TROY TECHNICAL

CELL CULTURE TECHNOLOGY

WEEKLY REPORT

November 8 - November 14, 2026 | Issue 2026-W45

Cell quality, process control, scale-up and release evidence

12	10
ANALYZED ARTICLES	PRIORITY THEMES

Issued 2026-11-14 | English edition | fixed approved cover artwork



Cell Culture Technology: the boundary moved from isolated claims to qualification evidence

12 English articles were reviewed independently from the Japanese edition. Ten themes are retained for management decisions.

SIGNAL 01 | CELL LINE

Hair Regeneration Therapy: Junji Fukuda's Multi-Layer Culture Method

Professor Junji Fukuda of Yokohama National University has developed a "multi-layer culture" technique to mass-produce hair papilla cells while maintaining their hair-inducing functions.

SIGNAL 02 | MEDIA & MATERIALS

Spinacia oleracea L. extracts: Serum reduction for cultured meat

Phytoecdysteroid-containing extracts from Spinacia oleracea L. can reduce animal-derived serum requirements by approximately 50% in muscle cell cultures.

SIGNAL 03 | BIOPROCESS

CAR T-cell Cryopreservation: EBMT Technical Recommendations 2026

The European Society for Blood and Marrow Transplantation (EBMT) has established consensus recommendations to standardize the cryopreservation of academic CAR T-cell products.

SIGNAL 04 | ANALYTICS & RELEASE

CHO-C Cell Lines: Acetate Accumulation in Bispecific Antibody Production

Researchers found that acetate accumulation, rather than lactate, drives late-stage acidification in CHO-C cells producing PD-1/VEGF bispecific antibodies.

DECISION

Focus this week's management attention on cell quality, process control, scale-up and release evidence. Move only when the linked evidence can be reproduced under your own operating conditions.

THREE MANAGEMENT MOVES

1. Buyers: define critical quality attributes and comparability before changing media, vessels or automation.
2. Suppliers: link media, sensors and equipment to yield, phenotype, contamination control and traceability.
3. Executives: track scale effects, variability, sterility, analytics, cost and regulatory comparability.

EVIDENCE DISCIPLINE

FACT states what the collected English source reports. BUSINESS READ and ACTION are editorial interpretations. UNKNOWN lists information that the source file does not establish. A linked article is not treated as independent confirmation of every claim.

Numbers and evidence anchors that require conditions

50%
A04

SOURCE-BOUND CONDITION
can reduce animal-derived serum requirements by approximately 50% in muscle cell cultures.

1.80 g
A10

SOURCE-BOUND CONDITION
Acetate levels reaching 1.75 to 1.80 grams per liter arrested protein synthesis and increased acidic charge variants by 16.2 percent.

100%
A08

SOURCE-BOUND CONDITION
The modification increased cell-bearing carrageenan microcarriers to 100% for bovine and porcine cells, expanding the material options for cultivated meat production.

HOW TO USE THESE NUMBERS
Each value is shown with the condition stated in the collected English article. Do not compare values across different test methods, device sizes, operating temperatures or commercial stages without normalizing those conditions.

Where the value chain moved

Each stage combines one leading theme and one supporting theme. The report treats handoffs as evidence transfers, not decorative arrows.

1

Cell line

P01/P06

Professor Junji Fukuda of Yokohama National University has developed a " multi-layer culture" technique to mass-produce hair.

2

Media & materials

P02/P07

Phytoecdysteroid-containing extracts from Spinacia oleracea L.

3

Bioprocess

P03/P08

The European Society for Blood and Marrow Transplantation (EBMT) has established consensus recommendations to standardize the.

4

Analytics & release

P04/P09

Researchers found that acetate accumulation, rather than lactate, drives late-stage acidification in CHO-C cells producing.

5

Manufacturing scale

P05/P10

Single-cell RNA sequencing (scRNA-seq) of Cytokine-Induced Killer (CIK) cells from five metastatic colorectal cancer (mCRC).

EVIDENCE REQUIRED AT EACH HANDOFF

Cell line to Media & materials	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck scale effects, variability, sterility, analytics, cost and regulatory comparability.
Media & materials to Bioprocess	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck scale effects, variability, sterility, analytics, cost and regulatory comparability.
Bioprocess to Analytics & release	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck scale effects, variability, sterility, analytics, cost and regulatory comparability.
Analytics & release to Manufacturing scale	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck scale effects, variability, sterility, analytics, cost and regulatory comparability.

COMMON CONTROL POINT

No theme moves to a commercial commitment until a named owner has reproduced the relevant evidence and documented scale effects, variability, sterility, analytics, cost and regulatory comparability.

Priority map: maturity and next decision locus



P01	Hair Regeneration Therapy: Junji Fukuda's Multi-Layer Culture Method System / adoption | cue: clinical
P02	Spinacia oleracea L. extracts: Serum reduction for cultured meat Tech / process | cue: no system/business cue
P03	CAR T-cell Cryopreservation: EBMT Technical Recommendations 2026 Business / rules | cue: standardize
P04	CHO-C Cell Lines: Acetate Accumulation in Bispecific Antibody Production Tech / process | cue: no system/business cue
P05	CIK Cell Atlas: scRNA-seq Analysis of mCRC Patient Products Tech / process | cue: no system/business cue
P06	Anti-CD22 CAR T-cells: Functional characterization of 24A7G6 and 29H9C8 clones Tech / process | cue: no system/business cue
P07	Spleen Transplantation: Human Stem Cell-Derived Cell Feasibility in OIDP Pigs System / adoption | cue: operational
P08	Edible Microcarriers: PLL/TA Surface Engineering for Cultivated Meat Tech / process | cue: no system/business cue
P09	CD22 CAR T-Cell Therapy: Multi-omics VCN and Protein Analysis System / adoption | cue: platform
P10	MC-GelMA Hydrogel: Biomimetic Platform for Lung Cancer Organoids System / adoption | cue: Platform

REPRODUCIBLE POSITIONING RULE

Horizontal position uses five discrete stages: Research, Prototype, Joint evaluation, Product adoption and Scale. The vertical bands classify the next decision locus: Tech / process, System / adoption, or Business / rules (including supply systems). Article-title cues take precedence; the overview is used only when the title is silent. These are categories, not impact ranks. Bubble diameter reflects the editorial score.

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P01 Hair Regeneration Therapy: Junji Fukuda's Multi-Layer Culture Method

A11 | Cell line | Joint evaluation

2026-11-11

FACT

Professor Junji Fukuda of Yokohama National University has developed a "multi-layer culture" technique to mass-produce hair papilla cells while maintaining their hair-inducing functions. By collaborating with Rohto Pharmaceutical on animal-free media, the team is preparing clinical trials for autologous transplantation to treat alopecia.

WHY IT MATTERS

The decision relevance is cell quality, process control, scale-up and release evidence. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link media, sensors and equipment to yield, phenotype, contamination control and traceability.

ACTION

Within 30 days, define critical quality attributes and comparability before changing media, vessels or automation; record the evidence and owner against P01.

UNKNOWN

Still unproven or incompletely stated: scale effects, variability, sterility, analytics, cost and regulatory comparability.

EDITORIAL SCORE 21/25 | MATURITY 3/5 | DECISION LOCUS: SYSTEM / ADOPTION

P02 Spinacia oleracea L. extracts: Serum reduction for cultured meat

A04 | Media & materials | Product adoption

2026-11-13

FACT

Phytoecdysteroid-containing extracts from Spinacia oleracea L. can reduce animal-derived serum requirements by approximately 50% in muscle cell cultures. The study demonstrates that these extracts support proliferation and myogenic differentiation in both C2C12 and bovine myosatellite cells. This provides a potential pathway to lower costs and reduce reliance on animal-origin supplements in cultured meat production.

WHY IT MATTERS

The decision relevance is cell quality, process control, scale-up and release evidence. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link media, sensors and equipment to yield, phenotype, contamination control and traceability.

ACTION

Within 30 days, define critical quality attributes and comparability before changing media, vessels or automation; record the evidence and owner against P02.

UNKNOWN

Still unproven or incompletely stated: scale effects, variability, sterility, analytics, cost and regulatory comparability.

EDITORIAL SCORE 20/25 | MATURITY 4/5 | DECISION LOCUS: TECH / PROCESS

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P03 CAR T-cell Cryopreservation: EBMT Technical Recommendations 2026

A01 | Bioprocess | Product adoption

2026-11-09

FACT

The European Society for Blood and Marrow Transplantation (EBMT) has established consensus recommendations to standardize the cryopreservation of academic CAR T-cell products. These guidelines address wide variability in freezing timing and storage temperatures to ensure product comparability across manufacturing centers.

