

**UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION**  
Washington, DC 20549

**FORM 8-K**

**CURRENT REPORT**  
Pursuant to Section 13 or 15(d)  
of the Securities Exchange Act of 1934

Date of Report (Date of earliest event reported): **June 13, 2022**

**Century Therapeutics, Inc.**  
(Exact name of registrant as specified in its charter)

**Delaware**  
(State or other jurisdiction of  
incorporation or organization)

**001-40498**  
(Commission File Number)

**84-2040295**  
(I.R.S. Employer  
Identification No.)

**3675 Market Street**  
**Philadelphia, Pennsylvania**  
(Address of principal executive offices)

**19104**  
(Zip Code)

Registrant's telephone number, including area code: **(267) 817-5790**

**Not Applicable**  
(Former name or former address, if changed since last report)

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions (see General Instruction A.2. below):

- Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)
- Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)
- Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))
- Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class	Trading Symbol	Name of Exchange on Which Registered
Common Stock, par value \$0.0001 per share	IPSC	Nasdaq Global Select Market

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (§230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (§240.12b-2 of this chapter).

Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

**Item 7.01**      **Regulation FD Disclosure**

On June 13, 2022, Century Therapeutics, Inc. (the “Company”) updated information reflected in a slide presentation, which is attached as Exhibit 99.1 to this Current Report on Form 8-K and is incorporated herein by reference. Representatives of the Company will use the updated presentation in various meetings with investors from time to time.

The information contained in this Item 7.01 (including Exhibit 99.1) is being furnished and shall not be deemed “filed” for purposes of Section 18 of the Exchange Act, as amended (the “Exchange Act”), or otherwise subject to the liabilities of that section and shall not be deemed to be incorporated by reference in any filing under the Securities Act of 1933, as amended, or the Exchange Act, except as shall be expressly set forth by specific reference in such filing.

**Item 9.01**      **Financial Statements and Exhibits**

**(d) Exhibits**

The following exhibit is being furnished herewith:

<b>Exhibit No.</b>	<b>Document</b>
<a href="#">99.1</a>	<a href="#">Investor Presentation of Century Therapeutics, Inc., dated June 13, 2022</a>
104	Cover Page Interactive Data File (embedded within the Inline XBRL document)

**SIGNATURES**

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned hereunto duly authorized.

**CENTURY THERAPEUTICS, INC.**

By: /s/ Osvaldo Flores, Ph.D.  
Name: Osvaldo Flores, Ph.D.  
Title: President and Chief Executive Officer

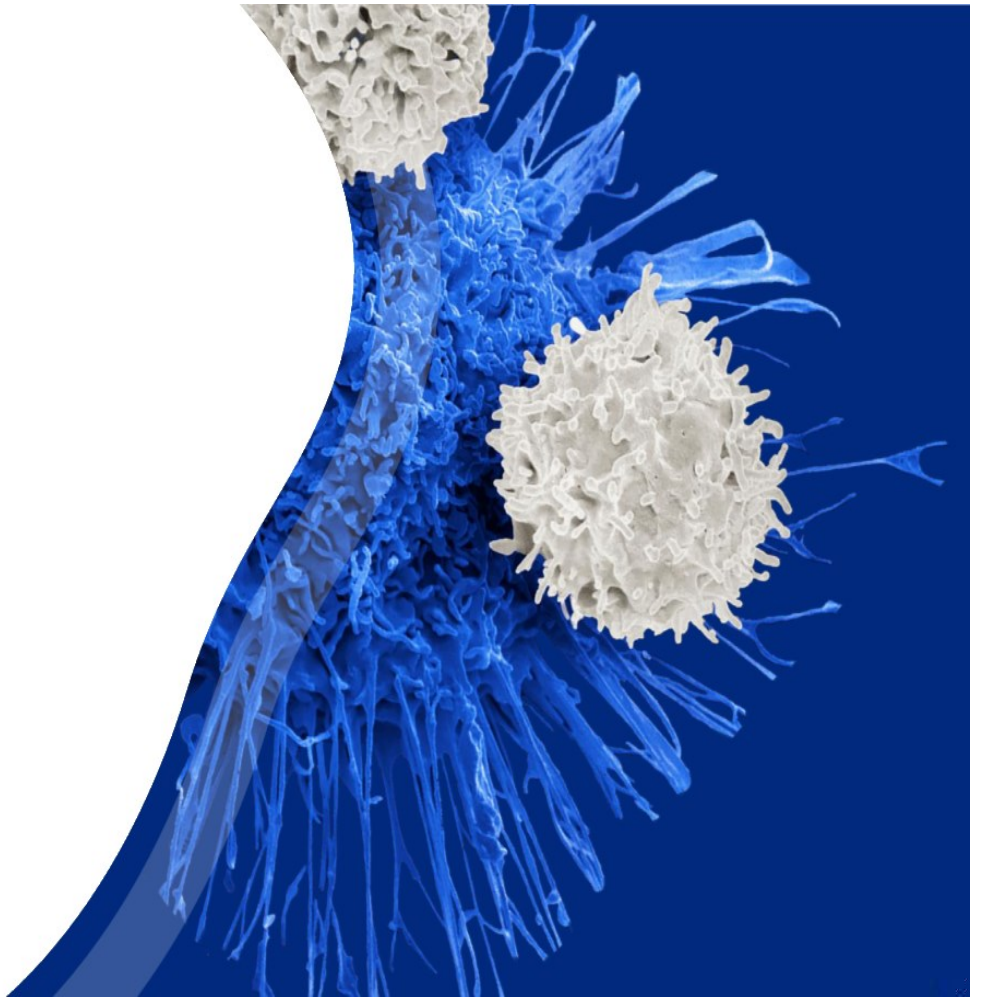
Date: June 13, 2022

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## Virtual R&D Day

June 13, 2022



# Forward-looking statements

This presentation contains forward-looking statements within the meaning of, and made pursuant to the safe harbour provisions of, The Private Securities Litigation Reform Act of 1995. All statements contained in this document, other than statements of historical facts or statements that relate to present facts or current conditions, including but not limited to, statements regarding possible or assumed future results of operations, business strategies, research and development plans, regulatory activities, market opportunity, competitive position and potential growth opportunities are forward-looking statements. These statements involve known and unknown risks, uncertainties and other important factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements. In some cases, you can identify forward-looking statements by terms such as "may," "might," "will," "should," "expect," "plan," "aim," "seek," "anticipate," "could," "intend," "target," "project," "contemplate," "believe," "estimate," "predict," "forecast," "potential" or "continue" or the negative of these terms or other similar expressions. The forward-looking statements in this presentation are only predictions. We have based these forward-looking statements largely on our current expectations and projections about future events and financial trends that we believe may affect our business, financial condition and results of operations. These forward-looking statements speak only as of the date of this presentation and are subject to a number of risks, uncertainties and assumptions, some of which cannot be predicted or quantified and some of which are beyond our control, including, among others: our ability to successfully advance our current and future product candidates through

development activities, preclinical studies, and clinical trials; our reliance on the maintenance on certain key collaborative relationships for the manufacturing and development of our product candidates; the timing, scope and likelihood of regulatory filings and approvals, including final regulatory approval of our product candidates; the impact of the COVID-19 pandemic, geopolitical issues and inflation on our business and operations, supply chain and labor force; the performance of third parties in connection with the development of our product candidates, including third parties conducting our future clinical trials as well as third-party suppliers and manufacturers; our ability to successfully commercialize our product candidates and develop sales and marketing capabilities, if our product candidates are approved; and our ability to maintain and successfully enforce adequate intellectual property protection. These and other risks and uncertainties are described more fully in the "Risk Factors" section of our most recent filings with the Securities and Exchange Commission and available at [www.sec.gov](http://www.sec.gov). You should not rely on these forward-looking statements as predictions of future events. The events and circumstances reflected in our forward-looking statements may not be achieved or occur, and actual results could differ materially from those projected in the forward-looking statements. Moreover, we operate in a dynamic industry and economy. New risk factors and uncertainties may emerge from time to time, and it is not possible for management to predict all risk factors and uncertainties that we may face. Except as required by applicable law, we do not plan to publicly update or revise any forward-looking statements contained herein, whether as a result of any new information, future events, changed circumstances or otherwise.

# Agenda

## **Building A Next-Generation iPSC Platform**

Lalo Flores, PhD, CEO

## **GBM Landscape and Opportunity**

Shelia Singh, MD, PhD, Professor of Surgery and Biochemistry, Chief Pediatric Neurosurgeon at McMaster Children's Hospital, the Division Head of Neurosurgery at Hamilton Health Sciences, and the Inaugural Director of McMaster's New Cancer Research Centre

## **iNK Cells Provide Enhanced Control in the Treatment of GBM**

Hy Levitsky, MD, Head of R&D

## **Century's iNK 3.0 platform**

### **iNK common progenitor and Next-Gen CNTY-103**

Luis Borges, PhD, CSO

## **Century's Novel Universal Targeting Receptor Adaptor Platform**

Jill Carton, PhD, Executive Director of CAR Engineering and Protein Sciences

## **MAD7 CRISPR Nuclease for iPSC Genome Engineering**

Michael Naso, PhD, VP Cell Engineering

## **Q&A**



## Building A Next-Generation iPSC Platform

Lalo Flores, PhD | CEO

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# Building a Next Generation Allogeneic Cell Therapy Platform

## iPSC Reprogramming



- Comprehensive collection of clinical grade lines (CD34+ HSC,  $\alpha\beta$  T cell,  $\gamma\delta$  T cell derived)

## Gene Editing



- Proprietary gene editing platform
  - CRISPR MAD7-derived gene editing for precise transgene integration

## iPSC Differentiation/Manufacturing



- Scalable protocols and processes to produce highly functional iNK and iT cell products

## Protein Engineering

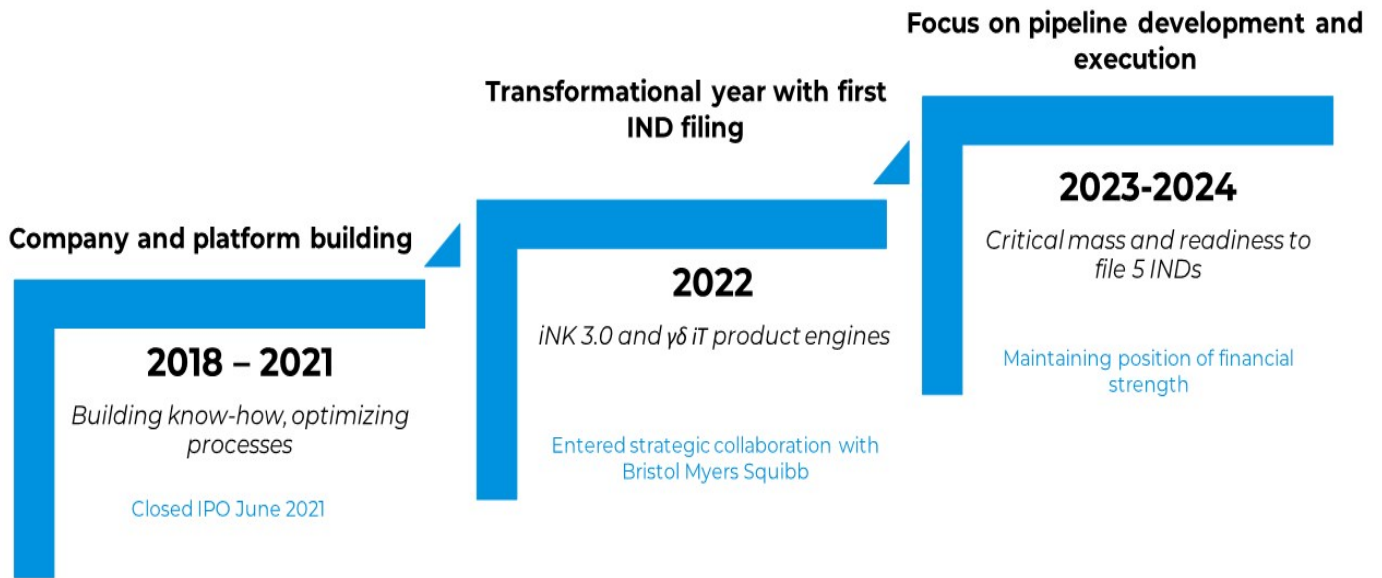


- Developing proprietary next-generation CARs
- Universal tumor targeting platform

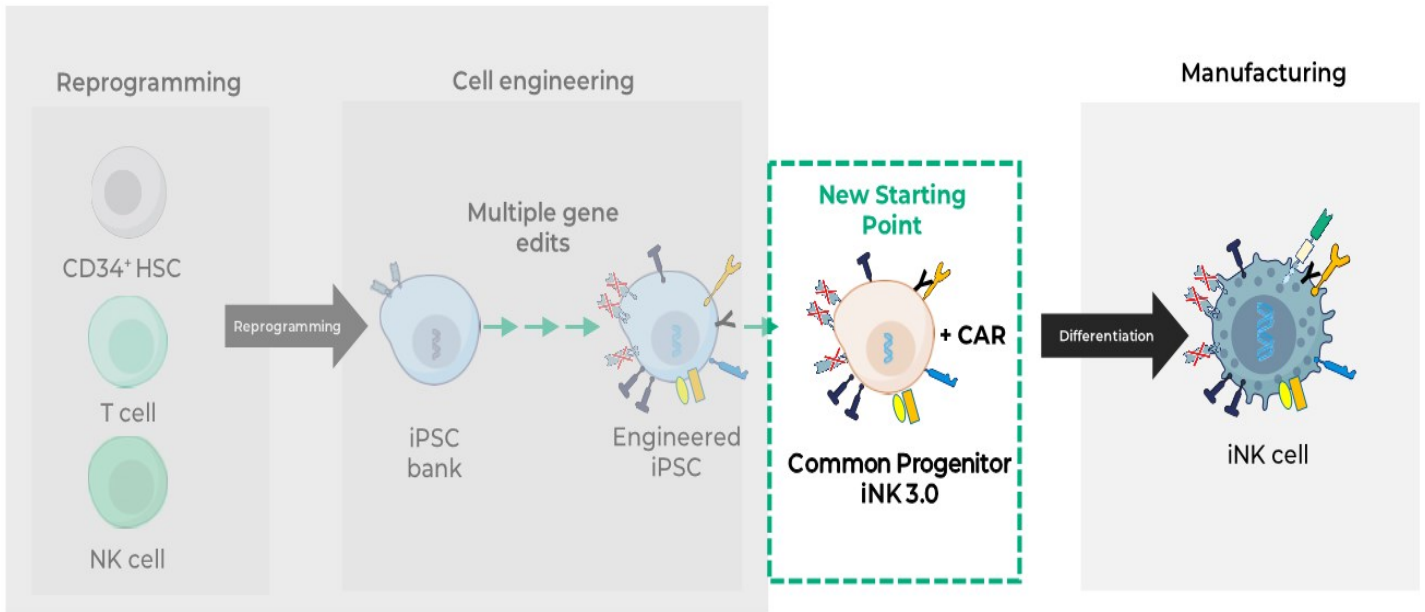
Vertically integrated capabilities differentiate Century's approach



# With a Strong Foundation in Place, Century is Ready to Execute



# Common Progenitor Milestone Enables Cost, Time Efficiencies



- iPSC cell bank with 12 core 3.0 gene edits introduced in 5 sequential steps
- Resets product development starting point: accelerates and de-risks development candidate selection

# Pipeline

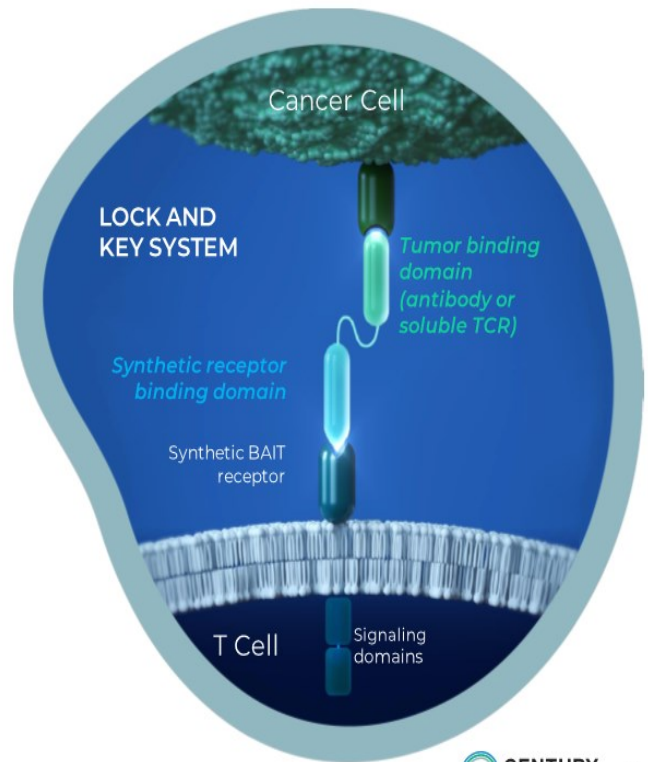
Product candidate pipeline across cell platforms and targets in solid and hematologic cancers

