UNIVERSITY of MARYLAND
SCHOOL OF PHARMACY

GeneTrack

Capture the Manufacturing Process, Perform Live Tracking, and Identify Individual Adverse Events of CAR-T Cell Therapy

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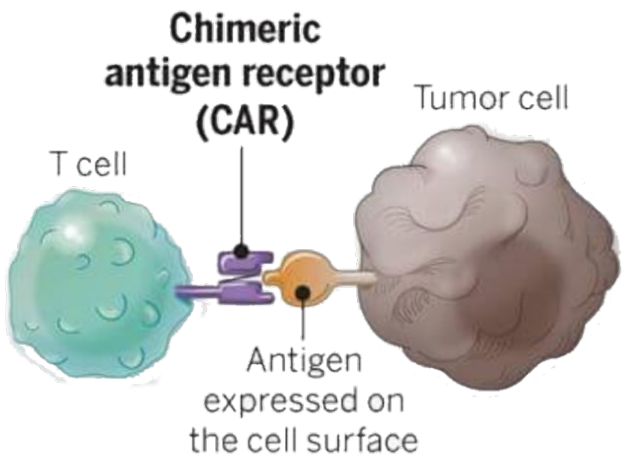
Presentation Overview

- Background: CAR-T Therapy
- Current Gaps
- Proposal: GeneTrack and GeneTracking Number
- GeneTrack System Demonstration
- Feasibility and Future Direction
- Conclusion

Background

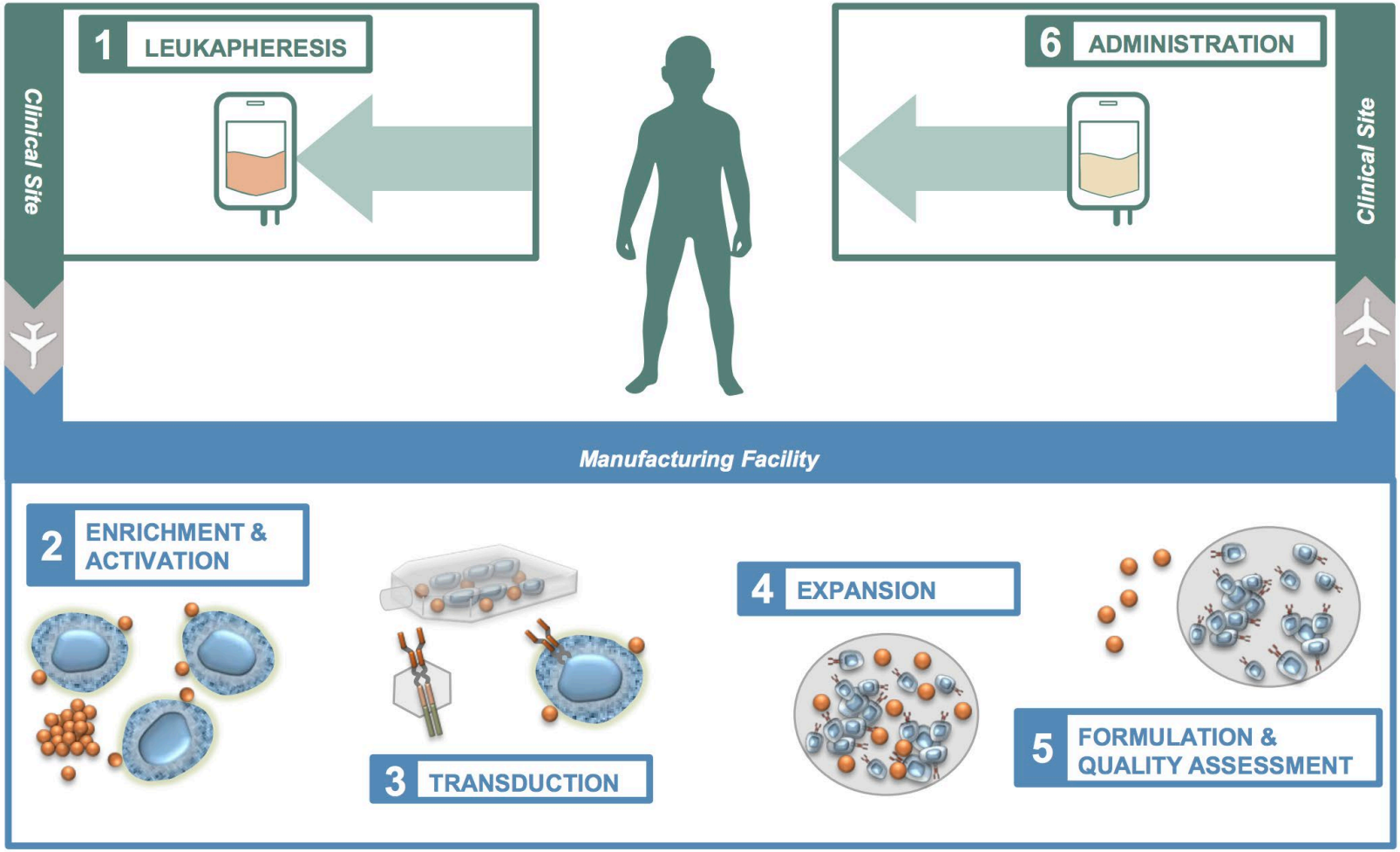
- Chimeric antigen receptor-modified T cells (CAR-T) therapy