WHY IT MATTERS

The decision relevance is cell quality, process control, scale-up and release evidence. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link media, sensors and equipment to yield, phenotype, contamination control and traceability.

ACTION

Within 30 days, define critical quality attributes and comparability before changing media, vessels or automation; record the evidence and owner against P03.

UNKNOWN

Still unproven or incompletely stated: scale effects, variability, sterility, analytics, cost and regulatory comparability.

EDITORIAL SCORE 20/25 | MATURITY 4/5 | DECISION LOCUS: BUSINESS / RULES

P04 CHO-C Cell Lines: Acetate Accumulation in Bispecific Antibody Production

A10 | Analytics & release | Product adoption

2026-11-14

FACT

Researchers found that acetate accumulation, rather than lactate, drives late-stage acidification in CHO-C cells producing PD-1/VEGF bispecific antibodies. Acetate levels reaching 1.75 to 1.80 grams per liter arrested protein synthesis and increased acidic charge variants by 16.2 percent. This discovery identifies a critical metabolic imbalance that compromises the integrity and yield of complex recombinant proteins.

WHY IT MATTERS

The decision relevance is cell quality, process control, scale-up and release evidence. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link media, sensors and equipment to yield, phenotype, contamination control and traceability.

ACTION

Within 30 days, define critical quality attributes and comparability before changing media, vessels or automation; record the evidence and owner against P04.

UNKNOWN

Still unproven or incompletely stated: scale effects, variability, sterility, analytics, cost and regulatory comparability.

EDITORIAL SCORE 19/25 | MATURITY 4/5 | DECISION LOCUS: TECH / PROCESS

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P05 CIK Cell Atlas: scRNA-seq Analysis of mCRC Patient Products

A05 | Manufacturing scale | Product adoption

Prior release 2026-11-06

FACT

Single-cell RNA sequencing (scRNA-seq) of Cytokine-Induced Killer (CIK) cells from five metastatic colorectal cancer (mCRC) patients reveals a complex cellular landscape dominated by cytotoxic CD8+ T cells. The study identifies seven major cell populations and ten distinct CD8+ T cell clusters, providing a transcriptional map of the heterogeneity within these therapeutic cell products.

WHY IT MATTERS

The decision relevance is cell quality, process control, scale-up and release evidence. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link media, sensors and equipment to yield, phenotype, contamination control and traceability.

ACTION

Within 30 days, define critical quality attributes and comparability before changing media, vessels or automation; record the evidence and owner against P05.

UNKNOWN

Still unproven or incompletely stated: scale effects, variability, sterility, analytics, cost and regulatory comparability.

EDITORIAL SCORE 19/25 | MATURITY 4/5 | DECISION LOCUS: TECH / PROCESS

P06 Anti-CD22 CAR T-cells: Functional characterization of 24A7G6 and 29H9C8 clones

A02 | Cell line | Pilot

2026-11-12

FACT

Researchers developed novel anti-CD22 CAR T-cells using monoclonal antibody clones 24A7G6 and 29H9C8 to address CD19-negative relapse in B-cell malignancies. In vitro tests showed that the 24A7G6-CD28 construct provided enhanced sustained tumor control compared to 4-1BB versions. These findings establish a basis for prioritizing lead constructs for further preclinical evaluation.

WHY IT MATTERS

The decision relevance is cell quality, process control, scale-up and release evidence. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link media, sensors and equipment to yield, phenotype, contamination control and traceability.

ACTION

Within 30 days, define critical quality attributes and comparability before changing media, vessels or automation; record the evidence and owner against P06.

UNKNOWN

Still unproven or incompletely stated: scale effects, variability, sterility, analytics, cost and regulatory comparability.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P07 Spleen Transplantation: Human Stem Cell-Derived Cell Feasibility in OIDP Pigs

A06 | Media & materials | Pilot

Prior release 2026-11-06

FACT

Researchers demonstrated that the spleen can serve as an ectopic transplantation site for human iPSC-derived hepatocyte-like cells and iTPC-derived islets using an operational immunodeficient pig (OIDP) model. The study confirmed the detection of human albumin and C-peptide in pig serum, suggesting the spleen's viability as a clinically relevant alternative to the liver.

WHY IT MATTERS

The decision relevance is cell quality, process control, scale-up and release evidence. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link media, sensors and equipment to yield, phenotype, contamination control and traceability.

ACTION

Within 30 days, define critical quality attributes and comparability before changing media, vessels or automation; record the evidence and owner against P07.

UNKNOWN

Still unproven or incompletely stated: scale effects, variability, sterility, analytics, cost and regulatory comparability.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

P08 Edible Microcarriers: PLL/TA Surface Engineering for Cultivated Meat

A08 | Bioprocess | Product adoption

2026-11-10

FACT

Researchers developed a decoupled surface-engineering strategy using a poly-L-lysine/tannic acid (PLL/TA) interface to enable cell adhesion on food-grade polysaccharide microcarriers. The modification increased cell-bearing carrageenan microcarriers to 100% for bovine and porcine cells, expanding the material options for cultivated meat production.

WHY IT MATTERS

The decision relevance is cell quality, process control, scale-up and release evidence. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link media, sensors and equipment to yield, phenotype, contamination control and traceability.

ACTION

Within 30 days, define critical quality attributes and comparability before changing media, vessels or automation; record the evidence and owner against P08.

UNKNOWN

Still unproven or incompletely stated: scale effects, variability, sterility, analytics, cost and regulatory comparability.

EDITORIAL SCORE 19/25 | MATURITY 4/5 | DECISION LOCUS: TECH / PROCESS

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P09 CD22 CAR T-Cell Therapy: Multi-omics VCN and Protein Analysis

A07 | Analytics & release | Product adoption

2026-11-13

FACT

Researchers utilized the Tapestri Single-cell DNA + protein multi-omics platform to simultaneously measure vector copy number (VCN) and surface protein markers in CD22 CAR T-cell products from five patients. The study demonstrated that amplicon-based sequencing effectively distinguishes transduced from untransduced samples, with average VCN values ranging from 0.69 to 1.24 copies per cell.

WHY IT MATTERS

The decision relevance is cell quality, process control, scale-up and release evidence. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link media, sensors and equipment to yield, phenotype, contamination control and traceability.

ACTION

Within 30 days, define critical quality attributes and comparability before changing media, vessels or automation; record the evidence and owner against P09.

UNKNOWN

Still unproven or incompletely stated: scale effects, variability, sterility, analytics, cost and regulatory comparability.

EDITORIAL SCORE 19/25 | MATURITY 4/5 | DECISION LOCUS: SYSTEM / ADOPTION

P10 MC-GelMA Hydrogel: Biomimetic Platform for Lung Cancer Organoids

A03 | Manufacturing scale | Pilot

2026-11-12

FACT

Researchers developed MC-GelMA, an autologous component-integrated hydrogel that mimics native lung tumor tissue with a Young's modulus of 15.67 ± 0.86 kPa. The system enables stable lung cancer organoid (LCO) culture through passage 9 and accurately recapitulates patient-specific immunotherapy responses to anti-PD-L1.

WHY IT MATTERS

The decision relevance is cell quality, process control, scale-up and release evidence. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link media, sensors and equipment to yield, phenotype, contamination control and traceability.

ACTION

Within 30 days, define critical quality attributes and comparability before changing media, vessels or automation; record the evidence and owner against P10.

UNKNOWN

Still unproven or incompletely stated: scale effects, variability, sterility, analytics, cost and regulatory comparability.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

Playbook and 0-5 year roadmap

STAKEHOLDER	NOW | 0-30 DAYS	NEXT | 1-12 MONTHS	LATER | 1-5 YEARS
Operating companies	define critical quality attributes and comparability before changing media, vessels or automation	Run production-like qualification with explicit acceptance and stop criteria.	Build a portfolio and architecture that can absorb technology and supplier changes.
Materials, equipment and technology suppliers	link media, sensors and equipment to yield, phenotype, contamination control and traceability	Create shared reliability, process-window and failure-analysis data with customers.	Standardize interfaces, traceability, lifecycle support and recovery services.
Trading, investment and legal teams	Map scale effects, variability, sterility, analytics, cost and regulatory comparability.	Contract for capacity, quality, change notice, liability, alternatives and exit.	Diversify regional, technical and customer concentration risk.