● Solid Tumors    ● Hematologic Tumors

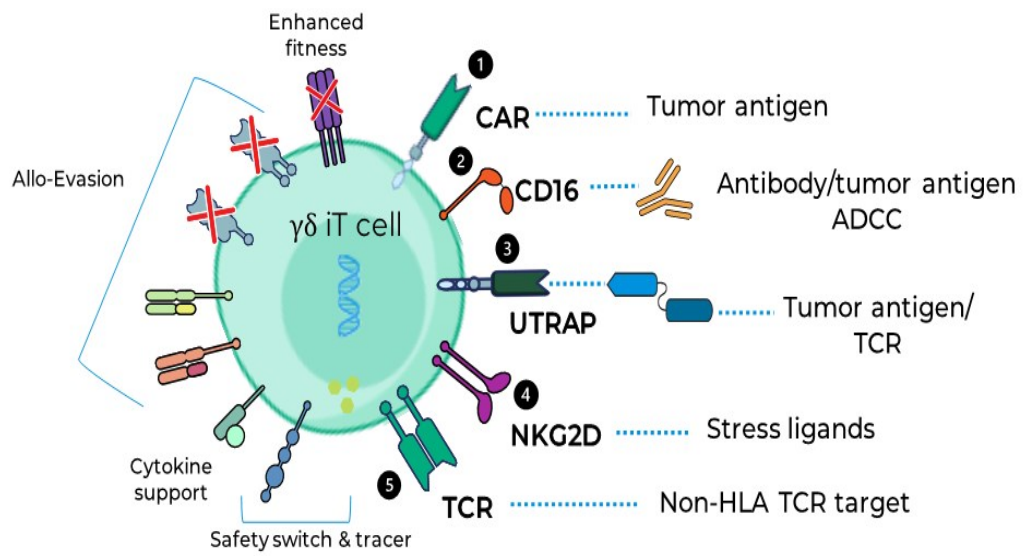
Product	iPSC Platform	Targets	Indications	Expected IND Submission	Discovery	Preclinical	Clinical	Collaborator
CNTY-101	iNK	CD19	B-Cell Malignancies	Mid 2022	<span style="color: blue;">●</span>			
CNTY-103	iNK	CD133	Glioblastoma	2024	<span style="color: green;">●</span>			
CNTY-102	iT	CD19 + CD79b	B-Cell Malignancies	2024	<span style="color: blue;">●</span>			
CNTY-104	iNK/iT	Multi-specific	Acute Myeloid Leukemia	2024	<span style="color: blue;">●</span> 			
CNTY-106	iNK/iT	Multi-specific	Multiple Myeloma	2024	<span style="color: blue;">●</span> 			
Discovery Research Programs								
	iNK/iT	TBD	Solid Tumors	TBD	<span style="color: blue;">●</span>			
	iNK	TBD	Hematological Tumors	2023	<span style="color: blue;">●</span>			

# Universal Tumor Antigen Receptor Targeting Platform (uTRAP)

- Multifaceted tumor targeting platform
  - Compatible with soluble CARs and TCRs
  - Potentially enables targeting of multiple TAAs with single cell product
- Selective for allogeneic cell vs CD3-based bispecific antibodies and CD16 NK engagers



# Century's Strategic Vision for Winning in Solid Tumors



Building best-in-class  $\gamma\delta$  iT cell platform with up to 5 distinct tumor killing mechanisms

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# Anticipated Catalysts Over Next 12 months

Underpinned by strong balance sheet with platform synergies and operational excellence

## CNTY-101

Becoming clinical stage biotech company with most advanced allogeneic cell therapy

- IND submission (Mid-2022)
- Phase 1 (ELiPSE-1) start in B-cell malignancies (2H22)

## $\gamma\delta$ iT Platform

Leveraging the comprehensive end-to-end platform

- $\gamma\delta$  iT pre-clinical data (4Q22)

## iNK 3.0 Common Progenitor

Creating platform efficiencies

- Select additional candidate based on iNK 3.0 (YE22) – disclose data at future medical meeting
- CNTY-103 development candidate (2023)

## Disclosures

5 INDs anticipated over next 3 years

- Solid tumor candidate expected to be announced (4Q22)

**AACR**

American Association  
for Cancer Research®

**ANNUAL  
MEETING**  
2022 *New Orleans*

APRIL 8-13, 2022 • #AACR22

# Targeting Clonal Heterogeneity in Treatment-refractory Brain Cancers with Rationally Designed Immunotherapies: Advances and Challenges

AACR Meet-The-Expert Session

April 10<sup>th</sup>, 2022

**Sheila K. Singh MD PhD FRCS(C)**

McMaster University, Hamilton, ON, Canada



McMaster  
University 

**BRIGHTER  
WORLD**

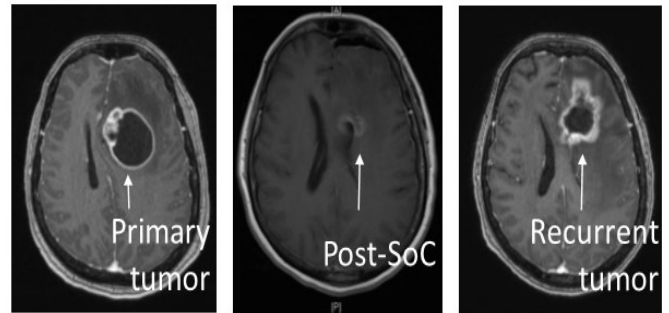
# Glioblastoma is an aggressive disease

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Most prevalent primary brain tumor in adults causing death

Disease progression →



## Standard of care (SoC):

- Surgical resection
- Radiation
- Chemotherapy with Temozolomide

Patients succumb to recurrent disease with a median overall survival of <15-17 months

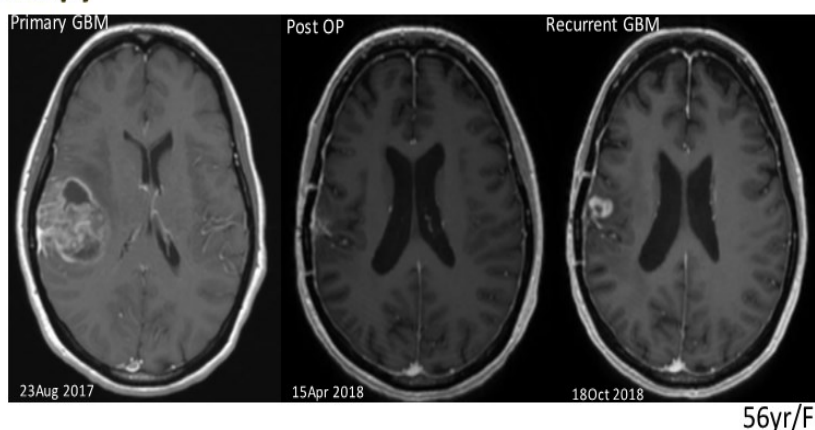


# Glioblastoma (GBM) Overview

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## FOCUS – Unmet need in brain cancer therapy

- **9-month** relapse period
- **15 months** median survival post-diagnosis
- **~5%** five-year relative survival



## COMMERCIAL POTENTIAL

- **~13,390 new** cases diagnosed in 2020 in the US<sup>1</sup>
- Global GBM treatment market to reach **USD \$1.15 billion** by 2024<sup>2</sup>
- In 2016, North America contributed **39.2%** of the global GBM market<sup>2</sup>
- Opportunity to acquire orphan/breakthrough designation

1. American Brain Tumor Association  
2. Hexa Research

## GBM Market landscape – Limited competition

A total of **139 drugs** currently in clinical development in primary and recurrent GBM

PHASE	SMALL MOLECULES	BIOLOGICS	OTHERS (CAR-Ts, viruses, vaccines, etc)
Approved	3 (Temozolomide, carmustine/ carmustine implant)	3 (bevacizumab and 2 biosimilars)	0
Phase III	9	6	8
Phase II	22	11	10
Phase I	41	22	10
Total	72	39	28

- Limited approved treatment options
- Small number of late-stage development
- Early development players largely small companies

**12 CAR-T trials:** EGFRvIII, BAFFR, IL13R, EphA2, CD133 and HER2

Data from BioMedTracker

# Glioblastoma: A Graveyard of Clinical Trials, or Unmet Opportunity?

- First-line standard of care was developed @ 20 years ago.
- SoC is far more effective in MGMT- methylated vs. unmethylated patients but used regardless of biomarker status due to lack of targeted options.
- Second-line options include lomustine or bevacizumab, the latter which provides marginal benefit, causes pseudo-progression, and renders subsequent intervention essentially ineffective.

## ◆ Historical failures arguably due to solvable problems

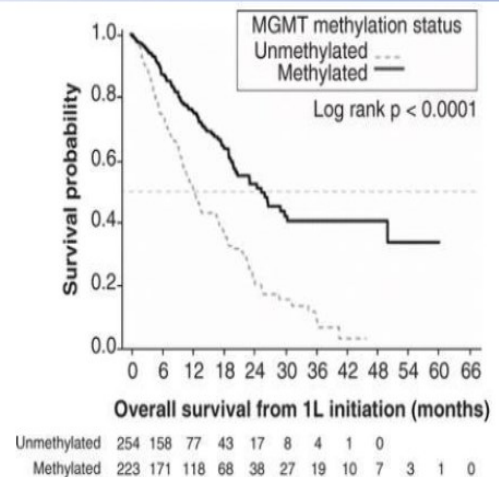
- Companies tend to focus on GBM as a line-extension of programs being developed elsewhere and hence may not be prioritizing as necessary to win in GBM
- Furthermore, many of the therapeutic targets (EGFR, VEGF) are relevant in treatment-naïve patients but become selected against following frontline therapy.

“Every surgeon carries within himself a small cemetery, where from time to time he goes to pray.”



- Dr. René Leriche: from epigraph to “Do No Harm,”

Dr. Henry Marsh



# CAR T Cell Therapies for GBM: the Promise of Locoregional Delivery

The NEW ENGLAND JOURNAL of MEDICINE

## BRIEF REPORT

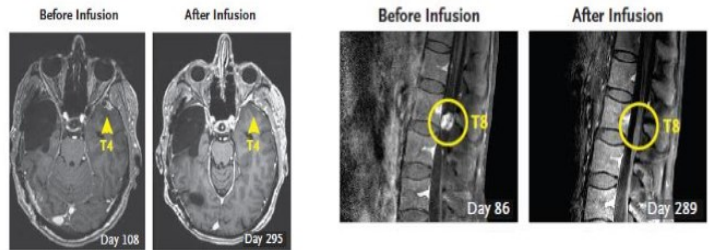
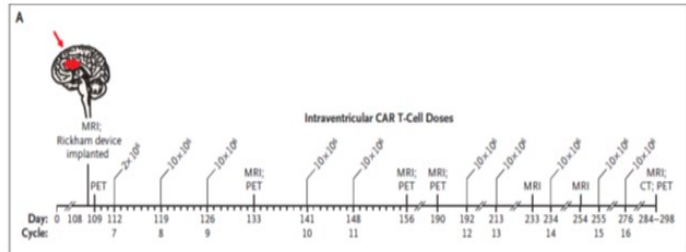
### Regression of Glioblastoma after Chimeric Antigen Receptor T-Cell Therapy

Christine E. Brown, Ph.D., Darya Alizadeh, Ph.D., Renate Starr, M.S., Lihong Weng, M.D., Jamie R. Wagner, B.A., Araceli Naranjo, B.A., Julie R. Ostberg, Ph.D., M. Suzette Blanchard, Ph.D., Julie Kilpatrick, M.S.N., Jennifer Simpson, B.A., Anita Kurien, M.B.S., Saul J. Priceman, Ph.D., Xiuli Wang, M.D., Ph.D., Todd L. Harshbarger, M.D., Massimo D'Apuzzo, M.D., Julie A. Ressler, M.D., Michael C. Jensen, M.D., Michael E. Barish, Ph.D., Mike Chen, M.D., Ph.D., Jana Portnow, M.D., Stephen J. Forman, M.D., and Behnam Badie, M.D.



Intracavitary Delivery of IL13aR2 CAR T Cells

### Intraventricular Delivery of IL13aR2 CAR T Cells



### Regression of Recurrent Multifocal Glioblastoma, Including Spinal Metastases

# EGFR CAR T Cells for GBM: Continued Improvements to Overcome Technical Challenges

IMMUNOTHERAPY

## Rational development and characterization of humanized anti-EGFR variant III chimeric antigen receptor T cells for glioblastoma

Laura A. Johnson,<sup>1,2\*</sup> John Scholler,<sup>1\*</sup> Takayuki Ohkuri,<sup>3</sup> Akemi Kosaka,<sup>3</sup> Prachi R. Patel,<sup>1</sup> Shannon E. McGettigan,<sup>1</sup> Arben K. Nace,<sup>4</sup> Tzvete Dentchev,<sup>4</sup> Pramod Thekkat,<sup>5</sup> Andreas Loew,<sup>5</sup> Alina C. Boesteanu,<sup>1</sup> Alexandria P. Cogdill,<sup>1</sup> Taylor Chen,<sup>1</sup> Joseph A. Fraietta,<sup>1</sup> Christopher C. Kloss,<sup>1</sup> Avery D. Posey Jr.,<sup>1</sup> Boris Engels,<sup>5</sup> Reshma Singh,<sup>5</sup> Tucker Ezell,<sup>5</sup> Neeraja Idamakanti,<sup>5</sup> Melissa H. Ramones,<sup>5</sup> Na Li,<sup>5</sup> Li Zhou,<sup>5</sup> Gabriela Plesa,<sup>1</sup> John T. Seykora,<sup>4</sup> Hideho Okada,<sup>6</sup> Carl H. June,<sup>1,2</sup> Jennifer L. Brogdon,<sup>5</sup> Marcela V. Maus<sup>1,7†</sup>

CANCER

## A single dose of peripherally infused EGFRvIII-directed CAR T cells mediates antigen loss and induces adaptive resistance in patients with recurrent glioblastoma

Donald M. O'Rourke,<sup>1</sup> MacLean P. Nasrallah,<sup>2\*</sup> Arati Desai,<sup>3\*</sup> Jan J. Melenhorst,<sup>4\*</sup> Keith Mansfield,<sup>5\*</sup> Jennifer J. D. Morrisette,<sup>6</sup> Maria Martinez-Lage,<sup>2†</sup> Steven Brem,<sup>1</sup> Eileen Maloney,<sup>1</sup> Angela Shen,<sup>7</sup> Randi Isaacs,<sup>5</sup> Suyash Mohan,<sup>8</sup> Gabriela Plesa,<sup>4</sup> Simon F. Lacey,<sup>4</sup> Jean-Marc Navenot,<sup>4</sup> Zhaohui Zheng,<sup>4</sup> Bruce L. Levine,<sup>4</sup> Hideho Okada,<sup>9</sup> Carl H. June,<sup>4</sup> Jennifer L. Brogdon,<sup>5</sup> Marcela V. Maus<sup>10†</sup>

Choi et al. *Journal for Immunotherapy of Cancer* (2019) 7:304  
<https://doi.org/10.1186/s40425-019-0806-7>

