event-Free Survival:** How long a patient remains free of cancer progression or relapse following treatment.
- **Overall Survival**: The length of time patients live after beginning therapy.
- **Multiple Myeloma**: A cancer of plasma cells in the bone marrow, often difficult to cure once relapsed.
- **DLBCL (Diffuse Large B-Cell Lymphoma)**: A fast-growing, common type of non-Hodgkin lymphoma, typically agressive, but potentially curable.

Making CAR-T Safer: The Digital Shield

While CAR-T therapy delivers impressive results, it still carries important risks, such as potentially serious immune reactions and effects on the nervous system.

Fortunately, recent advances in patient monitoring are helping to better manage these side effects, including:

- Patient monitoring tools, like digital diaries and electronic patient-reported outcomes (PROs), allow patients and care teams to spot problems early and respond quickly.
- With more frequent symptom tracking and experienced care teams, the risk of severe side effects can be reduced to less than 1% in top centers.

Thanks to closer patient monitoring, CAR-T cell therapy can be safer than ever for those who need it most.

Digital Health: Fueling Tomorrow's CAR-T Trials

CAR-T trials are uniquely complex, requiring long-term follow-up, supply chain management, and sensitive safety monitoring.

- **Signant's RTSM and eCOA platforms** orchestrate trials end-to-end: from onboarding and global logistics to high-frequency patient-reported outcome (PRO) tracking.
- **Wearables and apps** enable continual, real-world symptom monitoring and immediate clinical response.

Maximizing the Patient Voice (PROs) in CAR-T Care

Why PROs matter:
Patient-reported outcomes (PROs) give essential insights into symptoms, daily functioning, and quality of life, often uncovering issues that standard clinical metrics overlook.

How our digital solutions support PRO excellence:

- Drive frequent symptom tracking: High-frequency electronic diaries capture and flag acute side effects as they happen, empowering rapid action in critical early phases of CAR-T care.
- Automate validated surveys: Scheduled delivery of leading PRO questionnaires (PROMIS CAT, EORTS QLQ-C30, EQ-5D, NeuroQOL) keeps data glowing and precisely tracks patient fatigue, mood, and function.
- Streamline patient engagement: Reminders and easy-access portals encourage consistent reporting and patient participation, improving data completeness and patient experience.
- Enable confident regulatory reporting: Real-time symptoms and adverse event data are managed to meet global standards, supporting timely submission and safety oversight for sponsors and sites.

These capabilities ensure that patient data is accurate, timely, and actionable, empowering sponsors and sites to respond rapidly and meet both scientific and reporting requirements.

Phase	PRO Focus / Domains	Recommended Tools	Impact
Pre-infusion	Baseline symptoms, HRQoL, SOGI, fatigue	EQ-5D, PROMIS CAT, EORTC QLQ-C30	Risk stratification, equity, expectation-setting
Acute (0-30 days)	CRS, neurotoxicity, pain, function	eDiary, PRO-CTCAE, PROMIS Fatigue	Early toxicity detection, fast intervention
Recovery (1-12 months)	Fatigue, cognitive/physical recovery	PROMIS CAT, NeuroQOL, EORTC QLQ-C30	Rehab planning, monitor persistent effects
Long-term (>12 months)	Cognition, vocational, emotional, SOGI	PROMIS CAT, NeuroQOL, WPAI, SOGI	Late effects surveillance, equity, policy input

Acronyms: EQ-5D = EuroQol 5 Dimensions; EORTC QLQ-C30 = European Organisation for Research and Treatment of Cancer, Quality of Life Questionnaire, 30 items; HRQoL = Health-Related Quality of Life; PROMIS CAT = Patient-Reported Outcomes Measurement Information System, Computer Adaptive Test; SOGI = Sexual Orientation & Gender Identity; NeuroQOL: Quality of Life in Neurological Disorders.WPAI = Work Productivity and Activity Impairment.

Elevating the Patient Voice

- PROs drive clinical decisions, enable real-time intervention, and empower patients in their own care.
- PRO endpoints are now recognized by regulators and payers, strengthening the case for CAR-T value and survivorship programming.

Cognitive Innovation: The Signant CDR System

Cancer-related Cognitive Impairment (CRCI), or "chemo brain," is a common experience for many cancer survivors. For those receiving CAR-T, this risk rises even further: CAR-T can trigger effects on nervous system with symptoms ranging from confusion to longer-term deficits.

Systematic cognitive monitoring is therefore essential, not just for cancer patients in general, but especially for CAR-T recipients. Signant SmartSignals® Cognitive Drug Research (CDR) System enables rapid, multilingual assessments to proactively identify and manage both general CRCI and CAR-T–related neurotoxicity, a standard now embedded in modern trials and survivorship care.

Learn more about leveraging computerized cognitive assessments for understanding the impact of CRCI

CAR-T Beyond Oncology

CAR-T therapies are now being explored for conditions beyond cancer, like autoimmune and nervous system diseases, while researchers find safer ways to monitor and manage side effects. This rapid progress shows growing confidence in the benefits of these advanced cell treatments.

The Road Ahead: Collaboration for a Cure

CAR-T is transforming not only cancer outcomes but the entire care journey, from cell to clinic to lifelong well-being. Bringing together digital health, real-world PROs, and systematic cognitive assessment is key to smarter, safer, and more equitable care.

Signant Health is proud to enable these breakthroughs, unlocking CAR-T's full promise for every patient, everywhere.

Want to elevate your CAR-T program?
Let's achieve better science, together with digital, patient-centered care.

CONTACT US

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Dr. Figueroa is a Clinical Scientist with the eCOA Science Team at Signant Health, where she leverages her extensive expertise in electronic Clinical Outcome Assessments (eCOA) across diverse therapeutic areas, including oncology, dermatology, and infectious diseases. With over a decade of translational research experience, Dr. Figueroa is dedicated to advancing the field of clinical trials and improving patient outcomes through innovative methodologies and strategic insights. Her work at Signant Health focuses on integrating cutting-edge eCOA technologies to enhance the accuracy and reliability of clinical data, ultimately contributing to more effectice and patient-centric healthcare solutions.

Todd Everhart, MD, FACP is the internal medicine leader at Signant. Dr. Everhart is board-certified in internal medicine and a fellow of the American College of Physicians with over 23 years of experience in the practice of medicine and over 12 years of experience in clinical development. Prior to joining Signant, Dr. Everhart held positions of Vice President, Medical Affairs and Vice President, Medical Informatics at Chilltern and Covance, and consulted independently in the areas of medical monitoring, medical data review, data analytics, and physician adoption of technology. He has worked in all phases of clinical development in numerous therapeutic areas including allergy & immunology, cardiovascular, hematology & oncology, infectious disease & HIV, neurology, ophthalmology, psychiatry, respiratory, and rheumatology.