ROADMAP

NOW | 0-30 DAYS
Evidence ledger
Owner: Strategy + quality
Deliverable: claim, source, condition, owner

NOW | 0-30 DAYS
Risk screen
Owner: Procurement + legal
Deliverable: unknowns, alternatives, stop

NEXT | 1-12 MONTHS
Joint qualification
Owner: R&D + supplier
Deliverable: process window and failure data

NEXT | 1-12 MONTHS
Commercial gate
Owner: Business + finance
Deliverable: unit economics and capacity

LATER | 1-5 YEARS
Platform strategy
Owner: Executive team
Deliverable: portfolio and interface roadmap

LATER | 1-5 YEARS
Service layer
Owner: Operations + channel
Deliverable: monitoring, maintenance and recovery

GO / NO-GO GATES

GATE	OWNER	REQUIRED EVIDENCE	NO-GO CONDITION
G1 Evidence	**Quality**	Source, test conditions and reproducibility	No traceable evidence
G2 Integration	**R&D**	Interface, process window and failure analysis	Cannot meet system conditions
G3 Commercial	**Business**	Capacity, total cost, contract and alternatives	Economics or supply cannot be supported
G4 Lifecycle	**Operations**	Monitoring, maintenance, change notice and exit	No accountable operating plan

ANALYZED ARTICLES | ITEMS 01-12

Every title and URL is displayed in full. URLs wrap without shortening and remain clickable. A verified-reference label means the translated HTML did not retain its original source URL.

ID	FULL ARTICLE TITLE	FULL SOURCE / VERIFIED REFERENCE URL - CLICKABLE
A01	CAR T-cell Cryopreservation: EBMT Technical Recommendations 2026	https://doi.org/10.1038/s41409-026-03020-x
A02	Anti-CD22 CAR T-cells: Functional characterization of 24A7G6 and 29H9C8 clones	https://doi.org/10.1371/journal.pone.0362221
A03	MC-GelMA Hydrogel: Biomimetic Platform for Lung Cancer Organoids	https://doi.org/10.1088/1758-5090/aec19a
A04	Spinacia oleracea L. extracts: Serum reduction for cultured meat	https://doi.org/10.21203/rs.3.rs-11424261/v1
A05	CIK Cell Atlas: scRNA-seq Analysis of mCRC Patient Products	https://doi.org/10.21203/rs.3.rs-11560858/v1
A06	Spleen Transplantation: Human Stem Cell-Derived Cell Feasibility in OIDP Pigs	https://doi.org/10.1097/txd.0000000000002025
A07	CD22 CAR T-Cell Therapy: Multi-omics VCN and Protein Analysis	https://doi.org/10.21203/rs.3.rs-11529336/v1
A08	Edible Microcarriers: PLL/TA Surface Engineering for Cultivated Meat	https://doi.org/10.64898/2026.11.07.765013
A09	Oncolytic Vaccinia Engineering: Synthetic Support Niche for NK Cells	https://doi.org/10.64898/2026.11.06.764990
A10	CHO-C Cell Lines: Acetate Accumulation in Bispecific Antibody Production	https://bioengineer.org/acetate-accumulation-tied-to-pyruvate-conversion-disrupts-cultured-bispecific-antibody-production/
A11	Hair Regeneration Therapy: Junji Fukuda's Multi-Layer Culture Method	https://iyakutsushinsha.com/2026/11/11/10%e6%9c%ac%e3%81%ae%e6%af%9b%e9%ab%aa%e3%81%8b%e3%82%89%e7%b4%b0%e8%83%9e%e3%82%92%e5%a4%a7%e9%87%8f%e5%9f%b9%e9%a4%8a%e3%81%97%e3%81%a6%e7%a7%bb%e6%a4%8d%e3%80%81%e3%80%8c%e6%af%9b%e9%ab%aa%e5%86%8d/
A12	ImvivaBio CTA313: Dual CD19/BCMA CAR-T Data for Lupus in 2026	https://finance.yahoo.com/healthcare/articles/imvivabio-presents-longer-term-data-130000771.html

CellCultureTechnology — Selected Articles

Date: 2026-11-15

Articles: 12

Table of Contents

#01 CAR T-cell Cryopreservation: EBMT Technical Recommendations 2026

#02 Anti-CD22 CAR T-cells: Functional characterization of 24A7G6 and 29H9C8 clones

#03 MC-GelMA Hydrogel: Biomimetic Platform for Lung Cancer Organoids

#04 Spinacia oleracea L. extracts: Serum reduction for cultured meat

#05 CIK Cell Atlas: scRNA-seq Analysis of mCRC Patient Products

#06 Spleen Transplantation: Human Stem Cell-Derived Cell Feasibility in OIDP Pigs

#07 CD22 CAR T-Cell Therapy: Multi-omics VCN and Protein Analysis

#08 Edible Microcarriers: PLL/TA Surface Engineering for Cultivated Meat

#09 Oncolytic Vaccinia Engineering: Synthetic Support Niche for NK Cells

#10 CHO-C Cell Lines: Acetate Accumulation in Bispecific Antibody Production

#11 Hair Regeneration Therapy: Junji Fukuda's Multi-Layer Culture Method

#12 ImvivaBio CTA313: Dual CD19/BCMA CAR-T Data for Lupus in 2026

#01 CAR T-cell Cryopreservation: EBMT Technical Recommendations 2026

Published November 09, 2026 Bone marrow transplantation



OVERVIEW

The European Society for Blood and Marrow Transplantation (EBMT) has established consensus recommendations to standardize the cryopreservation of academic CAR T-cell products. These guidelines address wide variability in freezing timing and storage temperatures to ensure product comparability across manufacturing centers.

IN DEPTH

Key Findings

The EBMT has issued a set of methodological recommendations to harmonize the cryopreservation of CAR T-cell products produced in academic settings. The primary goal is to reduce the heterogeneity in practices that currently threatens the comparability of these cell products.

Technical Details

The consensus recommendations specify several critical parameters for the freezing and storage process:

- **Timing:** Cryopreservation should be performed as soon as possible after manufacturing, preferably within ≤48 h. Freezing must be initiated within 30 min of adding the cryomedium.
- **Freezing Process:** Controlled-rate freezing should be used to reach at least −80 °C. Liquid nitrogen and Peltier-based controlled-rate freezing systems are considered technically equivalent.
- **Storage:** Long-term storage should be maintained below −120 °C whenever feasible.
- **Backup Methods:** Passive freezing at −80 °C may serve as a back-up method, provided that suitability is confirmed via formal method validation.
- **Mandatory Requirements:** The guidelines mandate the use of retention samples, identity testing, post-thaw viability checks, and validated transportation procedures.

Background and Context

The need for these guidelines arose from a survey of 52 academic centers, which revealed significant variability in cryomedium composition, device choice, storage temperatures, and post-thaw quality control. While cryopreservation is essential for the storage of surplus cells, treatment postponement, and later infusion, no harmonized guidelines previously existed for CAR T-cell products.