  - Most promising immuno-oncology therapy
    - High response rates in patients with R/R B-cell malignancies
  - Individuals CAR-T cell therapy are not the same
    - Quality in processing of gene reflects the safety and efficacy

Source: Image from Microbe.tv

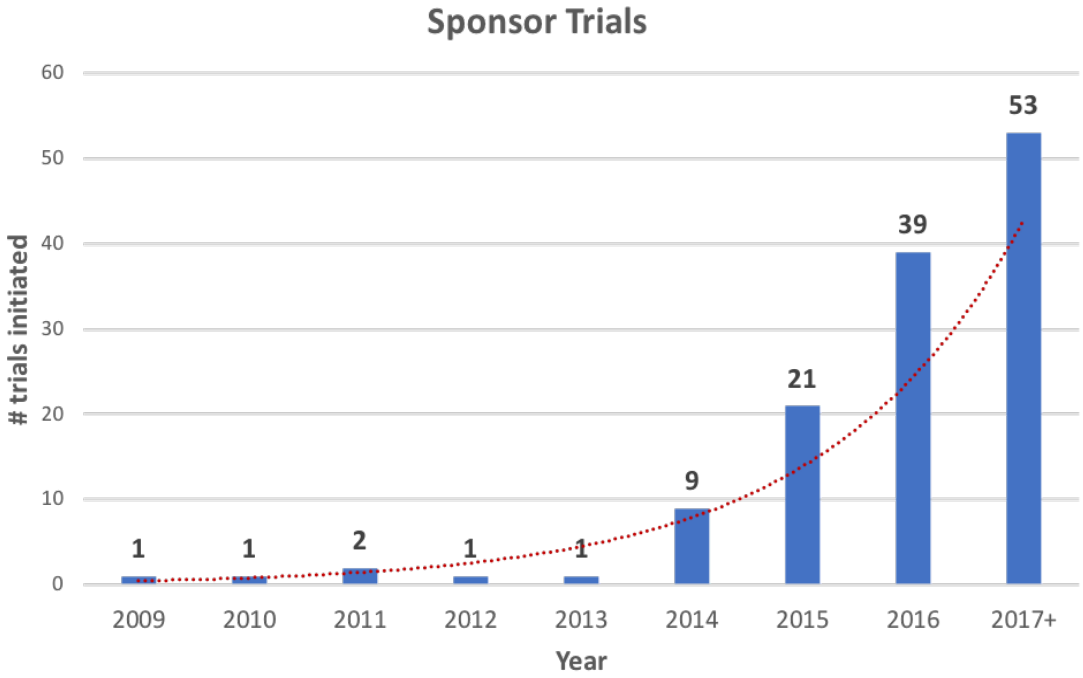
How CAR-T Cell Therapy Works



Source: Novartis Pharmaceuticals Corporation

Clinical Trials Landscape

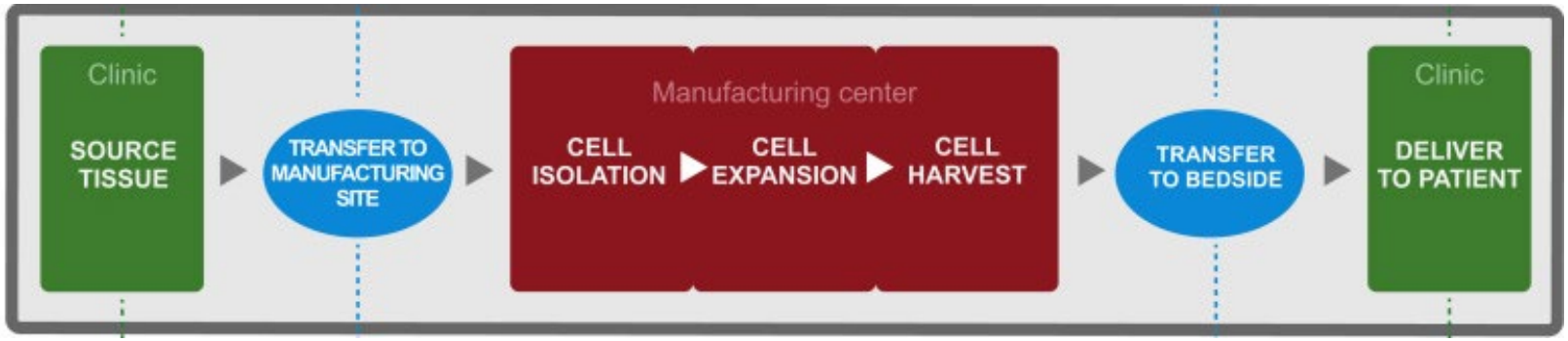
- As of 2017, **only 2 FDA-approved** CAR-T cell therapies
- > 100 CAR-T cell therapy sponsored trials are being investigated in hematologic and solid tumor space



Source: Clinicaltrials.gov

Current Gaps

- Limited tools to capture the manufacturing processes of post-marketing CAR-T cell therapy and track its distribution
  - Little Transparency
  - Lack Universal Tracking System



- Limited system to report adverse events to individual CAR-T cell therapy
- Uncertainties in its long term safety and efficacy

Image Source: Foster, Kimberly Lounds. "The Evolving CAR-T Therapy Supply Chain: Progress and Challenges." Cell and Gene Therapy Insights, vol. 3, no. 10, 2017, pp. 903–908., doi:10.18609/cgti.2017.085

Center for Biologics Evaluation and Research (CBER) Interim Strategic Plan FY 2017–2019

Objective 3.4

- Foster **improved manufacturing technologies and product characterization techniques** through a combination of research and interactions with stakeholders including sponsors.

Source: FDA, Center for Biologics Evaluation and Research (CBER) Interim Strategic Plan FY 2017–2019, https://www.fda.gov/downloads/aboutfda/centersoffices/cber/ucm266867.pdf