Journal for Immunotherapy  
of Cancer

nature  
biotechnology

ARTICLES

<https://doi.org/10.1038/s41587-019-0192-1>

SHORT REPORT

Open Access

## CAR-T cells secreting BiTEs circumvent antigen escape without detectable toxicity

Bryan D. Choi<sup>1,2</sup>, Xiaoling Yu<sup>1</sup>, Ana P. Castano<sup>1</sup>, Amanda A. Bouffard<sup>1</sup>, Andrea Schmidts<sup>1</sup>, Rebecca C. Larson<sup>1</sup>, Stefanie R. Bailey<sup>1</sup>, Angela C. Boroughs<sup>1</sup>, Matthew J. Frigault<sup>1,3</sup>, Mark B. Leick<sup>1</sup>, Irene Scarfò<sup>1</sup>, Curtis L. Cetrulo<sup>4</sup>, Shadmehr Demehri<sup>5</sup>, Brian V. Nahed<sup>2</sup>, Daniel P. Cahill<sup>2</sup>, Hiroaki Wakimoto<sup>2</sup>, William T. Curry<sup>2</sup>, Bob S. Carter<sup>2</sup> and Marcela V. Maus<sup>1,4\*</sup>

## CRISPR-Cas9 disruption of PD-1 enhances activity of universal EGFRvIII CAR T cells in a preclinical model of human glioblastoma

Bryan D. Choi<sup>1,2</sup>, Xiaoling Yu<sup>1</sup>, Ana P. Castano<sup>1</sup>, Henia Darr<sup>3</sup>, Daniel B. Henderson<sup>3</sup>, Amanda A. Bouffard<sup>1</sup>, Rebecca C. Larson<sup>1</sup>, Irene Scarfò<sup>1</sup>, Stefanie R. Bailey<sup>1</sup>, Genevieve M. Gerhard<sup>1</sup>, Matthew J. Frigault<sup>1,4</sup>, Mark B. Leick<sup>1</sup>, Andrea Schmidts<sup>1</sup>, Jason G. Sager<sup>3</sup>, William T. Curry<sup>2</sup>, Bob S. Carter<sup>2</sup> and Marcela V. Maus<sup>1,4\*</sup>

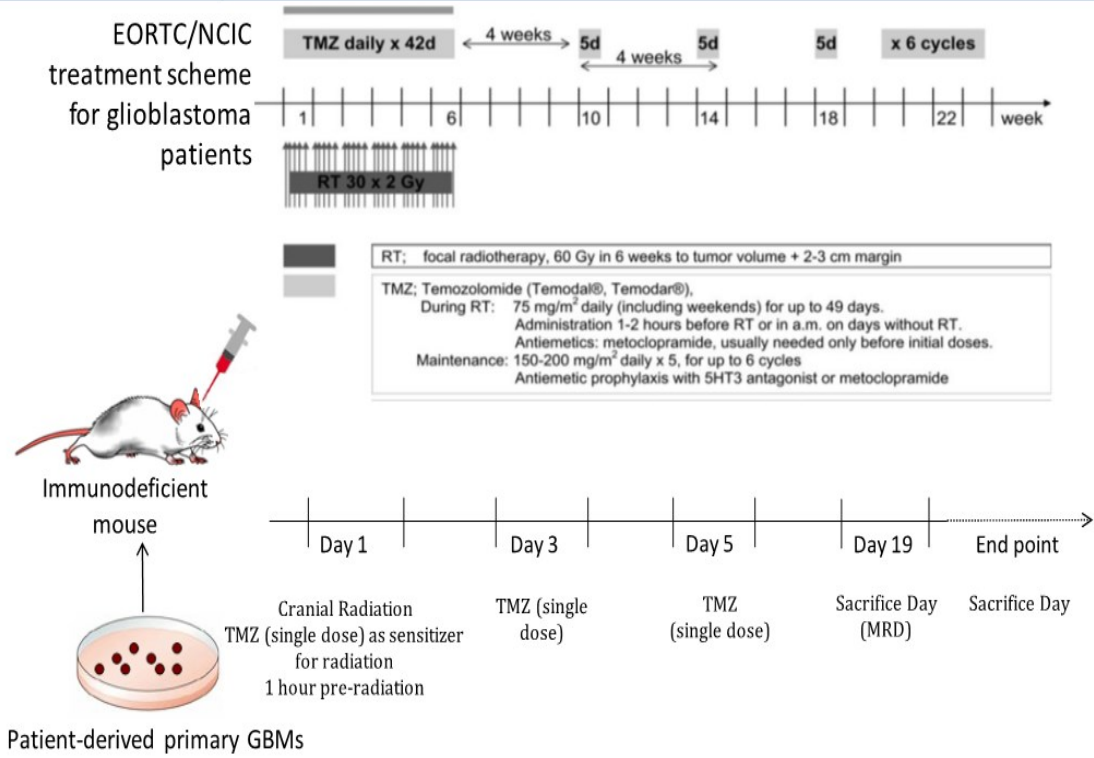


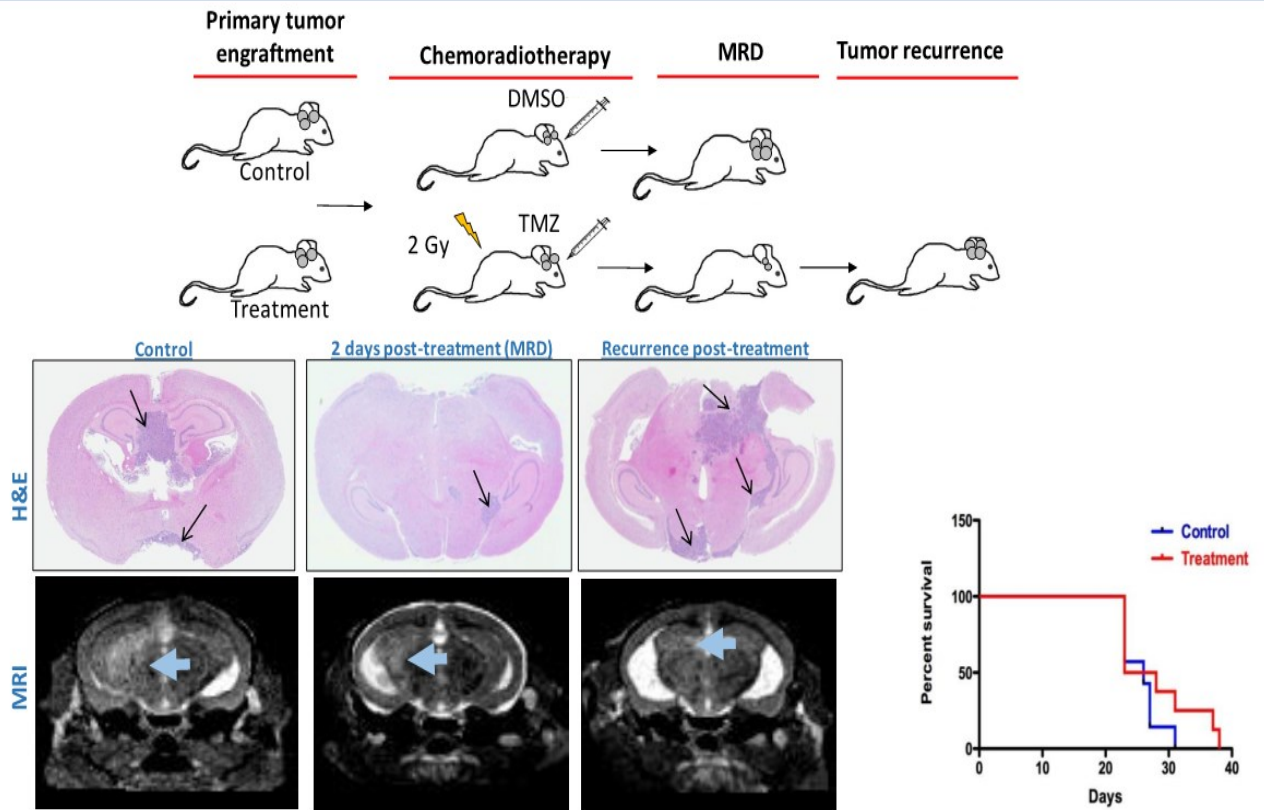
# Lessons from GBM Treatment Failures: Challenges to Overcome for New Immunotherapeutic Protocols

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- Trusted therapeutic targets expressed in treatment-naïve, primary GBM may be selected against and evolve out of GBM recurrence: **new therapeutic targets must be pursued that are relevant to recurrence.**
  - Monotherapies will not likely succeed in eradicating such a rapidly evolving, highly heterogeneous tumor: **rational combinatorial polytherapies should be developed.**
  - Therapeutics should target not only the GBM cells **but also the tumor microenvironment**, and to overcome the **immunosuppressive niche**, the tumour immune microenvironment (TIME)
  - **Locoregional delivery** of immunotherapies (especially into CSF spaces) has been well tolerated and may promote better **trafficking, durability and persistence** of cell therapies
-

# Mimicking GBM recurrence: Designing mouse-adapted *in vivo* tumor treatment protocol

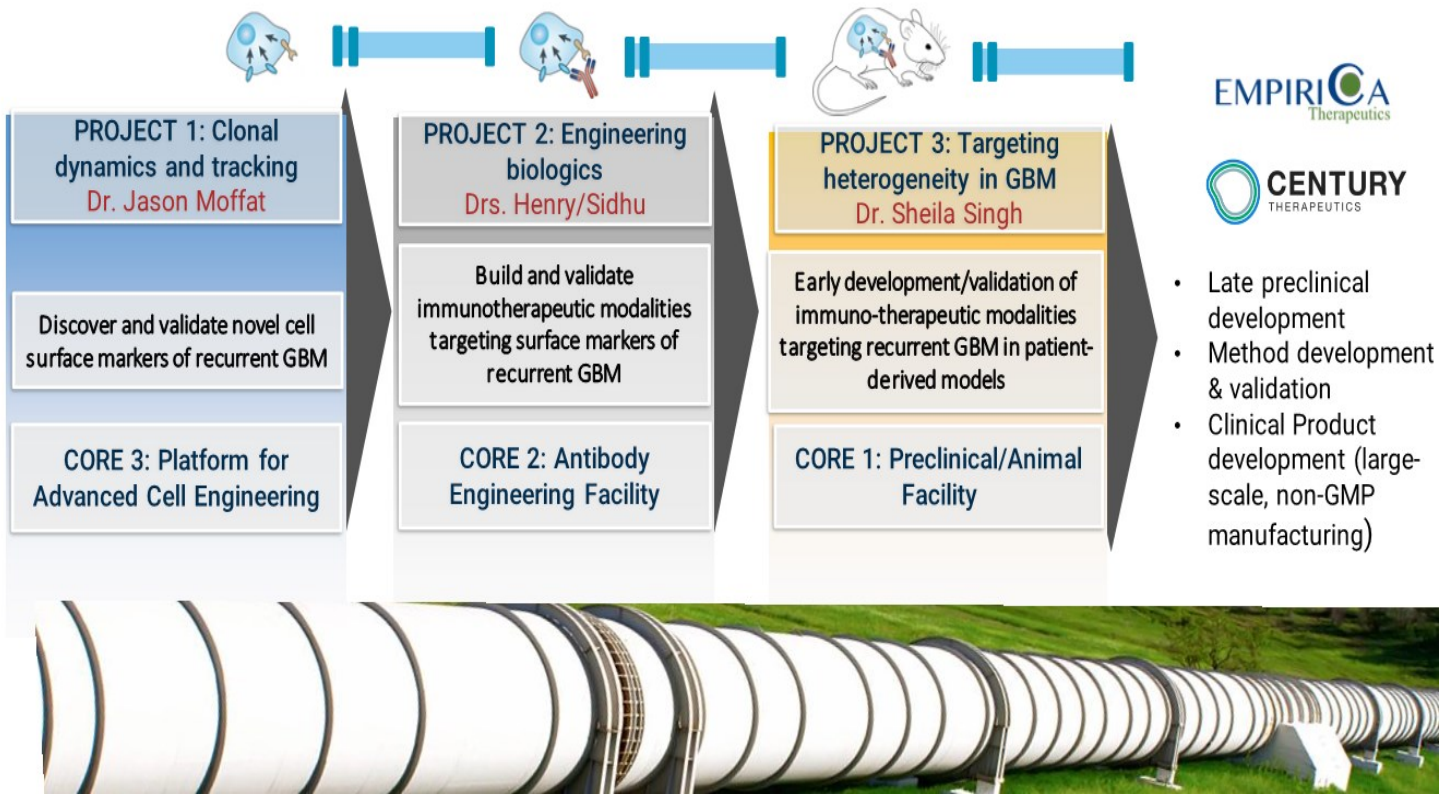






# GBM program: A Translational Pipeline

Targeting clonal heterogeneity in treatment-refractory GBM with novel and empiric immunotherapies



# CD133, a marker of tumor initiating cells

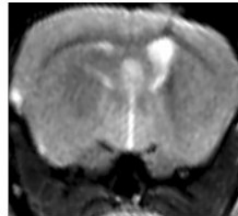


Sheila Singh Jason Moffat Parvez Vora Chitra Venugopal

*Nature* **432**, 396-401 (18 November 2004) | doi:10.1038/nature03128; Received 7 September 2004; Accepted 22 October 2004

## Identification of human brain tumour initiating cells

Sheila K. Singh<sup>1,2,3</sup>, Cynthia Hawkins<sup>1,4</sup>, Ian D. Clarke<sup>1,2</sup>, Jeremy A. Squire<sup>5</sup>, Jane Bayani<sup>6</sup>, Takuichiro Hide<sup>1,2</sup>, R. Mark Henkelman<sup>5</sup>, Michael D. Cusimano<sup>3,7</sup> & Peter B. Dirks<sup>1,2,3</sup>



Intracranial xenografts  
100 CD133+ BTICs

## Brain Tumor Initiating Cell (BTIC) model

Tumor Type	Marker(s) Used to Enrich for CSCs
Acute myeloid leukemia	CD34 <sup>+</sup> CD38 <sup>-</sup>
Breast	CD44 <sup>+</sup> CD24 <sup>-</sup>
Breast	ALDH1 <sup>+</sup>
Brain	CD133 <sup>+</sup>
Prostate	CD44 <sup>+</sup> α <sub>2</sub> β <sub>1</sub> <sup>high</sup> CD133 <sup>+</sup>
Head and neck	CD44 <sup>+</sup>
Colon	CD133 <sup>+</sup>
Colon	EpCAM <sup>high</sup> CD44 <sup>+</sup>
Colon	ALDH1 <sup>+</sup>
Pancreas	ESA <sup>+</sup> CD44 <sup>+</sup> CD24 <sup>-</sup>
Pancreas	CD133 <sup>+</sup>
Mesenchymal	Side population
Lung	CD133 <sup>+</sup>
Liver	CD90 <sup>+</sup>
Melanoma	ABC B5 <sup>+</sup>
Ovarian	CD133 <sup>+</sup>

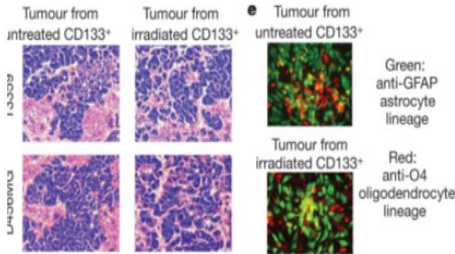
## CD133, a marker of treatment-resistance in several human malignancies

# CD133, a marker of treatment-resistant GBM

CD133- Nature 444, 756-760 (7 December 2006) | doi:10.1038/nature05236; Received 1 June 2006; Accepted 7 September 2006; Published online 18 October 2006

## Glioma stem cells promote radioresistance by preferential activation of the DNA damage response

Shideng Bao<sup>1,2</sup>, Qiulian Wu<sup>1,2</sup>, Roger E. McLendon<sup>2,3</sup>, Yueling Hao<sup>1,2</sup>, Qing Shi<sup>1,2</sup>, Anita B. Hjelmeland<sup>1,2</sup>, Mark W. Dewhirst<sup>4</sup>, Darell D. Bigner<sup>2,3</sup> & Jeremy N. Rich<sup>1,2,5,6</sup>



## Molecular Cancer

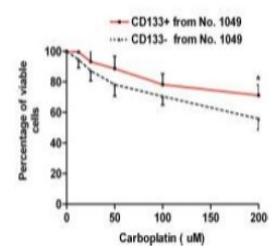
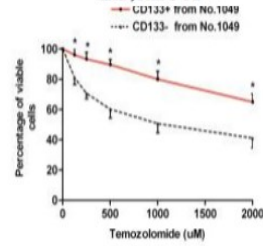


Research

Open Access

### Analysis of gene expression and chemoresistance of CD133<sup>+</sup> cancer stem cells in glioblastoma

Gentao Liu<sup>1,2</sup>, Xiangpeng Yuan<sup>1</sup>, Zhaohui Zeng<sup>1</sup>, Patrizia Tunicci<sup>1</sup>, Hiushan Ng<sup>1</sup>, Iman R Abdulkadir<sup>1</sup>, Lizhi Lu<sup>1,3</sup>, Dwain Irvin<sup>1</sup>, Keith L Black<sup>1</sup> and John S Yu<sup>\*1,4</sup>



CD133 expression correlates with disease progression, metastasis, recurrence, and poor overall survival in several human malignancies

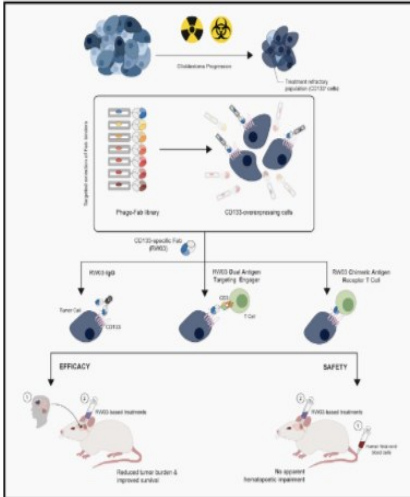
# Engineering CD133-targeting immunotherapies

## Cell Stem Cell

Clinical and Translational Report

### The Rational Development of CD133-Targeting Immunotherapies for Glioblastoma

#### Graphical Abstract



#### Authors

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#### Correspondence

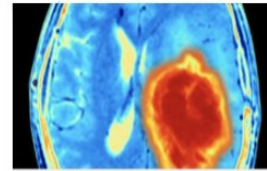
ssingh@mcmaster.ca (S.S.), j.moffat@utoronto.ca (J.M.)