Significance and Outlook

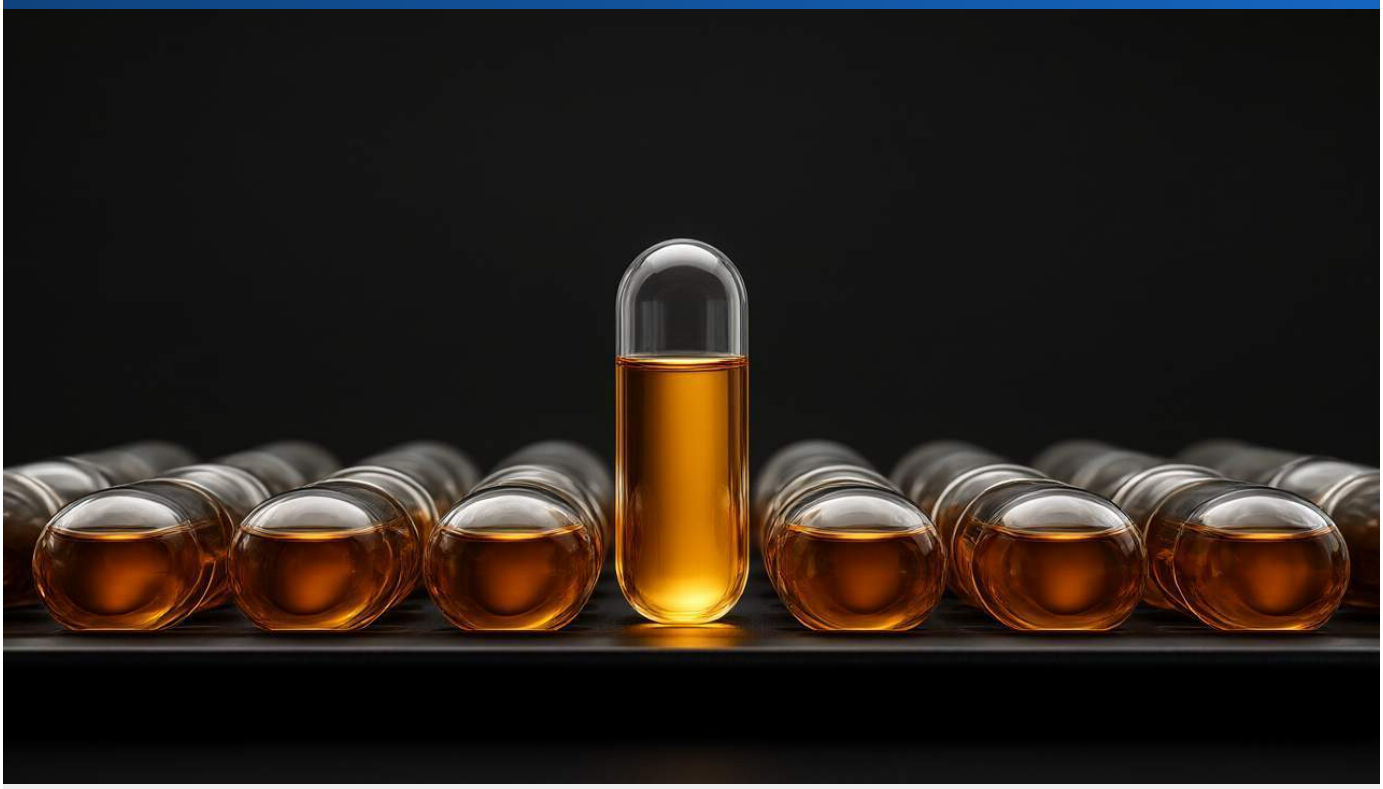
These recommendations provide a technical framework for groups currently establishing academic manufacturing of CAR-T products. By standardizing the transition from manufacturing to long-term storage, the EBMT seeks to ensure that academic CAR T-cell products maintain consistent quality and efficacy regardless of the producing center.

Source: https://doi.org/10.1038/s41409-026-03020-x

Collected: November 15, 2026 | Automated Research System (AI)

#02 Anti-CD22 CAR T-cells: Functional characterization of 24A7G6 and 29H9C8 clones

Published November 12, 2026 PloS one タイ



OVERVIEW

Researchers developed novel anti-CD22 CAR T-cells using monoclonal antibody clones 24A7G6 and 29H9C8 to address CD19-negative relapse in B-cell malignancies. In vitro tests showed that the 24A7G6-CD28 construct provided enhanced sustained tumor control compared to 4-1BB versions. These findings establish a basis for prioritizing lead constructs for further preclinical evaluation.

IN DEPTH

Key Findings

The study successfully generated and characterized novel anti-CD22 chimeric antigen receptor (CAR) T-cells derived from newly developed monoclonal antibody clones. Among four screened clones, 24A7G6 and 29H9C8 were selected for CAR development due to their favorable binding and surface expression profiles. Both clones mediated potent antigen-specific cytotoxicity against CD22-positive Raji and Nalm-6 cells, while showing no activity against CD22-negative K562 cells.

Technical Details

The researchers developed second-generation CAR constructs incorporating either a 4-1BB or CD28 costimulatory domain, which were then introduced into primary human T cells. The resulting CAR T-cells were evaluated across several metrics:

- **Phenotype:** CAR T-cells expanded efficiently and showed predominant CD8+ populations with naïve and central memory phenotypes.
- **Activation:** Following antigen stimulation, the cells upregulated activation markers and showed modest increases in inhibitory receptors.
- **Persistence:** In long-term co-culture and sequential tumor rechallenge assays, all constructs maintained antitumor activity under prolonged antigen exposure.
- **Comparative Performance:** While short-term cytotoxicity was comparable across constructs, the 24A7G6-CD28 CAR demonstrated superior sustained tumor control compared to the 24A7G6-4-1BB construct in extended assays.

Background and Context

CD19-directed CAR T-cell therapies have achieved complete remission rates exceeding 80–90% in patients with relapsed or refractory B-ALL. However, disease relapse often occurs due to "antigen escape," where tumor cells downregulate or eliminate CD19 expression through point mutations, alternative splicing, or lineage switching. CD22 is a transmembrane sialoglycoprotein of the Siglec family that remains expressed on malignant B cells even after CD19-directed therapy, making it a viable alternative target.

Significance and Outlook

By comparing distinct scFv frameworks and costimulatory domains, this research optimizes the functionality and persistence of CD22-targeted CAR T-cells. The identification of 24A7G6 and 29H9C8 as effective targeting domains provides the necessary in vitro evidence to prioritize these lead constructs for subsequent preclinical evaluation.

Source: https://doi.org/10.1371/journal.pone.0362221

Collected: November 15, 2026 | Automated Research System (AI)

#03 MC-GelMA Hydrogel: Biomimetic Platform for Lung Cancer Organoids

Published November 12, 2026 Biofabrication China



OVERVIEW

Researchers developed MC-GelMA, an autologous component-integrated hydrogel that mimics native lung tumor tissue with a Young’s modulus of 15.67 ± 0.86 kPa. The system enables stable lung cancer organoid (LCO) culture through passage 9 and accurately recapitulates patient-specific immunotherapy responses to anti-PD-L1.

IN DEPTH

Key Findings

The MC-GelMA hydrogel system demonstrated the ability to maintain lung cancer organoids (LCOs) with in vivo-like morphology, enhanced viability, and metabolic activity compared to Matrigel. The platform supported stable long-term culture through passage 9 while preserving drug sensitivity and key genomic and histological features. In co-culture experiments with PBMCs, the system successfully recapitulated anti-PD-L1 responses, where PD-L1-positive organoids showed increased LDH release, while PD-L1-negative organoids remained unresponsive.

Technical Details

The biomimetic hydrogel was constructed by integrating two patient-derived autologous components into a porous gelatin methacryloyl (GelMA) network:

- **Decellularized lung fiber fragments:** These fibers, measuring 1.25 μm in diameter and 52.5 μm in length, provided essential structural and mechanical cues.
- **Optimized autologous plasma:** Processed at 56 °C for 30 min and centrifuged at 8,000×g for 5 min (5% v/v), the plasma supplied necessary biochemical signals.

The resulting MC-GelMA exhibited a Young's modulus of 15.67 ± 0.86 kPa, closely matching the mechanical properties of native lung tumor tissue. The study compared five formulations—GelMA, GelMA+ fiber, GelMA + plasma, MC-GelMA, and Matrigel—to determine that the combination of fibers and plasma synergistically enhanced organoid growth and immune cell infiltration.

Background & Context

Traditional LCO culture relies heavily on Matrigel, which is limited by undefined composition, immunogenicity, and batch-to-batch variability. These factors often compromise experimental reproducibility and the accuracy of drug response readouts. To address this, the researchers developed a more reproducible biofabrication platform using patient-derived materials.

Significance & Outlook

This autologous component-integrated system provides a highly reproducible platform for stable LCO culture and the reliable recapitulation of patient-specific immunotherapy response patterns. The researchers note that further validation in larger cohorts is required to establish the platform's predictive potential for clinical immunotherapy outcomes.

Source: https://doi.org/10.1088/1758-5090/aec19a

Collected: November 15, 2026 | Automated Research System (AI)

#04 Spinacia oleracea L. extracts: Serum reduction for cultured meat

Published November 13, 2026 Research Square



OVERVIEW

Phytoecdysteroid-containing extracts from Spinacia oleracea L. can reduce animal-derived serum requirements by approximately 50% in muscle cell cultures. The study demonstrates that these extracts support proliferation and myogenic differentiation in both C2C12 and bovine myosatellite cells. This provides a potential pathway to lower costs and reduce reliance on animal-origin supplements in cultured meat production.

