KACTUS Publishes Framework for 2+1 and Trispecific TCE Scaffold Design

April 23, 2026

WALTHAM, MA - April 23, 2026 -
KACTUS has published a technical framework for engineering 2+1 and trispecific T-cell engager therapeutics, addressing structural scaffold challenges for drug discovery teams advancing beyond conventional bispecific formats.

KACTUS, a leading recombinant protein manufacturer, has published a technical framework for engineering 2+1 and trispecific T-cell engager (TCE) therapeutics. This new resource addresses critical structural scaffold challenges faced by drug discovery teams as they move beyond conventional bispecific formats in immuno-oncology research.

The framework draws on the company's portfolio of CD3 Proteins, the molecular anchors used to recruit T-cells in most TCE therapeutic designs, and addresses one of the more technically demanding transitions in modern immuno-oncology research: building functional constructs that engage three or more distinct molecular targets without compromising structural integrity or T-cell activation.

T-cell engagers are a class of engineered antibody molecules that bring cytotoxic T-cells into proximity with target cancer cells by simultaneously binding to CD3 on the T-cell surface and to one or more antigens expressed on tumor cells.

Conventional bispecific TCEs rely on two binding domains to make this connection. The 2+1 and trispecific formats extend that architecture by introducing a third specificity, most commonly a second tumor antigen target, a design strategy intended to narrow tumor selectivity and reduce the off-target T-cell activation that has historically limited the therapeutic window of early TCE compounds.

More information is available here: https://kactusbio.com/pages/cd3-proteins

CD3 proteins for TCR signaling are particularly sensitive variables in this engineering context. The CD3 complex includes four distinct subunits, epsilon, delta, gamma, and zeta, each contributing to the assembly and signaling function of the T-cell receptor at the cell surface. How a TCE molecule physically engages these subunits determines the threshold and selectivity of T-cell activation in response to antigen encounter. Research teams developing multispecific constructs rely on well-characterized CD3 reagents to evaluate how different scaffold geometries affect receptor clustering and downstream signaling before advancing candidates into preclinical models.

KACTUS supports these research workflows through its portfolio of CD3 Proteins in monomer, dimer, and complex-form configurations, produced through the company's SAMS (Structure Aided Multiplex Screening) technology platform. The platform is designed to yield correctly folded, bioactive versions of proteins that are structurally difficult to express in standard recombinant systems, including membrane-associated immune receptors such as CD3. The company's catalog of more than 3,000 proteins is used by biopharma development teams and academic research groups across North America, Europe, and Asia.

The commercial momentum behind TCE development is accelerating. According to DataM Intelligence, the global bispecific T-cell engager market reached $2.1 billion in 2024 and is projected to expand at a compound annual growth rate of 25.1 percent through 2033, driven by a pipeline of more than 200 clinical-stage bispecific and multispecific antibody candidates across hematologic malignancies and solid tumor indications.

Several TCE therapies have received regulatory approval from the U.S. Food and Drug Administration in recent years, increasing demand for validated structural benchmarks and well-characterized reagents at the discovery and optimization stages of drug development.

As the industry moves toward more complex 2+1 and trispecific architectures, the quality of the underlying

protein reagents becomes the defining factor for success," said Vincent Wu, spokesperson for KACTUS. "Our goal is to provide researchers with CD3 proteins that mimic native receptor behavior, allowing them to address scaffold design risks much earlier in the development cycle.

KACTUS operates within a research supply ecosystem that connects protein engineering companies with therapeutic development programs at institutions ranging from specialized oncology centers to large integrated pharmaceutical organizations.

The company distributes its recombinant protein catalog through established channels across the United States, with additional distribution partnerships in Europe and the Asia-Pacific region. KACTUS's technical documentation is designed for researchers at both discovery-stage biotechnology firms and established biopharmaceutical developers focused on immuno-oncology pipeline expansion.

About KACTUS

KACTUS is a recombinant protein manufacturer based in Waltham, Massachusetts, providing life science researchers and biopharmaceutical developers with validated proteins for antibody development, T-cell engager engineering, and immunological research. More information is available at https://kactusbio.com.

###

For more information about KACTUS, contact the company here:KACTUSVincent Wu1 (617) 665-7333support@kactusbio.us60 Hickory Drive, Waltham, MA 02451, United States

KACTUS

Website: https://kactusbio.com/

Email: support@kactusbio.us

Phone: 1 (617) 665-7333