#### In Brief

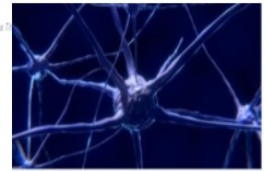
In this article, Singh and colleagues undertook a comparative evaluation of pre-clinical efficacy and safety of three immunotherapeutic modalities directed against CD133 brain tumor-initiating cells. While all three modalities were efficacious in orthotopic GBM xenografts, CD133-specific CAR-T cells represented the most therapeutically tractable strategy against functionally important CD133+ GBM cells.



#### Startup targets glioblastoma tumors with CAR-T therapy



GENENEWIS.COM  
**CAR-T Cell Therapy Shows Promise against Glioblastoma in Mice**  
Study results have led to establishment of brain cancer immunotherapy...



MEDICALPRESS.COM  
**Treatment shows promise in treating deadly brain cancer**  
Researchers of McMaster University and the University of Toronto have...

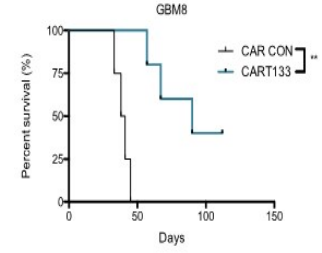
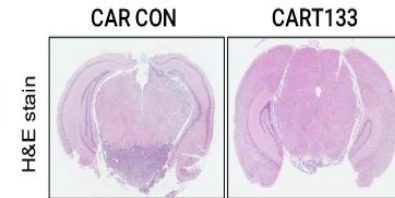
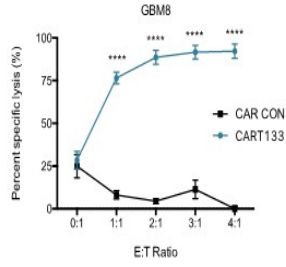
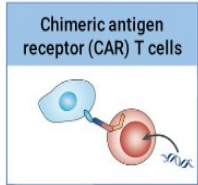
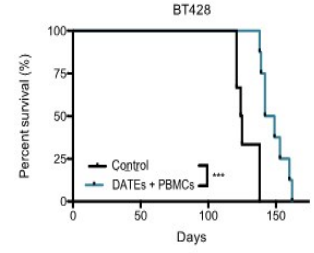
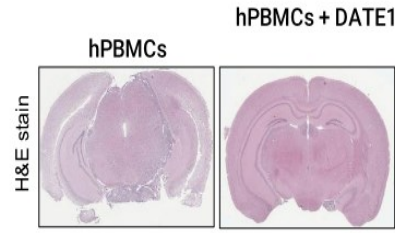
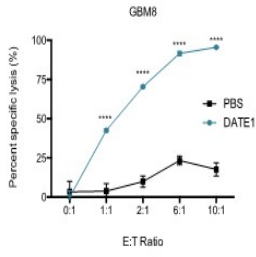
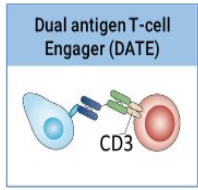
SCIENMAG.COM

#### Treatment shows promise in treating deadly brain cancer | Scienmag: Latest Science and Health News

When used in mice with human glioblastoma, CD133-targeting CAR-T therapy was considered a success Hamilton, ON (May 27, 2020) - Researchers of McMaster University and the University of Toronto have developed a promising...



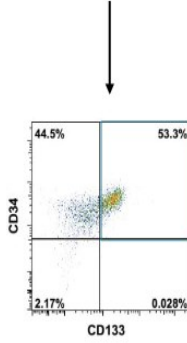
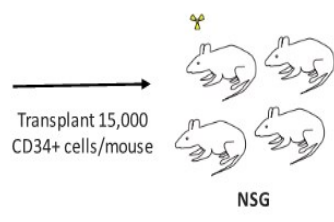
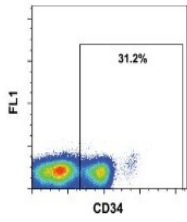
# CD133-directed treatment significantly eliminates GBM tumor burden



Vora et al., 2020 Cell Stem Cell

# Measuring the 'ON target OFF tumor' effect in humanized NSG mice

Hematopoietic stem cell enrichment  
from Lin-cord blood



Validate CD133 expression in cord  
blood HSPCs pre-transplant

NSG

12wk

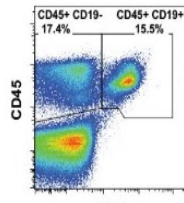
Long-term human  
stem cell  
repopulation

2wk

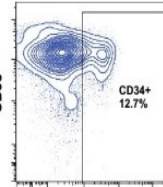
CD133 DAtEs  
CART133 cell  
treatment  
Intracranial or IV  
Delivery

Assess bone marrow for  
changes in CD133+  
hematopoietic stem and  
progenitor cell levels

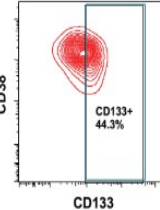
Bone marrow aspiration



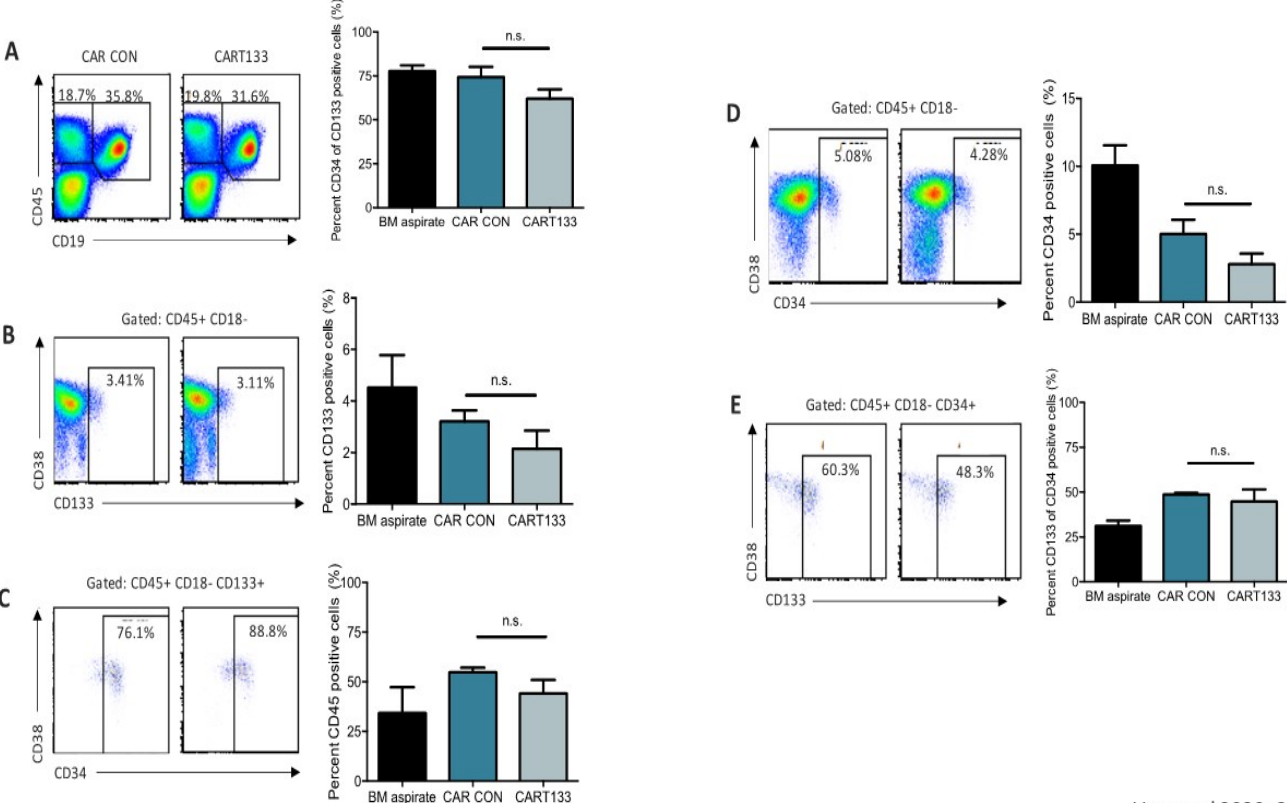
Bone marrow engraftment



CD133 expression in bone marrow pre-treatment



# ET001 treatment does not significantly reduce numbers of human HSPCs or impair haematopoiesis



Vora et al 2020, Cell Stem Cell

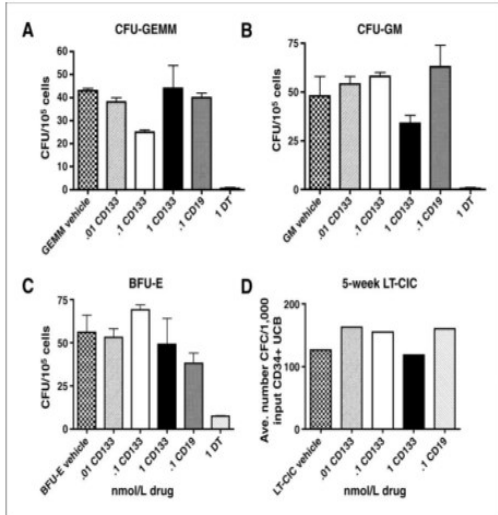
# CD133 plays a redundant role in haematopoiesis?

Therapeutic Discovery

Molecular  
Cancer  
Therapeutics

## Targeting Tumor-Initiating Cancer Cells with dCD133KDEL Shows Impressive Tumor Reductions in a Xenotransplant Model of Human Head and Neck Cancer

Nate N. Waldron<sup>1</sup>, Dan S. Kaufman<sup>2</sup>, Seunguk Oh<sup>3</sup>, Zintis Inde<sup>3</sup>, Melinda K. Hexum<sup>2</sup>, John R. Ohlfest<sup>4</sup>, and Daniel A. Vallera<sup>3</sup>

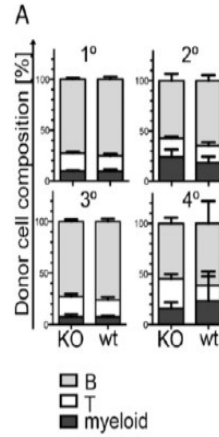


"CD133<sup>+</sup> cell targeting using dCD133KDEL does not inhibit hematopoietic colony development as assessed by short-term (2-weeks) and long-term (5-weeks) culture and colony-forming assays"

## CD133 is a modifier of hematopoietic progenitor frequencies but is dispensable for the maintenance of mouse hematopoietic stem cells

Kathrin Arndt<sup>1</sup>, Tatyana Grinenko<sup>3</sup>, Nicole Mende<sup>1</sup>, Doreen Reichert<sup>3</sup>, Melanie Portz<sup>2</sup>, Tatsiana Ripich<sup>1,3</sup>, Peter Carmeliet<sup>4,5</sup>, Denis Corbeil<sup>4</sup>, and Claudia Waskow<sup>1,2</sup>

<sup>1</sup>Regeneration in Hematopoiesis, Center for Regenerative Therapies Dresden (CRTD), Technische Universität Dresden, 01307 Dresden, Germany; <sup>2</sup>Tissue Engineering Laboratories, Biotec and CRTD, Technische Universität Dresden, 01307 Dresden, Germany; <sup>3</sup>Laboratory of Angiogenesis and Neurovascular Link, Vascular Research Center, VIB, 3000 Leuven, Belgium; and <sup>4</sup>Laboratory of Angiogenesis and Neurovascular Link, Department of Oncology, Katholieke Universiteit Leuven, 3000 Leuven, Belgium



"CD133-deficient HSCs (KO) can competitively and serially reconstitute immune cells and the HSC compartment of irradiated recipient mice"

"Animals were viable and fertile but are affected with a retinal degeneration leading to blindness. No obvious hematopoietic defects were reported in CD133 KO mice"



# NCT02541370: a phase I clinical trial of CD133-specific CAR-T for treatment of relapsed and/or chemotherapy refractory advanced malignancies

## Participant Overview [n=23]

- 7 with pancreatic carcinomas
- 2 with colorectal carcinomas
- 14 with hepatocellular carcinoma (HCC)

## Dose escalation study results:

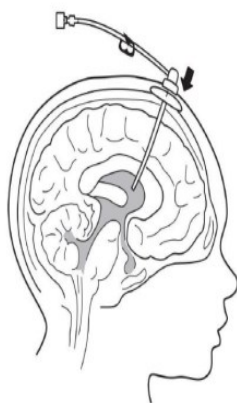
- **Dose 1:** Primary dose (0.05-0.15 x 10<sup>6</sup> cells/kg) was not sufficient in creating an obvious decrease in CD133 cells and an increase in CAR-gene copy
- **Dose 2:** Four patients moved onto dose 2(0.05-1.0 x 10<sup>6</sup> cells/kg) in cohort 2. These patients experienced mild (≤ Grade 2) hematologic toxicities but **self-recovered within 1 week**. CD133+ decreased and CAR-gene copy number increased
- **Dose 3:** The CART-133 cell dose was increased to 1.0-2.0 x 10<sup>6</sup>/kg for patients 5 to 8 in cohort 3. Similar toxicities and effective activity were all observed in cohort 3

Table 2. Patients' response and toxicity.