IN DEPTH

Key Findings

Research indicates that extracts from Spinacia oleracea L. can facilitate an approximately 50% reduction in animal-derived serum under the best-performing conditions tested. In C2C12 myoblasts, freeze-dried extracts containing 0.05 μM 20-hydroxyecdysone (20-HE) supported proliferation in medium with 5% fetal bovine serum (FBS) at levels comparable to or exceeding those of 10% FBS. For bovine myosatellite cells, a freeze-dried methanol extract containing 0.5 μM 20-HE combined with 10% FBS produced proliferation comparable to a 20% FBS control.

Technical Details

The study utilized extracts prepared from either fresh or freeze-dried spinach using ethanol or methanol. These extracts were characterized based on their content of 20-hydroxyecdysone (20-HE), fatty acids, and free amino acids. The researchers observed that responses were concentration-dependent and varied between the two cell models used, suggesting that serum reduction requirements are cell-model-specific. Additionally, selected spinach-derived treatments maintained myogenic differentiation under conditions where horse serum (HS) was reduced.

Background & Context

The production of cultured meat is currently constrained by several factors related to serum supplements, specifically high costs, variability, and their animal origin. To address these limitations, this study evaluated the use of phytoecdysteroid-containing plant extracts as partial replacements for horse serum (HS) and fetal bovine serum (FBS).

Significance & Outlook

While the findings do not support the complete replacement of animal-derived serums, the ability to halve the required concentration of FBS or HS represents a significant step toward more sustainable and cost-effective culture media. The differentiation in requirements between C2C12 and bovine myosatellite cells highlights the necessity for tailored medium components depending on the specific cell line used in cultured meat production.

Source: https://doi.org/10.21203/rs.3.rs-11424261/v1

Collected: November 15, 2026 | Automated Research System (AI)

#05 CIK Cell Atlas: scRNA-seq Analysis of mCRC Patient Products

Published November 06, 2026 Research Square



OVERVIEW

Single-cell RNA sequencing (scRNA-seq) of Cytokine-Induced Killer (CIK) cells from five metastatic colorectal cancer (mCRC) patients reveals a complex cellular landscape dominated by cytotoxic CD8+ T cells. The study identifies seven major cell populations and ten distinct CD8+ T cell clusters, providing a transcriptional map of the heterogeneity within these therapeutic cell products.

IN DEPTH

Key Findings

Analysis of CIK cell products generated from five treatment-naïve mCRC patients identified 17 "Global Cell Clusters" (G) across 43,047 retained cells. These were grouped into seven main cell subtypes: CD8+ T cells, CD4+ T cells, Mixed CD4/CD8+ T cells, NK cells, γ9δ2 T cells, B cells, and Cycling T cells. The results confirm that the cell product is predominantly composed of αβ T cells, with cytotoxic CD8+ T cells serving as the primary expanded population critical for tumor clearance.

Technical Details

The researchers utilized unsupervised Louvain clustering and the top 100 differentially expressed genes (DEGs) to define transcriptional identities. Specific markers used for annotation included:

- **T Cell Subtypes:** CD3E for general T cells; CD4 and CD8A for specific lineages; MKI67 and cell cycle gene signatures for Cycling T cells.
- **γ9δ2 T cells:** Identified via TRDV2 and TRGV9 expression, with enrichment for ZBTB16 (encoding PLZF) and cytotoxicity genes such as GNLY, NKG7, and FCGR3A.
- **NK and B cells:** NK cells were characterized by NCAM1 and TYROBP1; B cells by CD19 and MS4A1.

Sub-analysis of 14,973 CD8 single-positive αβ T cells revealed 10 distinct clusters. Based on NCAM1 expression, these were divided into conventional (C0, C1, C2, C4, C6, C8) and NK-like (C3, C5, C7, C9) subtypes. Conventional clusters C0 and C1 exhibited memory-associated transcriptional cores (TCF7, IL7R, LEF1), with C0 showing interferon-stimulated genes (ISG20) and C1 showing hypoxia and glycolysis programs (HILPDA, BNIP3).

Background & Context

CIK cells are generated to leverage potent cell-killing capacities against tumors. While flow cytometry has previously indicated the composition of these products, this scRNA-seq approach allows for a more granular understanding of functional states, such as the identification of "Tc2-like" subtypes (C2) characterized by high GATA3, PTGDR2, IL13, and IL4 expression.

Significance & Outlook

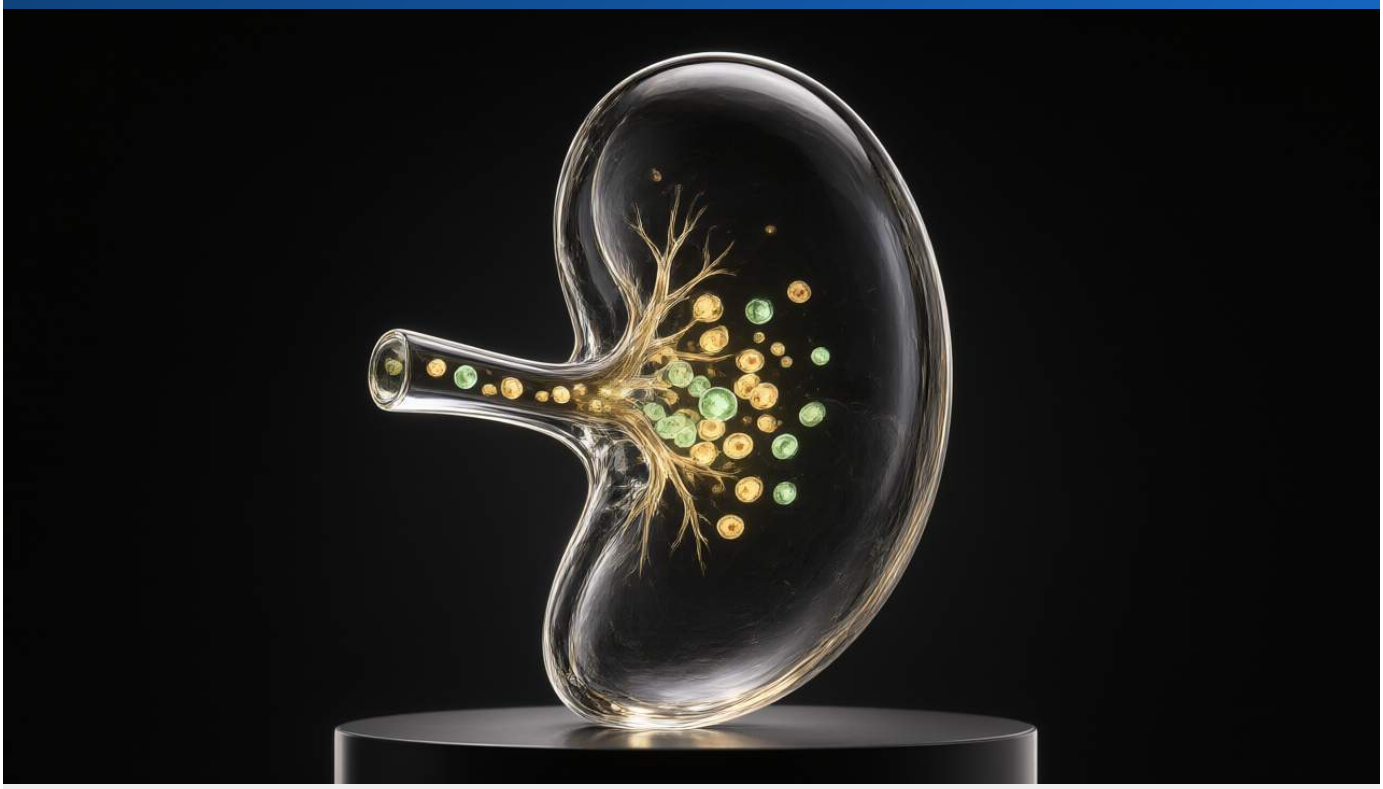
By mapping the heterogeneity of CD8+ T cells—including the distinction between ISG+ Tcm-like and Tcm-like states—this atlas provides a transcriptional baseline for evaluating the composition and potential efficacy of CIK cell therapies in mCRC patients.

Source: https://doi.org/10.21203/rs.3.rs-11560858/v1

Collected: November 15, 2026 | Automated Research System (AI)

#06 Spleen Transplantation: Human Stem Cell-Derived Cell Feasibility in OIDP Pigs

Published November 06, 2026 Transplantation direct Japan



OVERVIEW

Researchers demonstrated that the spleen can serve as an ectopic transplantation site for human iPSC-derived hepatocyte-like cells and iTPC-derived islets using an operational immunodeficient pig (OIDP) model. The study confirmed the detection of human albumin and C-peptide in pig serum, suggesting the spleen's viability as a clinically relevant alternative to the liver.

IN DEPTH

Key Findings

The study established the feasibility of intrasplenic cell transplantation via the splenic artery in an operational immunodeficient pig (OIDP) model. Following the transplantation of human-induced pluripotent stem cell-derived hepatocyte-like cells (iPSC-HLCs), human albumin was detected in pig serum 2 weeks post-transplantation. Histological analysis at 4 weeks identified cell colonies positive for human albumin and vimentin. Additionally, transplantation of quantum-dot-labeled human induced tissue progenitor cell-derived islets (iTPC-derived islets) resulted in the detection of human C-peptide in serum after a glucose tolerance test, with histological confirmation of insulin-producing cells in the spleen.

Technical Details

The OIDP model involved thymectomy and the administration of tacrolimus, mycophenolate mofetil, and prednisolone via a gastric tube. To prevent rejection without removing the organ, splenic immune cells were inactivated by perfusing mitomycin C through a temporal extracorporeal circuit that isolated the spleen from systemic circulation. This circuit allowed for preconditioning before the cells were delivered via the splenic artery and vein. The study utilized adult microminiature pigs (27- to 29-mo-old, 20–24 kg) for iPSC-HLC transplantation and domestic piglets (5-wk-old, approximately 10 kg) for iTPC-derived islet transplantation.

Background and Context

While intrahepatic transplantation (such as the Edmonton protocol) has produced favorable outcomes for pancreatic islets, researchers sought an alternative ectopic site. The spleen was selected due to its sinusoidal vascular structure, which mimics that of the liver. Unlike the liver, the spleen typically remains normal in patients with diabetes and liver diseases. Furthermore, because the spleen is not a life-supporting organ, transplanted cells can be surgically removed if tumors form.

Significance and Outlook

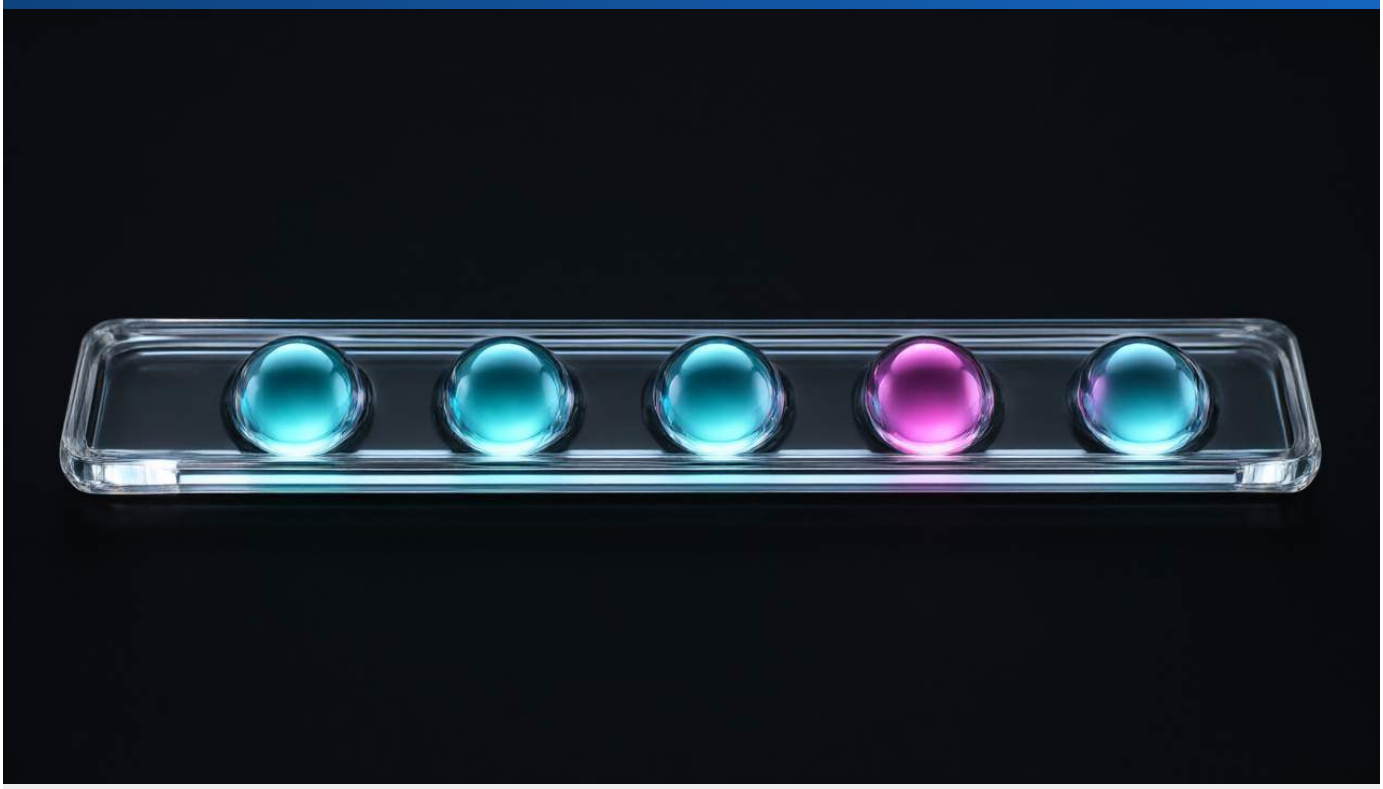
This research provides a preclinical proof-of-concept for the use of the spleen as a site for progenitor-derived cell therapy. By utilizing a vascular approach that closely mimics clinical procedures, the study suggests the spleen is a viable alternative for the transplantation of hepatocytes and islets.

Source: https://doi.org/10.1097/txd.0000000000002025

Collected: November 15, 2026 | Automated Research System (AI)

#07 CD22 CAR T-Cell Therapy: Multi-omics VCN and Protein Analysis

Published November 13, 2026 Research Square



OVERVIEW

Researchers utilized the Tapestri Single-cell DNA + protein multi-omics platform to simultaneously measure vector copy number (VCN) and surface protein markers in CD22 CAR T-cell products from five patients. The study demonstrated that amplicon-based sequencing effectively distinguishes transduced from untransduced samples, with average VCN values ranging from 0.69 to 1.24 copies per cell.

IN DEPTH

Key Findings

The study successfully validated a multi-omics approach for the simultaneous characterization of DNA and protein markers in CAR T-cell therapy. In CD22 CAR T-cell product samples (TR3 to TR7), the analysis identified measurable vector copy numbers, with the majority of transduced cells carrying between one and three vector copies per cell. Two-copy integrations represented the largest fraction across samples. Conversely, untransduced (UT) samples showed negligible copy numbers, with 97.9–100% of cells having zero vector reads.

Technical Details

The researchers used a targeted amplicon sequencing panel to evaluate total variants and vector-derived reads. Specificity was confirmed as an average of 99.89% (range: 99.83%–99.90%) of all vector-aligned reads mapped to 11 target regions (3 CAR1 amplicons and 8 vector amplicons). Reproducibility was high, with Spearman rho values between replicates ranging from a minimum of 0.97 to a median of 0.99.

Protein expression was analyzed using antibody oligonucleotide conjugates (AOC). The platform detected canonical T-cell markers including CD3, CD4, CD8, CD45RA, CD45RO, CD62L, CD27, CD183, and CD28. Analysis showed high concordance in marker read distributions between transduced and untransduced groups (Pearson r = 0.864, Spearman rho = 0.937), suggesting that lentiviral transduction did not substantially alter antibody capture efficiency.

Background and Context

The study analyzed apheresis products from five patients (four males, one female) aged five to 49 years, collected between March 2023 and July 2024. Four patients were diagnosed with Acute Lymphoblastic Leukemia (ALL) and one with Lymphoma. PBMCs were T-cell enriched, cultured, and transduced with a lentiviral vector encoding a CD22 CAR. To ensure accuracy, the researchers used UT cells as negative controls and a vector-transduced Jurkat cell line as a positive control.

Significance and Outlook

The integration of single-cell DNA and protein analysis allows for the precise estimation of VCN while simultaneously resolving T-cell subsets based on phenotype markers. This approach provides a more comprehensive characterization of the final CAR T-cell product compared to using ddPCR and flow cytometry separately.