Patient No.	Disease status at study entry	No. of CAR positive T cells infused (10 <sup>6</sup> /kg) at each treatment cycle	Outcome		Grade ≥ 2 toxicities			
			Response (month)	New metastatic lesions during treatment	Adverse events	Grade	Time of occurrence after cell infusion	Duration
1	PD	1 st: 0.78	SD (4/25)	None	None			
2	PD	1 st: 0.51	PD	Spleen	Nausea Constipation	II III	2 weeks 2 weeks	2 weeks 2 weeks
3	PD	1 st: 0.8	SD (3/5)	None	None			
4	PD	1 st: 0.67	SD (3)	None	Anemia Thrombocytopenia Hypert bilirubinemia	II II III	3 days 3 days 5 days	1 week 1 week 3 weeks
5	PD	1 st: 1.01; 2 nd: 0.6	SD (4/5)	None	None			
6	PD	1 st: 1.0; 2 nd: 0.5 3rd: 1.4; 4th: 1.6	SD (15/25)	None	None			
7	PD	1 st: 1.8; 2 nd: 0.83 3rd: 1.5	SD (4)	None	Hypotension	II	2 days	2-3days
8	PD	1 st: 1.98; 2 nd: 0.52; 3rd: 1.34	PR (3) SD(1.7)	Abdominal wall	None			
9	PD	1 st: 1.32	PD	None	Hypert bilirubinemia	III	3 weeks	3 weeks
10	PD	1 st: 0.67; 2 nd: 1.43; 3rd: 1.08	PD	None	None			
11	PD	1 st: 1.05	SD (2)	None	None			
12	PD	1 st: 2.0; 2 nd: 2.0 3rd: 1.5	SD (13/7+)	None	None			
13	PD	1 st: 0.85	PD	None	None			
14	PD	1 st: 1.8; 2 nd: 1.0 3rd: 0.8	SD (6)	None	None			
15	PD	1 st: 1.48; 2 nd: 1.67 3rd: 2.0	PR (4)	None	Leukopenia	IV	2 days	2 weeks
16	PD	1 st: 1.88; 2 nd: 1.67 3rd: 1.92	PR (2)	None	Leukopenia Thrombocytopenia	III II	2 days 2 days	2-3 days 2-3 days
17	PD	1 st: 2.0	SD (3)	None	Thrombocytopenia	II	2-5days	3 weeks
18	PD	1 st: 1.8	SD (3)	None	Leukopenia	II	2 days	2-5 days
19	PD	1 st: 1.38 2 nd: 1.67	PD	None	Leukopenia Anemia Nausea Anorexia Mucosa hyperemia	II II III II II	2-5days 2-5days 2 weeks 2 weeks 4 weeks	1 week 2 weeks 4 weeks 4 weeks 2 weeks
20	PD	1 st: 1.72	PD	None	Leukopenia Anemia Nausea Anorexia Mucosa hyperemia	II III II II II	2-5days 2-5 days 2 weeks 2 weeks 4 weeks	1 week 2 weeks 4 weeks 4 weeks 2 weeks
21	PD	1 st: 1.43; 2 nd: 1.78 3rd: 1.52	SD (10/25+)	None	Leukopenia	II	2-5days	2-5 days
22	PD	1 st: 1.87	SD (2/2)	None	Leukopenia	II	2-5days	2 weeks
23	PD	1 st: 1.43; 2 nd: 1.79	SD (15/7+)	None	Hypert bilirubinemia (Direct bilirubin) Leukopenia	III III	1 week 2-5days	3 weeks 1 week

Abbreviations: PR, regression of measurable disease (≥30% decrease) and no new sites; SD, stable disease; PD, progressive disease.

# Locoregional delivery can address CAR-T trafficking challenges



Holter™ Rickham Catheter device for infusion of CAR-T cells

## Ongoing Phase 1 CAR-T clinical trials utilizing intracranial route of administration

Identifier	Indication	Therapy	Sponsor
NCT02208362	Relapsed GBM	Anti-IL13Ra2 CAR-T	City of Hope Medical Center
NCT03283631	Relapsed GBM	Anti-EGFRvIII CAR-T	Duke University Medical Center
NCT02442297	Relapsed GBM	Anti-HER2 CAR-T	Baylor College of Medicine
NCT03696030	Recurrent Brain or leptomeningeal Metastases	Anti-HER2 CAR-T	Baylor College of Medicine
NCT03500991	Recurrent/refractory pediatric CNS Tumors	Anti-HER2 CAR-T	Seattle Children's Hospital
NCT03638167	Recurrent/refractory pediatric CNS Tumors	Anti-EGFR806 CAR-T	Seattle Children's Hospital
NCT04003649	Recurrent/refractory GBM	Anti-IL13Ra2 CAR-T + nivolumab (IV)	City of Hope Medical Center
NCT03389230	Recurrent/refractory high-grade Glioma	Anti-HER2 memory-enriched T cells	City of Hope Medical Center

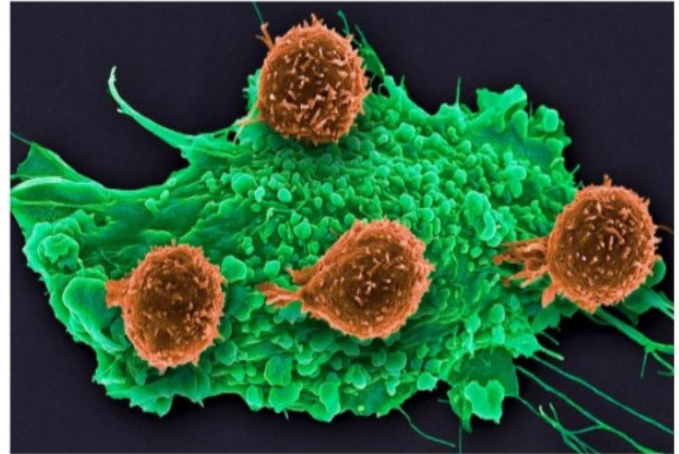
# Engineering new allogeneic CAR T therapies for cancer patients

## RESEARCH ARTICLE SUMMARY

### CLINICAL TRIALS

## CRISPR-engineered T cells in patients with refractory cancer

Edward A. Stadtmauer\*†, Joseph A. Fraietta\*, Megan M. Davis, Adam D. Cohen, Kristy L. Weber, Eric Lancaster, Patricia A. Mangan, Irina Kulikovskaya, Minnal Gupta, Fang Chen, Lifeng Tian, Vanessa E. Gonzalez, Jun Xu, In-young Jung, J. Joseph Melenhorst, Gabriela Plesa, Joanne Shea, Tina Matlawski, Amanda Cervini, Avery L. Gaymon, Stephanie Desjardins, Anne Lamontagne, January Salas-Mckee, Andrew Fesnak, Donald L. Siegel, Bruce L. Levine, Julie K. Jadowsky, Regina M. Young, Anne Chew, Wei-Ting Hwang, Elizabeth O. Hexner, Beatriz M. Carreno, Christopher L. Nobles, Frederic D. Bushman, Kevin R. Parker, Yanyan Qi, Ansuman T. Satpathy, Howard Y. Chang, Yangbing Zhao, Simon F. Lacey\*, Carl H. June\*†



Immune cells (brown) attack a cancer cell. Using CRISPR could make the immune cells more potent. STEVE GSCHEISSNER/SCIENCE SOURCE

## Cutting-edge CRISPR gene editing appears safe in three cancer patients

By Jennifer Couzin-Frankel | Feb. 6, 2020, 2:00 PM



Enhanced Control of iNK Cells in the Treatment of GBM

Hy Levitsky, MD | President, R&D

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# Major Challenges in Cell Therapy for GBM

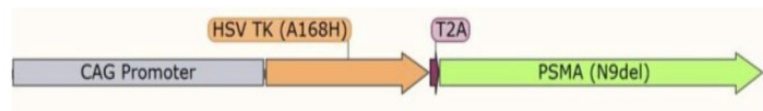
- Clonal evolution of cancer cells driving antigen heterogeneity
- The most abundant target antigens are also expressed at some level on normal tissues
- The CNS is highly sensitive to features associated with immune effector function (e.g., cytokines, rapid cell expansion, altered vascular permeability)
- Difficulty assessing PK and biodistribution of effector cells in the brain complicates dose and schedule optimization
- Suppressive features of the tumor microenvironment must be addressed in product and clinical trial design

**The ability to address many of these challenges requires a level of therapeutic control that has not been a feature of current generation cell therapies**

# Century's iNK platform- Engineered to provide control to overcome these challenges

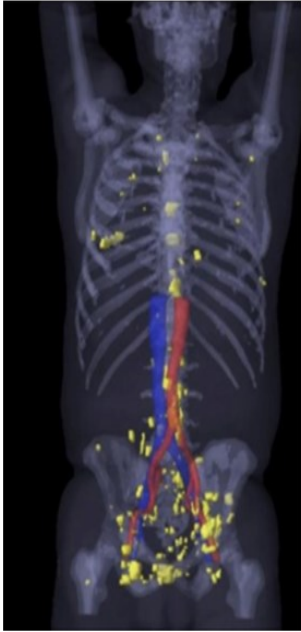
- NK cells significantly less proliferative than T cells, reducing the risk of toxicities associated with rapid and extensive lymphocyte expansion in the brain
- iNK clones selected for maximal serial killing capacity, achieving tumor eradication with less cell expansion vs CAR-T
- Direct activation of iNK cells via NKG2D recognition of GBM "stress ligands" MIC-A, MIC-B, ULBP
- Antigen heterogeneity addressed with multi-plex targeting via "bridge molecules" (monoclonal antibodies engaging CD16 and custom binders engaging Universal CAR)
  - **Finite half-life of protein bridge molecules provide control over the extent of iNK cell activation against targets**
- HSV-tk enables rapid termination of toxicities unresponsive to SOC
- PET reporter genes designed to enable serial non-invasive assessment of PK and biodistribution to guide dose and schedule during clinical development (and potentially in clinical practice)

# HSVtk-2A-PSMA Cassette



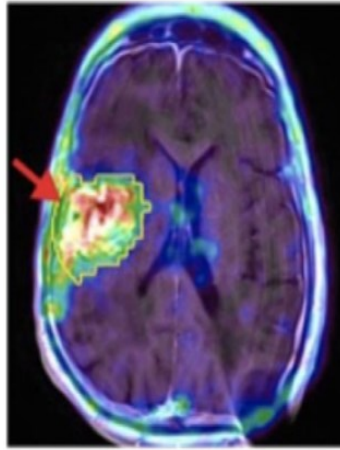
- Single molecular construct enables co-expression and selection for intracellular HSV-tk, and surface membrane expressed PSMA
- HSV-tk encodes an intracellular enzyme that converts ganciclovir (GCV) into GCV-triphosphate that inhibits DNA-polymerase, leading to cell death (“Safety Switch”)  
Used successfully in the clinic to abort T cell mediated toxicity (GVHD) associated with allogeneic donor lymphocyte infusions<sup>1,2</sup>
- PSMA imaging with clinically approved PET probes is widely used to detect and quantify prostate cancer micro-metastases  
Preclinical studies of PSMA as a *PET reporter gene* in CAR-T demonstrate sensitive and quantitative detection of CAR-T in sites of accumulation (“total body PK”)

# PET Imaging for Quantitative Assessment of Cell Trafficking, Abundance, and Persistence



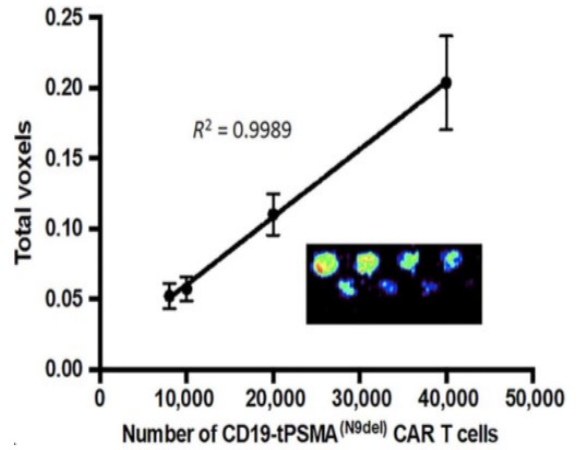
PSMA PET Imaging of Prostate Cancer

*OncologyLive*, Vol. 21/No. 6, Volume 21, March 13, 2020



HSV-tk PET Imaging of CAR-T in GBM

*SCIENCE TRANSLATIONAL MEDICINE*  
18 Jan 2017 Vol 9, Issue 373



Correlation between PET signal strength and CAR-T accumulation in mouse model

*SCIENCE ADVANCES* 3 Jul 2019 Vol 5, Issue 7

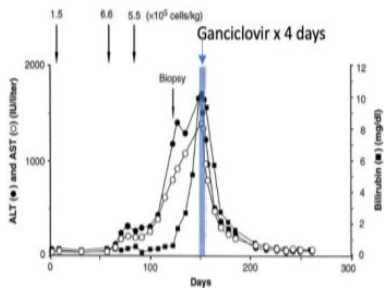


# Safety Switch

- Ability to rapidly eliminate the product upon encountering severe toxicities improves safety profile, broadens eligible patient populations, and partially de-risks pursuing novel targets that may have narrow therapeutic windows
- Transgenic HSV-tk expression has been successfully used in the clinic to abrogate severe T cell mediated toxicities within hours of ganciclovir administration
- Recently, CAR-T associated ICANS and CRS has been successfully abrogated within hours of triggering an alternate safety switch platform (iCas9 + rimiducid)

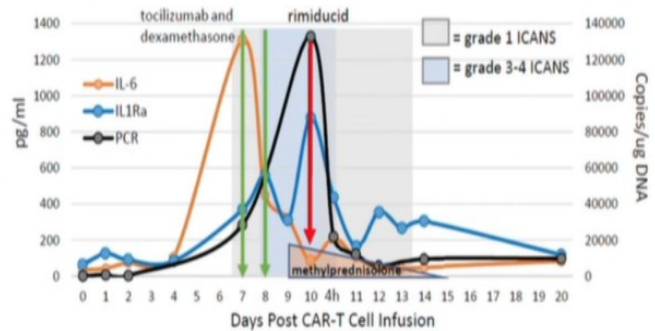
## HSV-TK Gene Transfer into Donor Lymphocytes for Control of Allogeneic Graft-Versus-Leukemia

Chiara Bonini, Giuliana Ferrari, Simona Verzeletti,  
Paolo Servida, Elisabetta Zappone, Luciano Ruggieri,  
Maurilio Ponzoni, Silvano Rossini, Fulvio Mavilio,  
Catia Traversari, Claudio Bordignon\*



SCIENCE • VOL. 276 • 13 JUNE 1997 • www.sciencemag.org

## Safety Switch Activation Rapidly Controls Severe CAR-T Associated ICANS



G. Dotti et al., ASGCT presentation May 2022



# Enhanced Control of iNK Cells To Address GBM

- Therapeutic control achieved through engineered product attributes enables the pursuit of the most challenging oncology settings, including GBM
- These attributes include:
  - Selection of cell type (iNK) and clones with limited replicative capacity
  - Tumor targeting via co-administered bridge molecules with finite half-lives
  - Precise assessment of cell expansion, biodistribution, and tissue-resident PK to guide dose and schedule determination
  - Safety switch to abrogate toxicities



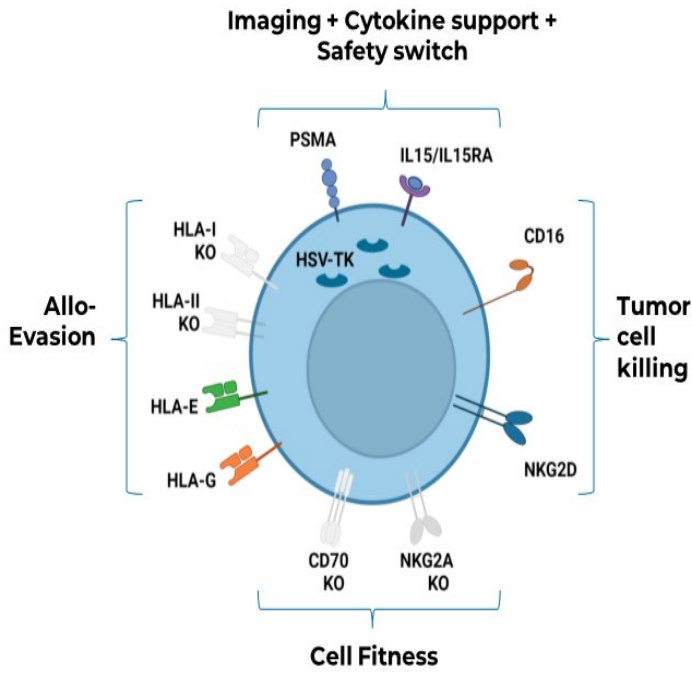
Century's iNK 3.0 platform  
iNK common progenitor and Next-Gen CNTY-103