Source: https://doi.org/10.21203/rs.3.rs-11529336/v1

Collected: November 15, 2026 | Automated Research System (AI)

#08 Edible Microcarriers: PLL/TA Surface Engineering for Cultivated Meat

Published November 10, 2026 bioRxiv South Korea



OVERVIEW

Researchers developed a decoupled surface-engineering strategy using a poly-L-lysine/tannic acid (PLL/TA) interface to enable cell adhesion on food-grade polysaccharide microcarriers. The modification increased cell-bearing carrageenan microcarriers to 100% for bovine and porcine cells, expanding the material options for cultivated meat production.

IN DEPTH

Key Findings

The decoupled surface-engineering strategy significantly improves cell attachment across various food-grade polysaccharides. On alginate microcarriers, PLL/TA modification resulted in 83% of microcarriers supporting attached cells, whereas bare alginate showed no detectable attachment. By Day 6, the cell-covered area on modified alginate reached 63.74%, compared to 9.64% for PLL-coated microcarriers and negligible coverage for bare alginate.

Technical Details

The method involves constructing a poly-L-lysine/tannic acid (PLL/TA) interface on preformed polysaccharide microcarriers. This interface facilitates an adaptive mechanism by recruiting proteins from the culture medium, such as fibronectin, rather than relying on predefined protein presentation. The effectiveness of this modification was validated across multiple materials and cell types:

- **Materials:** The strategy was successfully extended to pectin and carrageenan microcarriers.
- **Cell Types:** Testing included Hanwoo bovine and Handon porcine muscle cells.
- **Performance on Carrageenan:** Following PLL/TA modification, the proportion of cell-bearing microcarriers increased from 30% to 100% for Hanwoo bovine cells and from 10% to 100% for Handon porcine cells.

Background & Context

Cultivated meat production requires edible microcarriers that support cell expansion while maintaining the desired properties of the final food product. While food-grade polysaccharides offer desirable food-related functions, they typically provide limited support for cell adhesion. This creates a design challenge where bulk material selection is often constrained by the need for cell-interactive functionality.

Significance & Outlook

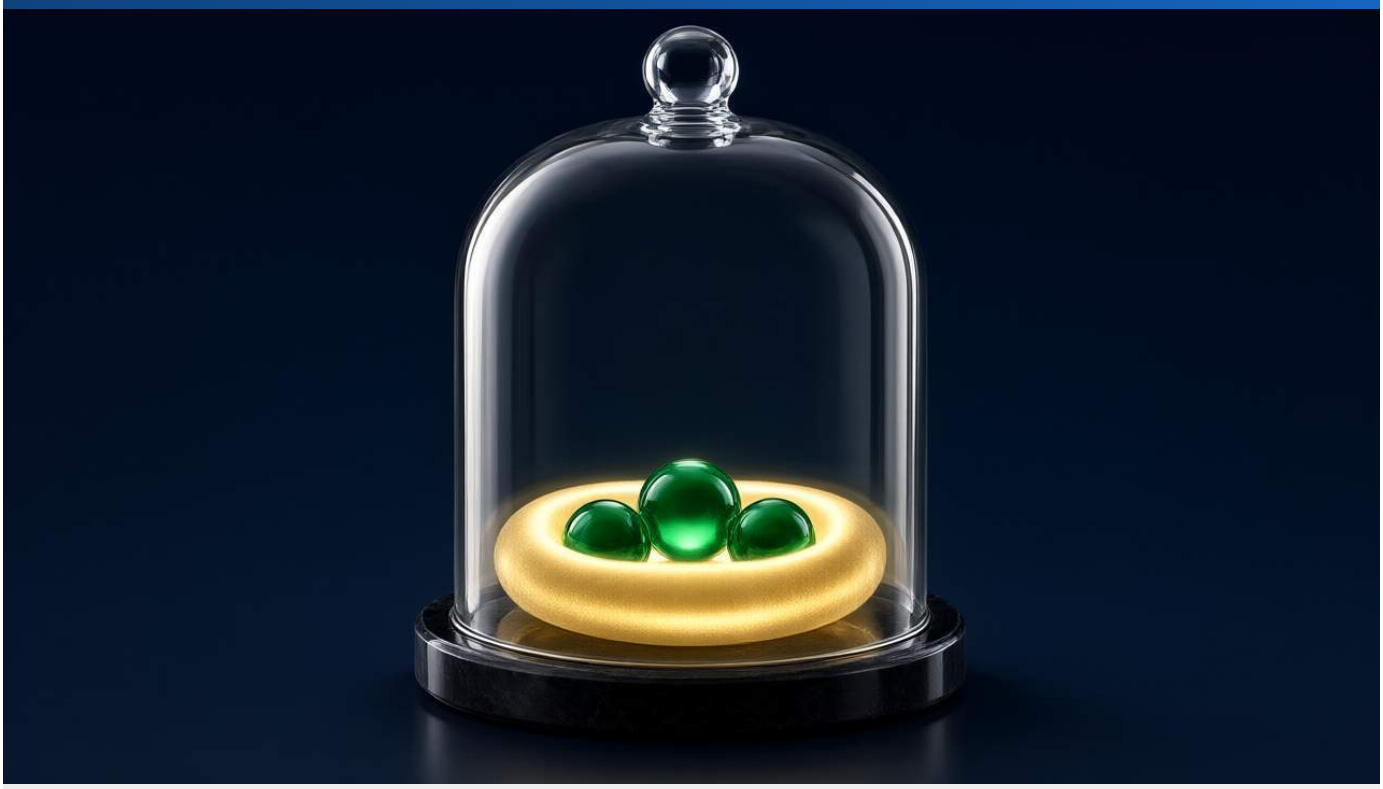
This research establishes a transferable surface-engineering strategy that decouples cell-interactive functionality from the selection of bulk materials. By enabling the use of a wider range of food-grade polysaccharides, this approach expands the design space for edible microcarriers in the production of cultivated meat. A Korean patent application (Application No. 10-2026-0217041) has been filed by the Pohang University of Science and Technology (POSTECH) Industry-Academic Cooperation Foundation regarding these surface-modified polysaccharide microcarriers.

Source: https://doi.org/10.64898/2026.11.07.765013

Collected: November 15, 2026 | Automated Research System (AI)

#09 Oncolytic Vaccinia Engineering: Synthetic Support Niche for NK Cells

Published November 09, 2026 bioRxiv USA



OVERVIEW

Researchers developed an engineering framework to create a synthetic support niche using oncolytic vaccinia virus (VV) to enhance off-the-shelf NK cell therapy. By delivering a five-factor payload, the system supports NK cell migration and cytotoxicity at effector-to-target ratios as low as 1:10.

IN DEPTH

Key Findings

The study establishes a framework where the post-manufacturing state of adoptive cell products guides the design of a complementary oncolytic support niche. The researchers identified that off-the-shelf expanded, frozen, and thawed (EFT) natural killer (NK) cells suffer from reduced chemokine responsiveness, a dependence on extrinsic cytokine support, and a loss of sustained function at limiting effector-to-target ratios. To address this, a five-factor program consisting of CXCL11, IL-15, IL-27, IL-2, and IL-1β was developed to support NK-cell migration, survival, cytotoxicity, and metabolic fitness.

Technical Details

The team evaluated viral chassis compatibility under human NK-cell antiviral pressure, finding that oncolytic vaccinia virus (VV) retained replication and spread, whereas HSV-1 was rapidly restricted. To optimize the payload, the researchers mapped endogenous receptor expression and conducted sequential functional screening under limiting effector densities. While consolidating these signals into a single viral chassis increased antitumor activity, constitutive IL-1β expression caused systemic inflammatory liability. To mitigate this, the IL-2/IL-1β module was placed under chemically inducible control, which limited systemic toxicity while maintaining in vivo antitumor activity.

Background & Context

Combining adoptive cell therapy with oncolytic viruses provides localized support within solid tumors. However, viral chassis and therapeutic payloads are typically selected independently of the biological state of the manufactured cell product. This research shifts the approach by using the phenotypic and functional features of the cell product as the primary design inputs for the viral niche.

Significance & Outlook

This framework demonstrates that tailoring the oncolytic environment to the specific needs of EFT NK cells can maintain efficacy even at low effector-to-target ratios (1:10). The use of programmable control for specific payloads allows for the balance of high antitumor potency with reduced systemic toxicity, providing a blueprint for future adoptive cell and viral therapy combinations.

Source: https://doi.org/10.64898/2026.11.06.764990

Collected: November 15, 2026 | Automated Research System (AI)

#10 CHO-C Cell Lines: Acetate Accumulation in Bispecific Antibody Production

Published November 14, 2026 BIOENGINEER USA



OVERVIEW

Researchers found that acetate accumulation, rather than lactate, drives late-stage acidification in CHO-C cells producing PD-1/VEGF bispecific antibodies. Acetate levels reaching 1.75 to 1.80 grams per liter arrested protein synthesis and increased acidic charge variants by 16.2 percent. This discovery identifies a critical metabolic imbalance that compromises the integrity and yield of complex recombinant proteins.

IN DEPTH

Key Findings

Acetate accumulation is the primary driver of late-stage acidification in CHO-C cell lines engineered for PD-1/VEGF bispecific antibody production. In a fourteen-day bioreactor process, acetate concentrations climbed to between 1.75 and 1.80 grams per liter (approximately 30 millimoles per liter) between day ten and day fourteen. This metabolic shift caused the culture pH to drop below 6.4 by day fourteen, despite automated base addition, and led to a complete plateau in antibody expression after day twelve.

Technical Details

The study compared CHO-C (bispecific antibody) with CHO-B (monoclonal antibody targeting EGFRvIII) under identical conditions. While CHO-B maintained a steady pH of 7.05 and accumulated less than 0.3 grams per liter of acetate, CHO-C exhibited severe molecular deterioration. Analytical evaluations on day sixteen showed:

- A 16.2 percent increase in acidic charge variants.
- A decline in the primary monomeric peak from 50.97 percent to 36.46 percent.
- A 1.5 percent drop in overall purity due to antibody fragmentation.

Isotopic labeling with carbon-13 mass spectrometry revealed that exogenous pyruvate carbon directly enters the intracellular acetate pool in CHO-C cells, a phenomenon absent in CHO-B cells. Additionally, halting glucose feeding at day thirteen caused the pH to shift upward, but intracellular acetate levels remained largely unchanged, suggesting that glucose availability strongly influences the acid-producing metabolic mode.

Background & Context

Biopharmaceutical manufacturing typically monitors lactate as the main contributor to acidic conditions. However, this investigation demonstrated that in the CHO-C line, eight key tricarboxylic acid cycle intermediates remained below 0.5 grams per liter, confirming that acetate—not residual lactate—was the primary acidic byproduct. The process also showed a sharp reduction in cellular oxygen uptake rate, indicating impaired mitochondrial oxidative phosphorylation.

Significance & Outlook

The results highlight a specific metabolic vulnerability in bispecific antibody production where pyruvate conversion to acetate disrupts protein synthesis and quality. Identifying the link between glucose availability, pyruvate, and acetate accumulation provides a target for optimizing fed-batch cultivation to prevent late-stage acidification and product degradation.

Reference technology guide: Chromatography: https://troy-technical.com/cell-culture-technology-term-chromatography/

Source: https://bioengineer.org/acetate-accumulation-tied-to-pyruvate-conversion-disrupts-cultured-bispecific-antibody-production/

Collected: November 15, 2026 | Automated Research System (AI)

#11 Hair Regeneration Therapy: Junji Fukuda's Multi-Layer Culture Method

Published November 11, 2026　医薬通信社　Japan



OVERVIEW

Professor Junji Fukuda of Yokohama National University has developed a "multi-layer culture" technique to mass-produce hair papilla cells while maintaining their hair-inducing functions. By collaborating with Rohto Pharmaceutical on animal-free media, the team is preparing clinical trials for autologous transplantation to treat alopecia.

IN DEPTH

Key Findings

Professor Junji Fukuda and his team at Yokohama National University have established a method to mass-produce hair papilla cells from approximately 10 hairs harvested from a patient's occipital region. The core breakthrough is a "multi-layer culture" technique that overcomes the traditional loss of hair-inducing function associated with standard planar cell expansion. When combined with a specialized animal-free medium developed with Rohto Pharmaceutical, the expression of the hair-growth-related gene alkaline phosphatase (ALP) increased 100-fold.

Technical Details

The research focuses on the hair papilla cells, which act as the control center for the hair cycle via Wnt and TGF-β signals. Fukuda's team compared several cultivation methods:

- **Planar Culture:** Cells increased in number but showed a significant drop in ALP expression.
- **Spheroid Culture:** Maintained hair-inducing functions better than planar culture, but cell counts did not increase sufficiently for medical application.
- **Multi-layer Culture:** By continuing cultivation beyond the confluent stage (approximately 5 days), cells formed 3–5 layer thick clusters. After 30 days, cell counts increased approximately 20-fold, and ALP expression reached approximately 7 times the initial level.

To ensure clinical safety, the team transitioned from fetal bovine serum (FBS) to animal-free media. Using a commercially available Rohto Pharmaceutical medium doubled cell proliferation and increased ALP expression 30-fold; a further joint development of a new medium increased ALP expression 100-fold.

Background and Context

Fukuda, who previously worked on artificial liver development, pivoted to hair regeneration due to lower costs and higher scalability. The team is pursuing three therapeutic approaches: activating dormant follicles via mesenchymal cell transplantation, transplanting hair follicle primordia, and transplanting hair follicle organoids for end-stage alopecia.

Significance and Outlook

The multi-layer culture method is the most viable for immediate application due to its simplicity. Fukuda has established a venture company to move toward clinical trials for hair papilla cell transplantation. Additionally, the team has successfully created human hair follicle organoids in vitro, which are now being developed as a quantitative evaluation system for testing the efficacy of hair growth agents like minoxidil.

Source:
https://iyakutsushinsha.com/2026/11/11/10%e6%9c%ac%e3%81%ae%e6%af%9b%e9%ab%aa%e3%81%8b%

Collected: November 15, 2026 | Automated Research System (AI)

#12 ImvivaBio CTA313: Dual CD19/BCMA CAR-T Data for Lupus in 2026

Published November 11, 2026 Yahoo Finance（GlobeNewswire） USA



OVERVIEW

ImvivaBio presented 12-month follow-up data for CTA313, an allogeneic dual-targeted CD19/BCMA CAR-T therapy for systemic lupus erythematosus (SLE) and lupus nephritis (LN). The therapy demonstrated durable remission, with DORIS remission reaching 88% at Month 12 in refractory SLE patients. These results suggest a potential "immune reset" mechanism that provides superior disease control compared to single-target CD19 approaches.

IN DEPTH

Key Findings

CTA313 induced durable remission and immune reconstitution in patients with refractory SLE. In a pooled analysis of 14 heavily pretreated patients with minimal renal involvement, DORIS remission reached 73% at Month 6 and 88% (7/8 patients) at Month 12. Additionally, 92.9% of these patients were off immunosuppressants at the data cutoff, and 92% of evaluable patients were taking glucocorticoids at 5 mg/day or less by Month 6.

Technical Details

CTA313 is an off-the-shelf allogeneic CAR-T therapy targeting both CD19 and BCMA to prevent relapses caused by autoreactive B-cell precursors or plasma-cell reservoirs. Technical data highlights include:

- **B-cell Dynamics:** B cells dropped from a median of 52.2 to 0 cells/μL by Day 7, reconstituting around Day 42 with over 95% naive phenotype. Single-cell analysis showed no overlap between pretreatment autoreactive clones and new clones.
- **Biomarkers:** Anti-dsDNA antibodies became undetectable by Month 3 and remained so for up to one year. Complement component C3 rose from 0.65 to 1.34 g/L by Day 28.
- **Comparative Efficacy:** In SLE with minimal renal involvement, the dual-target approach achieved 80% DORIS remission at Month 12, compared to 20% for single-target CD19 CAR-T.
- **Safety:** Cytokine release syndrome (CRS) occurred in 35.7% of patients (all Grade 1). No neurotoxicity or graft-versus-host disease (GvHD) was observed. Grade 3 or higher adverse events included neutropenia (71.4%), thrombocytopenia (21.4%), and infections (21.4%).

Background and Significance

Current standard-of-care for SLE and LN relies on broad immunosuppression, which often results in incomplete responses and toxicity. By targeting both CD19 and BCMA, CTA313 aims to achieve a deeper B-cell eradication and a complete immune reset. These findings support the transition of CTA313 into the upcoming global Phase 1b ALLNEW basket study to evaluate durable disease control in a broader patient population.

Source: https://finance.yahoo.com/healthcare/articles/imvivabio-presents-longer-term-data-130000771.html

Collected: November 15, 2026 | Automated Research System (AI)