Luis Borges, PhD | CSO

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# iNK 3.0 Common Progenitor

## Multiple New Features for Enhanced Functionality

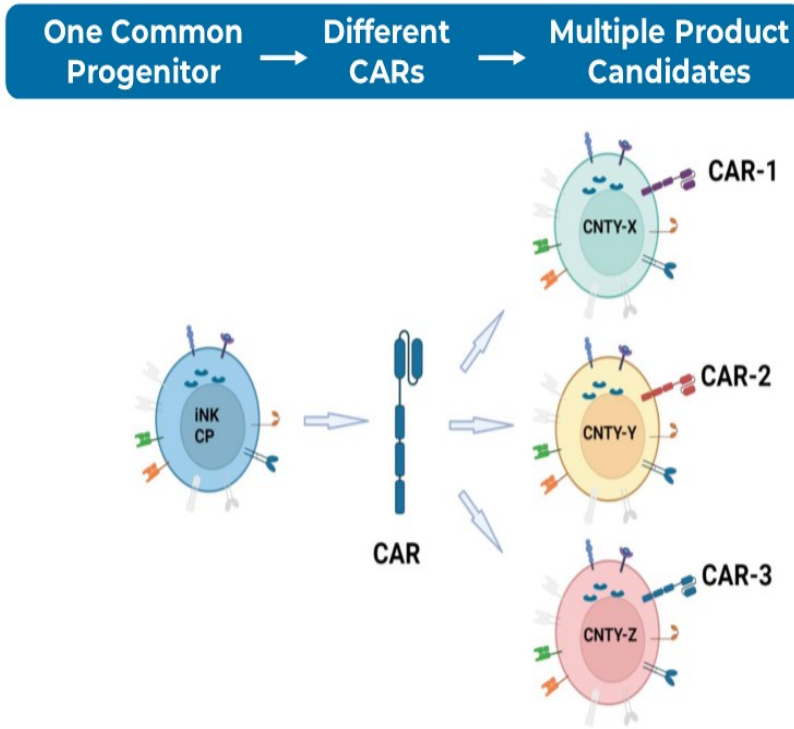


ENGINEERING PROFILE			
Step	Gene Edit		Rationale
1	KO	<b>NKG2A</b>	Potential to block inhibitory signal
	KI	<b>IL15/IL15Ra</b>	Homeostatic cytokine support
2	KO	B2M	Allo-Evasion
	KI	HLA-E-2A-HLA-G	Allo-Evasion
3	KO	CIITA ex5	Allo-Evasion
	KI	<b>HSV-TK-2A-PSMA</b>	Safety switch + cell tracer
4	KO	<b>CD70</b>	Landing pad, potential to enhance cell fitness
	KI	<b>CD16-2A-NKG2D</b>	Ab targeting + Tumor stress ligands
5	INS	CLYBL	Safe harbor site
	KI	CD133-CAR	Tumor targeting

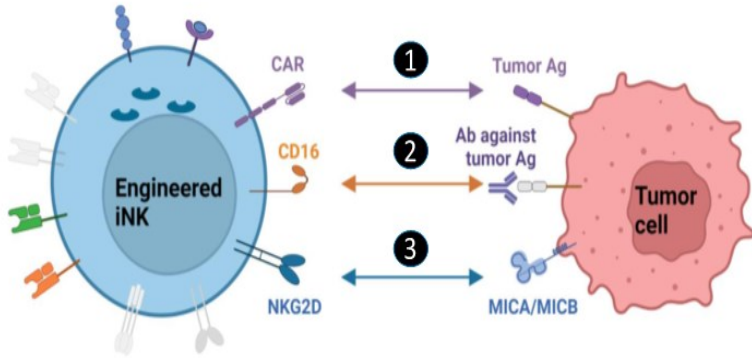
**Boldface:** iNK 3.0-specific gene edits

Common Progenitor Features

# The iPSC Common Progenitor Enables Significant Cost and Time Efficiencies



# iNK 3.0 Cell Platform Has Multiple Built-In Mechanisms for Tumor Cell Killing



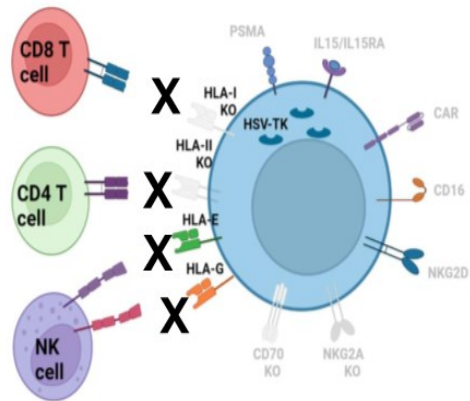
## PATHWAYS FOR TUMOR KILLING

1. CAR-mediated killing
2. ADCC (Antibody-dependent cellular cytotoxicity)
3. NKG2D-mediated killing through recognition of stress ligands

# iNK 3.0 Enhanced Allo-Evasion Features

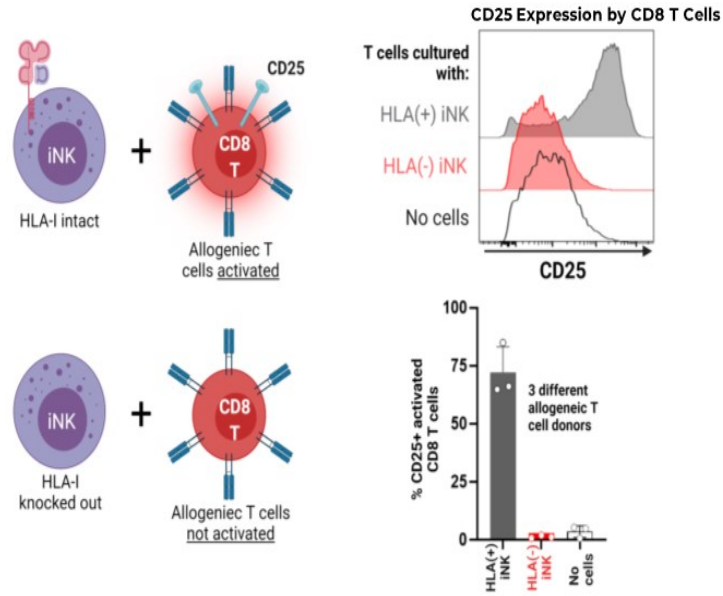
## Allo-Evasion 3.0

- Deletion of  $\beta 2M$  designed to eliminate HLA-I expression and prevents recognition by CD8 T cells
- Knock out of CIITA designed to eliminate HLA-II expression and prevents recognition by CD4 T cells
- Knock-in of HLA-E and HLA-G prevent killing by NK cells



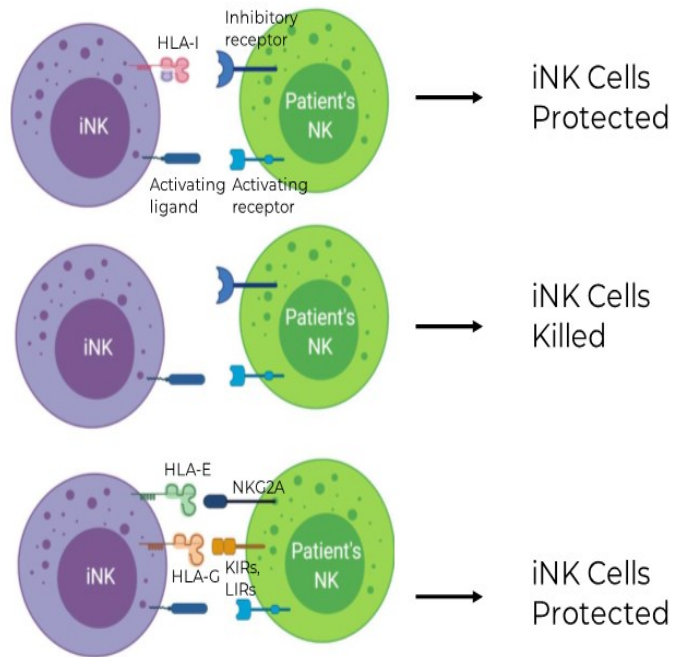
# iNK Cells Lacking HLA-I Are Not Recognized by Allogeneic CD8 T cells

## iNK Cells Expressing HLA-I Cause Allogeneic CD8 T Cell Activation, But Not HLA-I Null iNK Cells



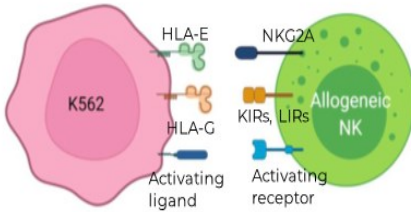


# Lack of HLA-I on iNK Cells Can Lead to Their Elimination by Allogeneic NK Cells



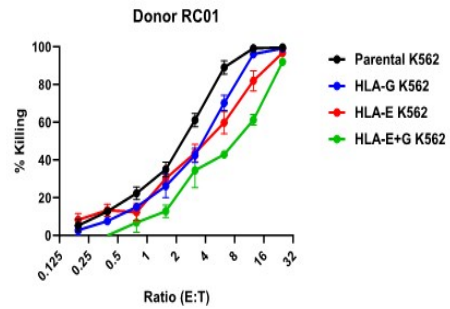
# Expression of HLA-E + HLA-G Offers Better Protection From NK Cell Killing

## Proof-of-Concept Study with HLA-I Null K562 Cells Engineered with HLA-E and HLA-G

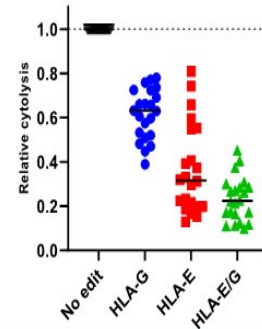


- HLA-E and HLA-G engage different receptors on NK cells including NKG2A, KIRs, and LIRs
- The expression of NKG2A, KIRs, and LIRs varies among NK cells from different donors

## The Combination of HLA-E + HLA-G Improved Protection to Killing by Allogeneic NK Cells

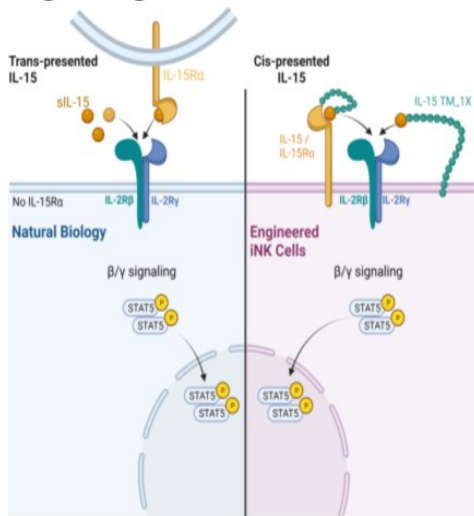


## Agglomerated Data from 22 NK Cell Donors

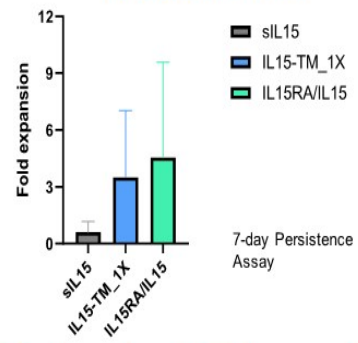


# Membrane-Bound IL-15/IL-15RA Enhances iNK Cell Persistence *in vitro*

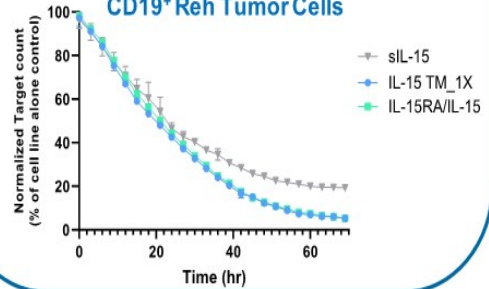
## IL-15 Receptor Engagement and Signaling



## Membrane-bound IL-15 Improves iNK Cell Persistence In Vitro

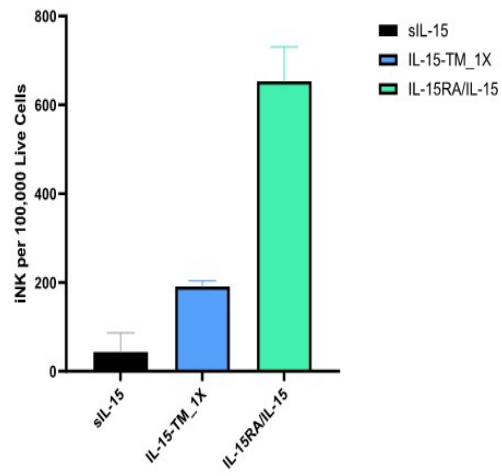


## Membrane-bound IL-15 Improves Killing CD19<sup>+</sup> Reh Tumor Cells

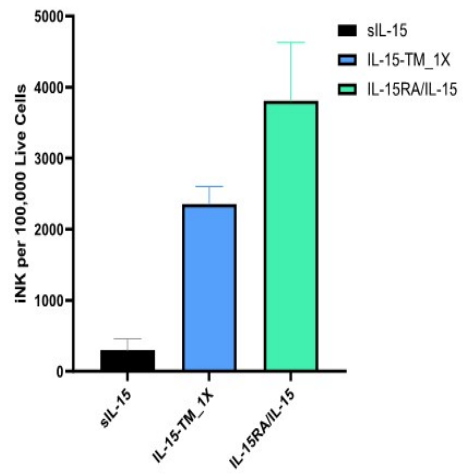


# Engineered IL-15/IL-15RA Enhances iNK Cell Persistence *in vivo*

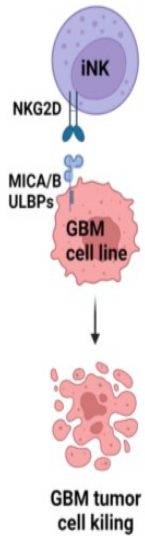
14-Day Peripheral Blood iNK Persistence



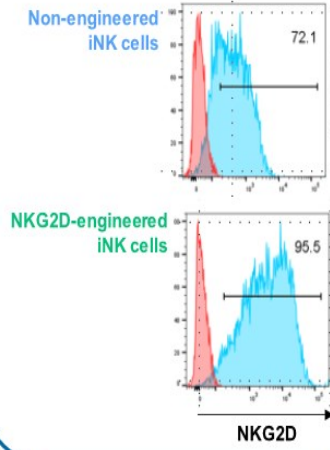
14-Day Lung iNK Persistence



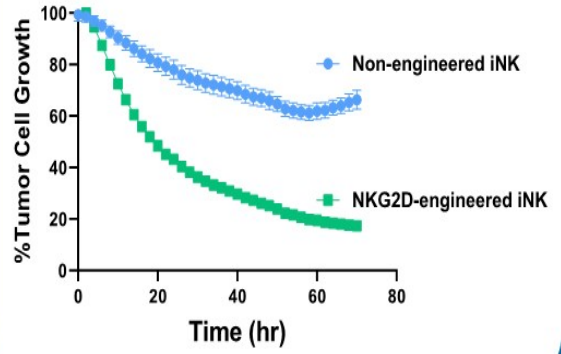
# Engineered NKG2D Expression on iNK Cells Enhances Tumor Killing



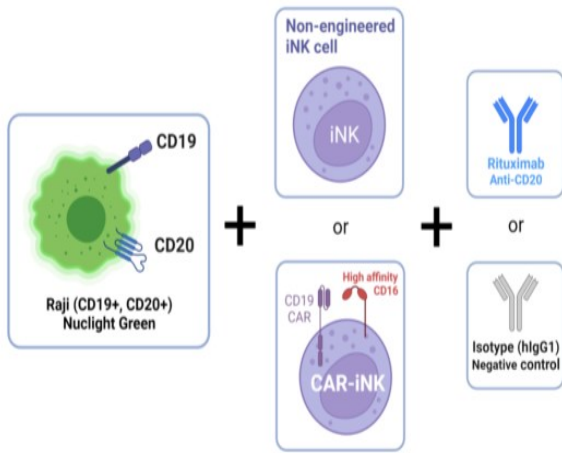
## Engineered iNK Cells Express Higher Levels of NKG2D



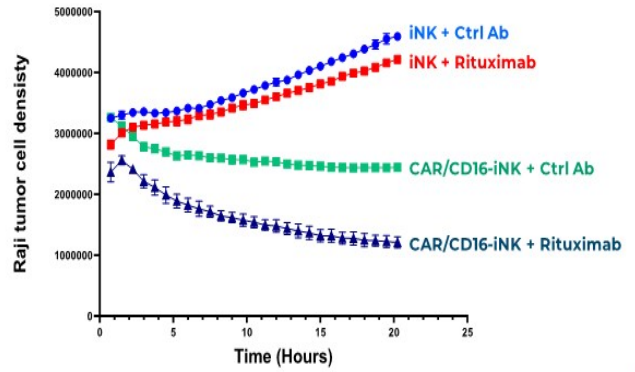
## NKG2D-Engineered iNK Cells Mediate Robust Killing of the U87 GBM Cell Line



# High-affinity CD16 Augments CAR-Mediated Killing of Tumor Cells Through Antibody-Dependent Cellular Cytotoxicity (ADCC)



iNK Cells Engineered with High Affinity CD16 Mediate Robust ADCC of Tumor cells



# Pivoting to the iNK 3.0 Platform to Create Next-Gen CNTY-103 Is Expected to Improve the Likelihood of Clinical Success

The iNK 3.0 Platform incorporates multiple features that are highly relevant for the treatment of GBM

Pivoting to the iNK 3.0 platform is expected to improve the likelihood of clinical success for CNTY-103 without a major timeline impact

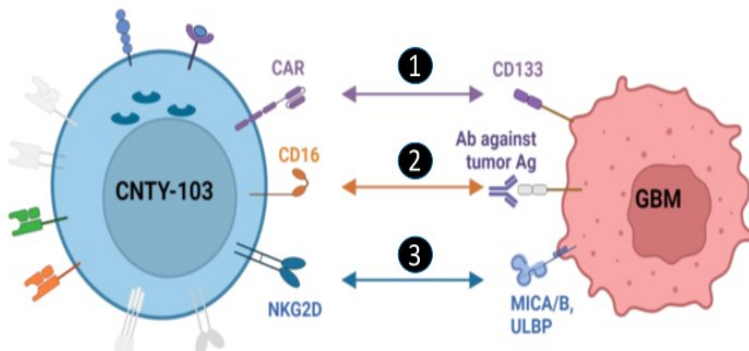
Next-Gen CNTY-103 uses a single specificity CAR to target CD133 and adds two additional mechanisms for tumor cell killing (NKG2D and CD16)

- Targeting of EGFR is leveraged through the combination with an anti-EGFR antibody that acts through CD16

PET-reporter (PSMA) provides a non-invasive image tool that we believe will help gain significant insights on the persistence and migration of CNTY-103 iNK cells after infusion

The incorporation of a safety switch is expected to improve the safety profile

# Next-Gen CNTY-103 Has Multiple Built-in Mechanisms for Enhanced Anti-tumor Activity



## MULTIPLE MECHANISMS TO CONTROL TUMOR GROWTH

### Tumor Killing

1. CD133 CAR-mediated tumor cell killing
2. CD16-mediated killing using Abs against tumor antigens (EGFR, HER2, CD70, others)
3. NKG2D-mediated killing through recognition of stress ligands (MICA/B, ULBPs)

### Tumor Microenvironment Modulation

- Elimination of suppressive cells within TME using Abs (CD73, CSF1R, PD-L1, others)



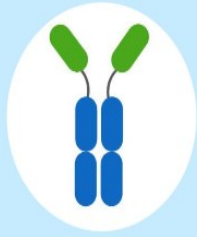


**Century's Novel Universal Targeting Receptor  
Adaptor Platform**

Jill Carton, PhD | Executive Director of CAR Engineering and  
Protein Sciences

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# Century's Protein Sciences Capabilities Drive Sophisticated Therapeutic Solutions



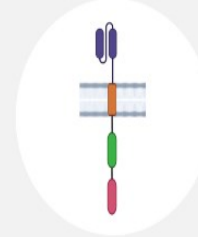
## **Antibody Discovery**

Century Therapeutics' proprietary Phage Display Library for novel humanized VHH tumor target binders



## **Protein Biochemistry**

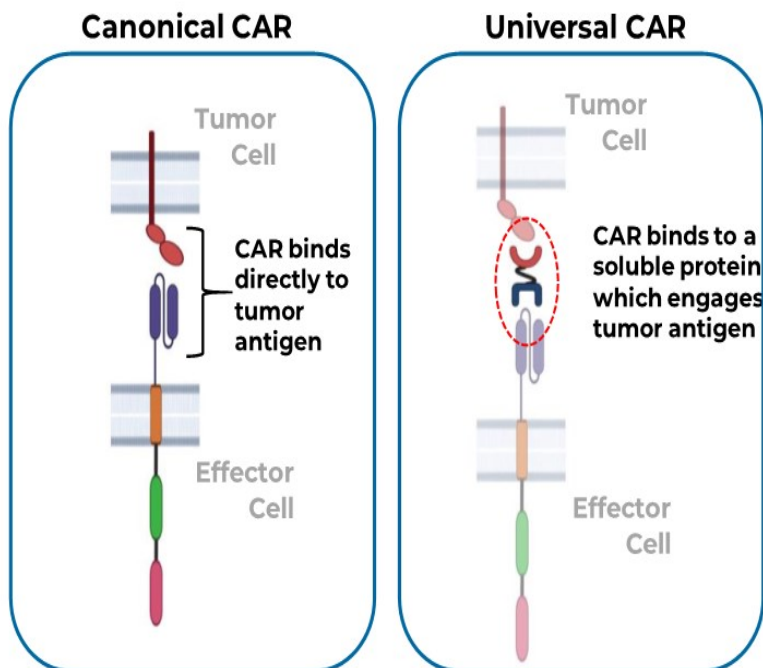
Protein stability and biophysical characteristics designed to produce safe and consistent products



## **Protein Engineering**

Fit-for-purpose CAR assembly and transgene designs for therapeutic cell features, allo-evasion, safety switch, cytokines

# Universal CAR Platforms Extend the Versatility of Conventional CARs



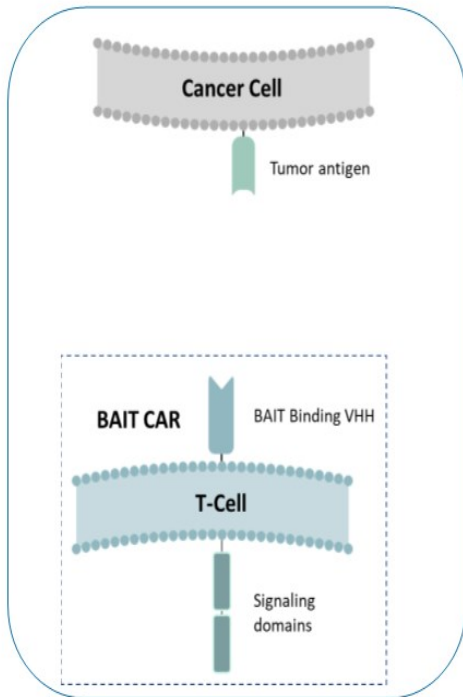
Universal CAR has two components:

1. CAR that binds a tag on a soluble protein
2. Soluble protein that binds to the tumor cell antigen and the CAR

Effector cell mediated tumor cell killing is only activated when the soluble protein engages both the CAR and the tumor antigen

Activity of the CAR can be modulated by the tumor targeting specificity and dose of the soluble protein

# Century's Novel Universal Targeting Receptor Adaptor Platform (uTRAP) is Versatile and Flexible

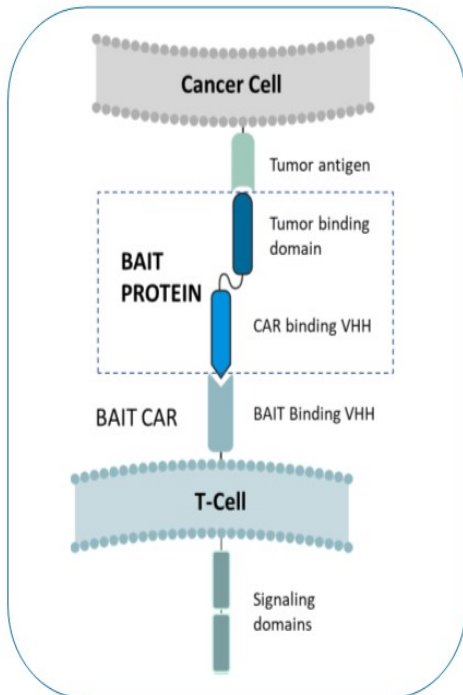


**uTRAP is built on highly adaptable, single domain VHH proteins**

## 1. BAIT CAR

- Inactive in circulation
- Inactive in the presence of tumor cells

# Century's Novel Universal Targeting Receptor Adaptor Platform (uTRAP) is Versatile and Flexible



**uTRAP is built on highly adaptable, single domain VHH proteins**

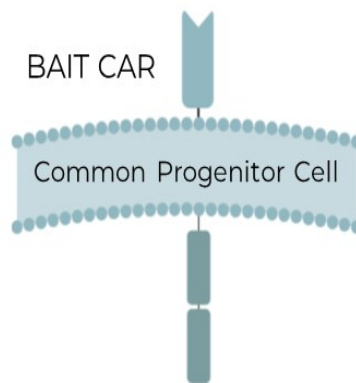
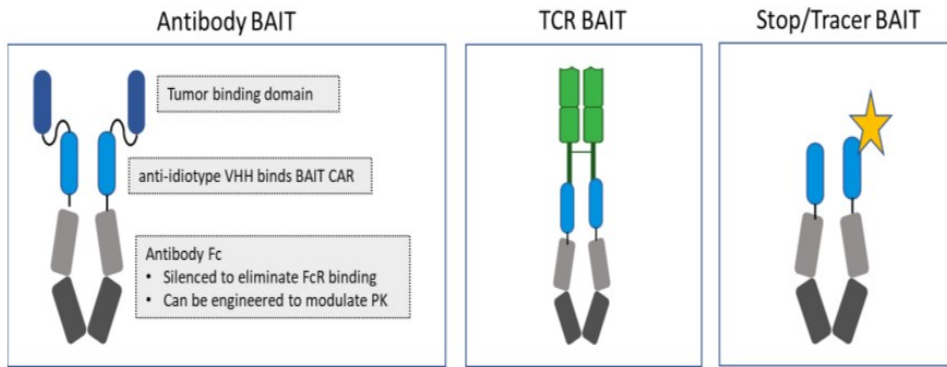
## 1. BAIT CAR

- Inactive in circulation
- Inactive in the presence of tumor cells

## 2. Bispecific Anti-Idiotypic Targeting (BAIT) Protein

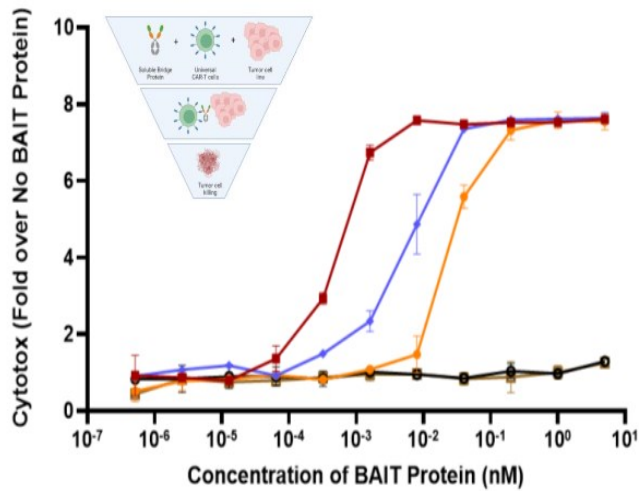
- Exploits the high specificity of an anti-Idiotypic antibody
- Adaptable binding affinity to the CAR and to the tumor antigen
- Effector cell mediated tumor cell killing is only activated when the BAIT engages both the CAR and the tumor antigen

# BAIT Proteins are Engineered for Diverse Functions and Used With a Single Cell Line



# Century's uTRAP Platform Mediates Potent Cytotoxicity

## In Vitro Killing of NALM6 EGFR+ Cells through uTRAP engineered T-Cells In the presence of EGFR BAIT proteins

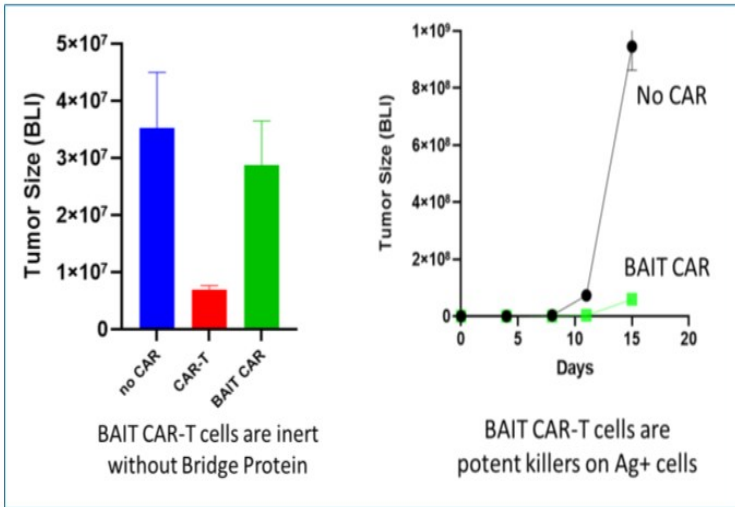


Sample	Format	EC50 (pM)
BAIT 1		0.5
BAIT 2		5.1
BAIT 3		22.3
BAIT 4		CAR only binder
BAIT 5		Tumor only binder

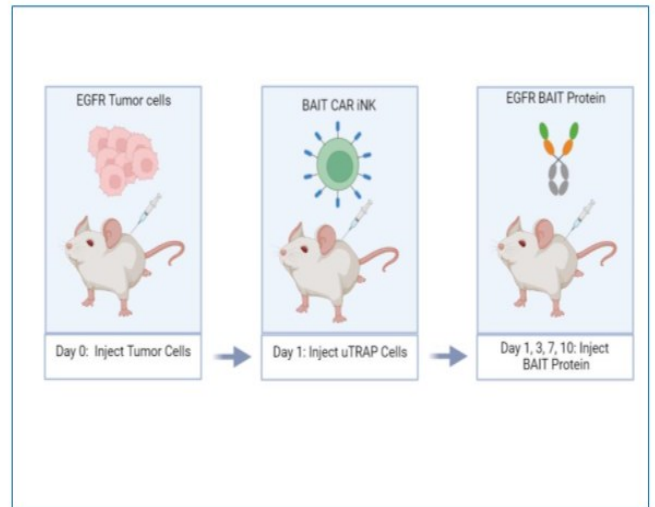
BAIT protein engineering can modulate functionality

# In vivo Proof of Concept Studies with Century's uTRAP Platform Initiated

## In vivo studies with Peripheral Blood T-cells



## uTRAP in vivo efficacy studies in iPSC-derived iNK and iT cells are initiated



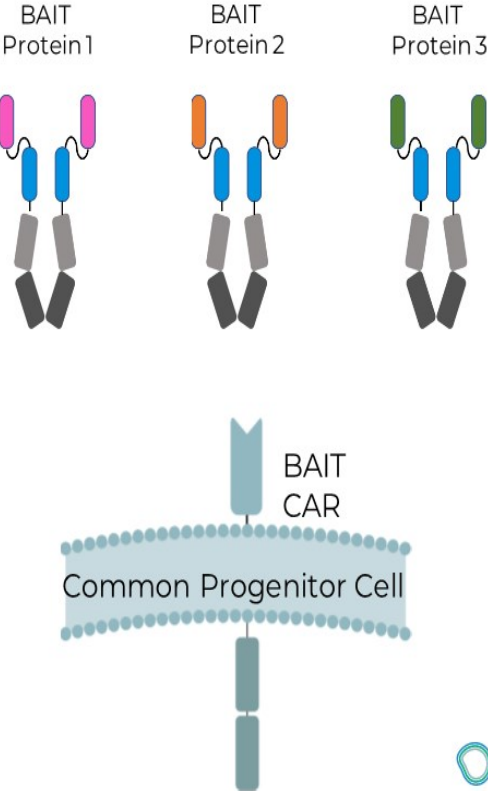
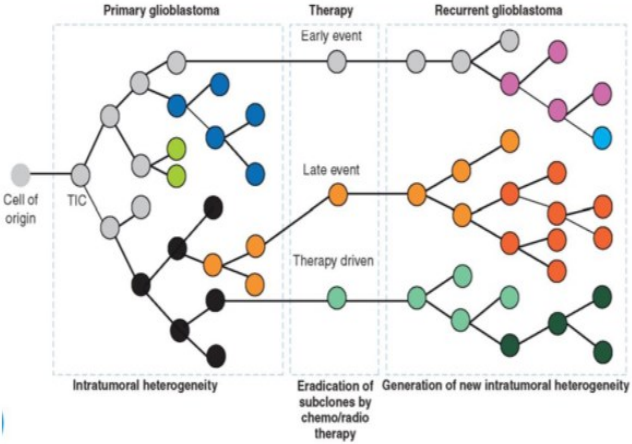


# Century's uTRAP Addresses Multiple Clinical Challenges

Advantage	
<b>Extend the target landscape</b>	Tunable potency and temporal regulation of BAIT protein increases control of target engagement Antibody and TCR BAIT formats access cell surface and intracellular targets
<b>Address tumor heterogeneity</b>	Soluble BAIT proteins can target multiple antigens, each for use with a single uTRAP cell line One cell line can be used to develop many therapeutic approaches
<b>Widen the therapeutic window</b>	Tunable potency and temporal regulation of activity provides greater control over adverse effects
<b>On/Off safety switch</b>	Soluble protein half-life regulation allows for off-switch Stop or Eliminate BAIT proteins can switch off/clear uTRAP cells
<b>Tracking and detecting</b>	Non-targeted, labelled BAIT protein to trace engineered cells

# uTRAP Enables a Therapeutic Strategy to Tackle Tumor Heterogeneity in Glioblastoma

Evolution of GBM tumor target profile



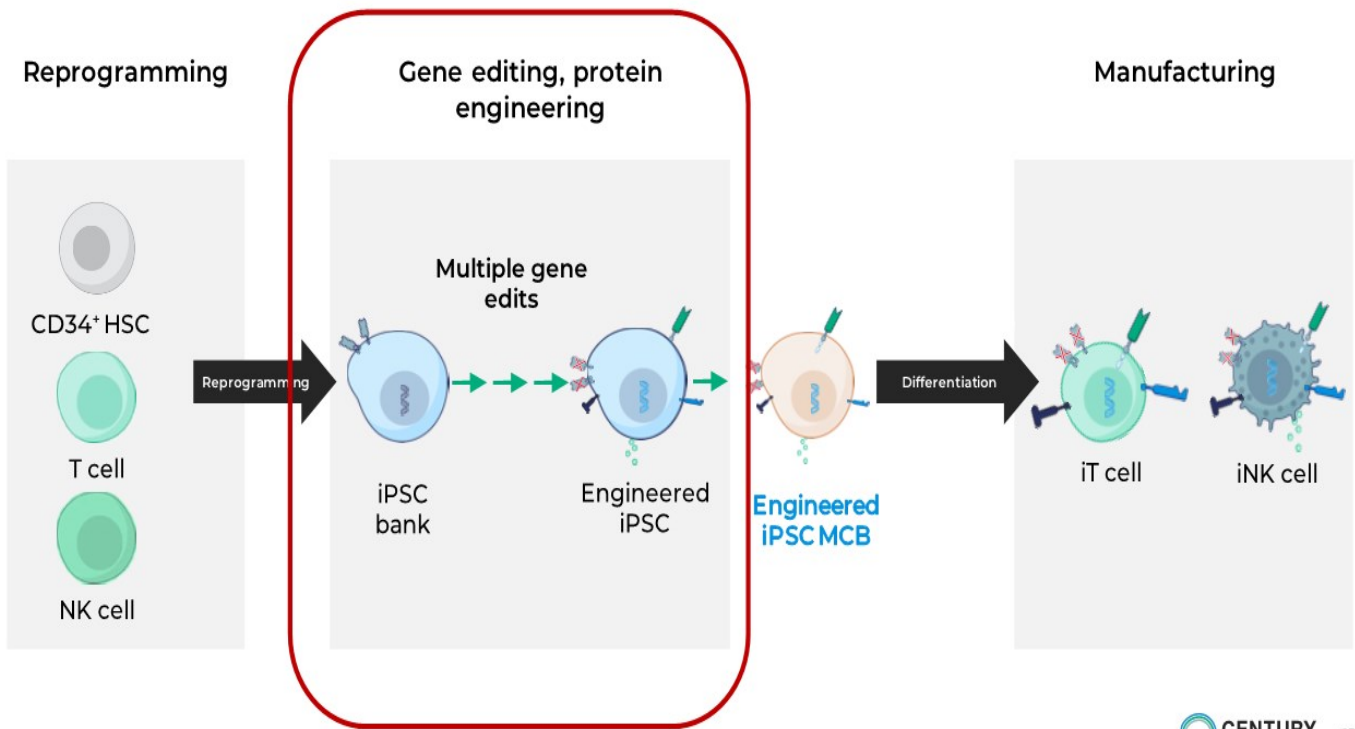


## MAD7 CRISPR Nuclease for iPSC Genome Engineering

Michael Naso, PhD | VP Cell Engineering

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# Century's End-to-End Platform Has the Key Components to Realize Potential of iPSC

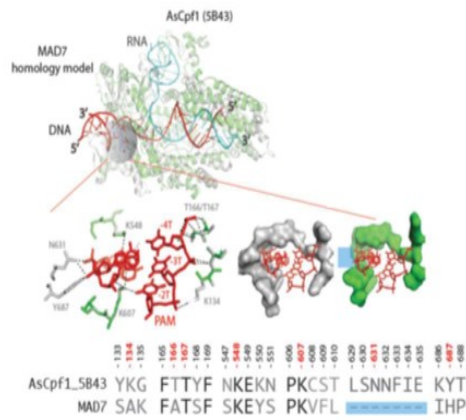


# Product Candidate Engineering Requires a High Functioning and Reliably Sourced CRISPR Nuclease

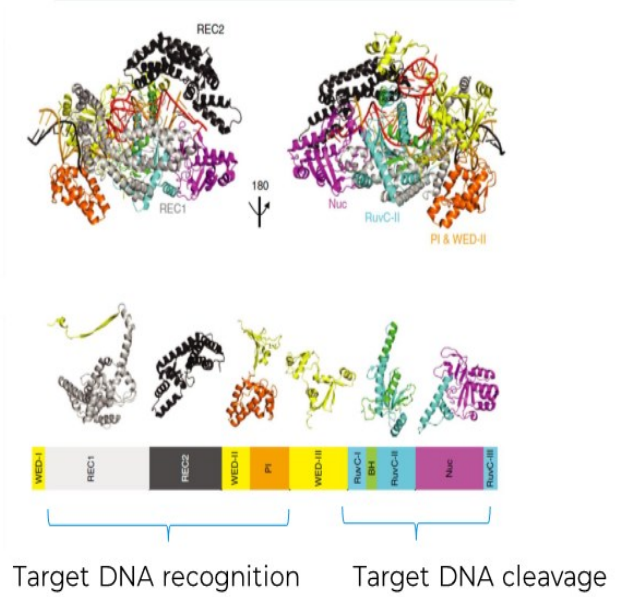
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Attribute	Preference for product candidate engineering
Double-stranded gDNA cleavage	High efficiency in iPSCs
Fidelity	Low off-target cutting
Gene insertion	High efficiency HDR in iPSCs
PAM site recognition	Prevalent throughout genome
Delivery	RNP formulation
Regulatory compliance	Complete documentation for all components

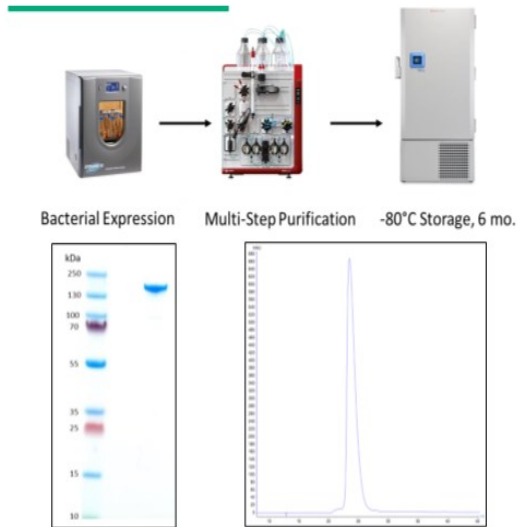
# MAD7 is a Novel Class 2 Type V-A CRISPR Nuclease



- High structural homology to Cpf1 (Cas12a), low sequence identity (~30%)
- T-rich PAM site similar to Cpf1
- Single molecule gRNA
- Staggered DNA cutting to facilitate HDR



# MAD7 Produced in House In E. Coli and is Functionally Equivalent to Industry Standard Cpf1



Multi-step column purification yields homogenous MAD7 protein

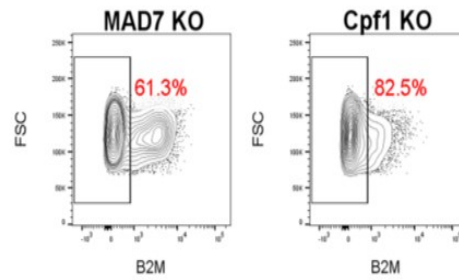
MAD7 RNPs function comparably to Cpf1 in iPSCs

MAD7 protein is stable for at least 6 months at -80C

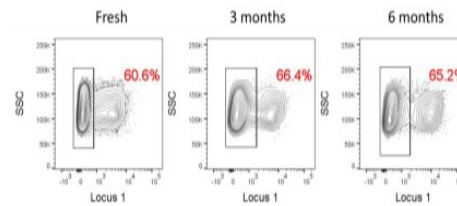
Regulatory compliant production process



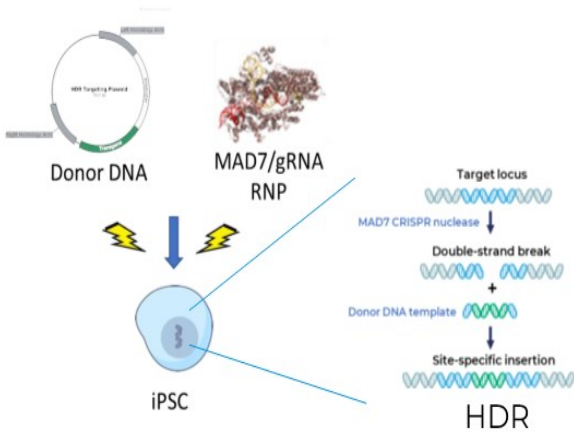
## Knock-out efficiency of MAD7 is as efficient as Cpf1



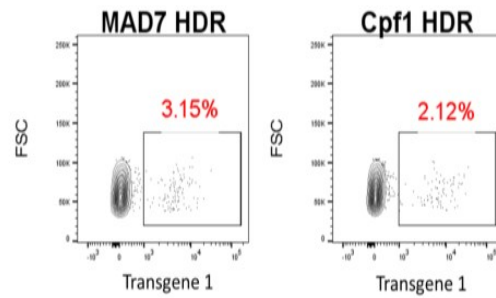
## Purified MAD7 activity is maintained for >6 months at -80C



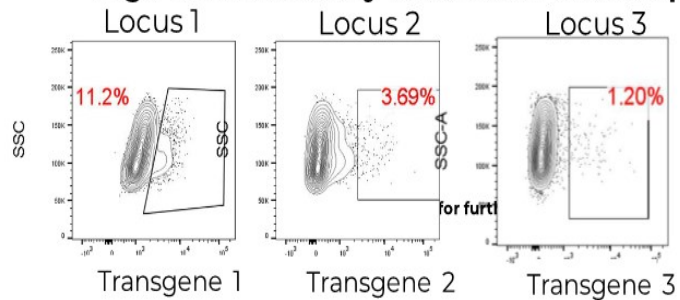
# Mad7 Facilitates HDR at Multiple Loci in iPSCs at Efficiencies Seen with Cpf1



HDR efficiency with MAD7 is equivalent to Cpf1



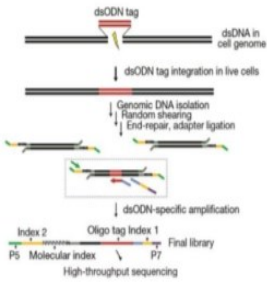
High HDR efficiency with MAD7 at multiple loci





# MAD7 is a High-Fidelity CRISPR Nuclease with Off-Target Rates at Least as Good as Cpf1

## Guide-seq off-target analysis



On-target Basic

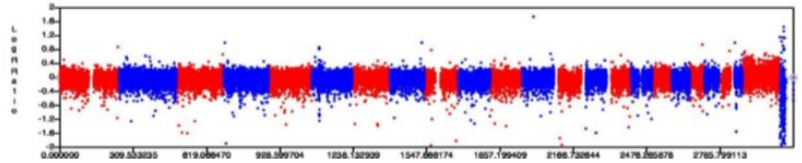
Sample	BED Chromosome	Position	Total Reads	+Reads	-Reads	+ODN Reads	-ODN Reads
B2M	chr15	447124	36233	227	35006	31331	35947

Off-target Basic

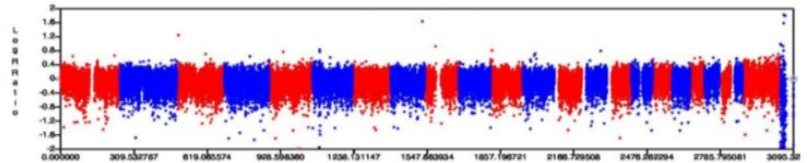
Sample	BED Chromosome	Position	Total Reads	+Reads	-Reads	+ODN Reads	-ODN Reads
B2M	chr11	58382331	492	0	252	2	168
	chr20	22976139	72	72	0	3	68

## SNP CNV array analysis

### iPSC donor line



### Engineered iPSC donor line



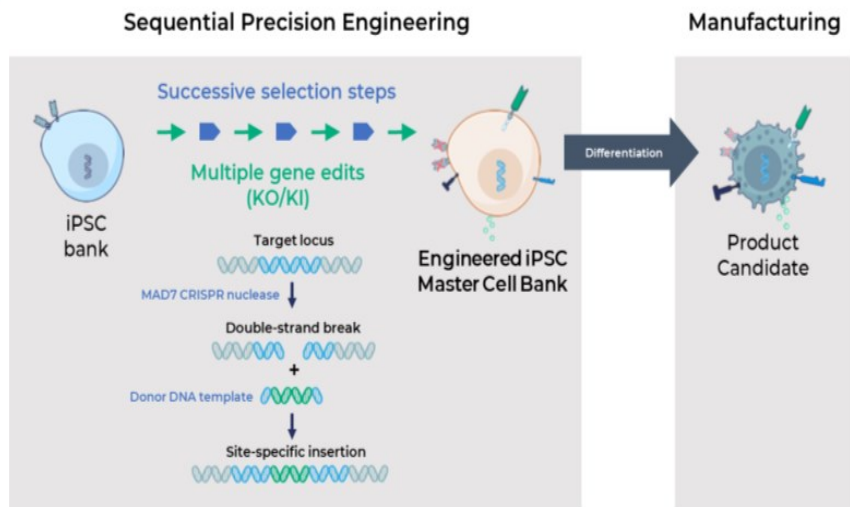
Guide-seq characterization revealed very low frequency of off-target cutting, comparable to Cpf1, in iPSCs

- SNP microarray CNV analysis does not show increased frequency of small or large CNVs with MAD7, comparable to Cpf1, in iPSCs

Not for further distribution

## WGS performed on all lead single-cell clones to confirm fidelity

# We Have Pivoted to MAD-7 for Platform and Pipeline Engineering of All Product Candidates



No impact on viability or pluripotency after multiple uses of MAD7 in iPSCs

Process used to make common progenitor iPSC clone for CAR insertion to support multiple programs

# We Continue to Optimize and Evolve Our Mad7 Platform

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Increasing protein production yield and long-term stability

PAM site evolution

Increased HDR efficiencies with further protein engineering

MAD7-on and MAD7-off fusions for gene regulation strategies

Not for further distribution





## Concluding Remarks

Lalo Flores, PhD | CEO

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Emerging leader in  
allogeneic cell  
therapies for cancer

**Comprehensive iPSC  
cell platform**

With end-to-end  
capabilities to develop  
iNK and  $\gamma\delta$ T cell  
candidates

**Disruptive, fit-for-  
purpose approach for  
GBM**

CNTY-103 engineered with  
multiple features to  
increase PTS

**Toolbox to address  
solid tumors**

iNK 3.0 platform and  $\gamma\delta$ T  
cell platform engineered  
with versatile features like  
UTRAP

**Emerging pipeline of  
candidates**

Product engine  
anticipated to deliver 5  
INDs over the next 3 years

**Financial Strength**

Cash runway into 2025  
Ended 1Q22 with cash, cash  
equivalents, and  
investments of \$466.4M



Q&A





Thank you

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