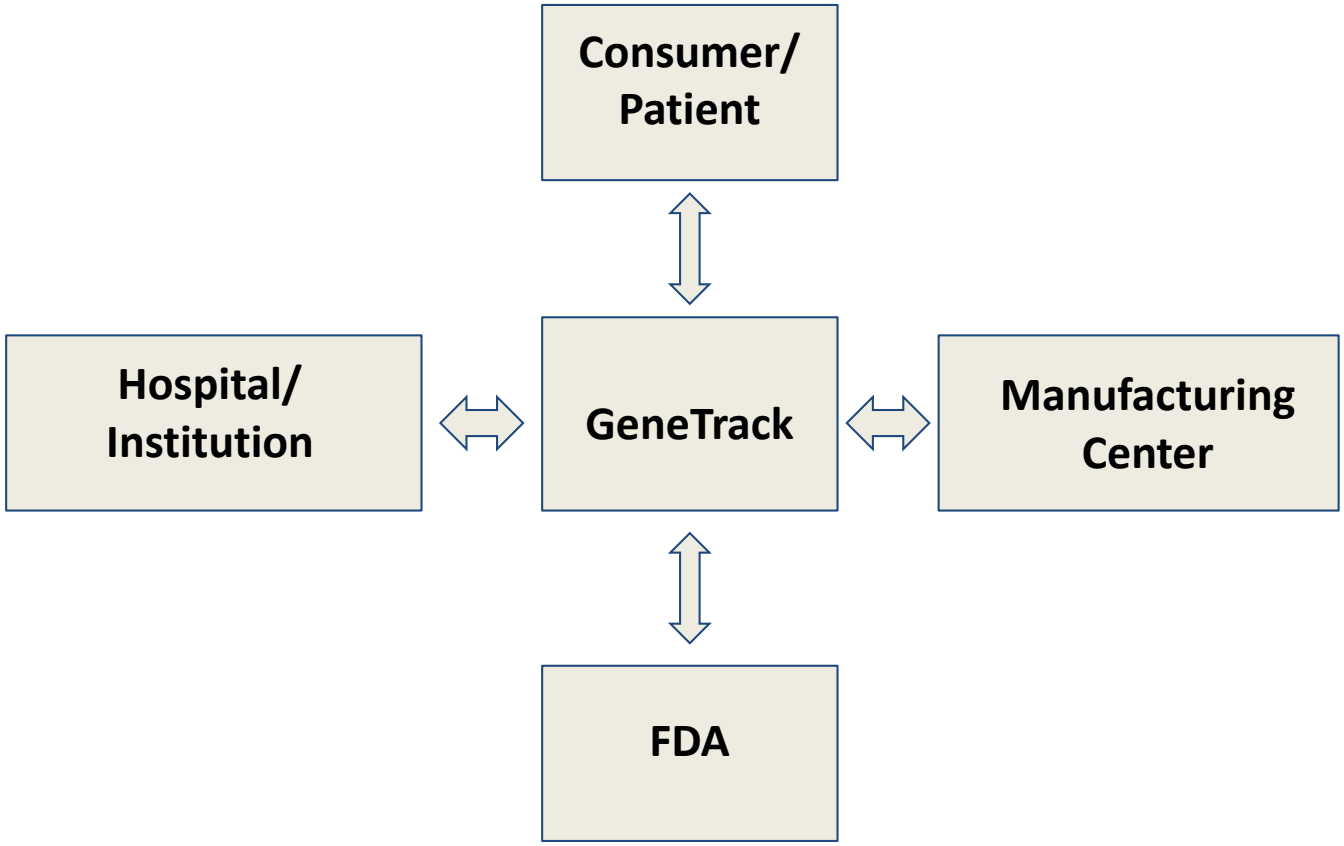
Importance of CAR T-Cell Regulation

- Novel individualized therapy
  - Required compliance of the CAR-T cell manufacturing process with global regulatory requirements
  - Limited long term data on Safety and Efficacy
- Expensive process
- Cumbersome/multiple manufacturing steps
  - Challenges in regulatory convergence or harmonization among the global regulatory agency

Proposal: GeneTrack System

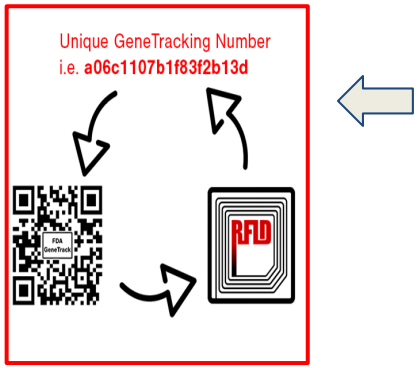
- **Publicly accessible database** in compliance with HIPAA
- **Capture the manufacturing process** of the individual CAR-T cell therapy
- **Report adverse events per individual** CAR-T therapy
- **Consolidate** patient electronic health record (EHR) with GeneTracking number
- GeneTracking number will be **linked to RFID/NFC** technology
  - Live tracking of distribution
  - Tampered/Damaged detection
  - Storage temperature detection

Proposal: GeneTrack System



GeneTrack System Demonstration

GeneTrack number generation (step 1)



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GeneTrack

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GeneTrack is an extensive publicly accessible database that contains information on the collection, extraction, and manufacturing of individualized gene therapy. Along with the GeneTracking number, this database creates a transparent system to capture the manufacturing process and to perform live tracking of the individual gene therapy .

Step 1: To generate a GeneTracking number, please click here

Step 2: To fill relevant information regarding the collection, extraction, and manufacturing of individual gene therapy, please click here. (*Note: you must obtain a GeneTracking number to proceed*)

To access the **GeneTrack Database** for manufacturing process information and live tracking of the individual gene therapy, please click here. (*Note: you must obtain a GeneTracking number to proceed*)

Spotlight

- References for the Regulatory Process for the Office of Tissues and Advanced Therapies
- OTAT Learn: Educational Webinars Regarding OTAT and Products Regulated in the Office

Contact FDA

(800) 835-4709
(240) 402-8010
ocod@fda.hhs.gov

Consumer Affairs Branch (CBER)
Division of Communication and Consumer Affairs
Office of Communication,

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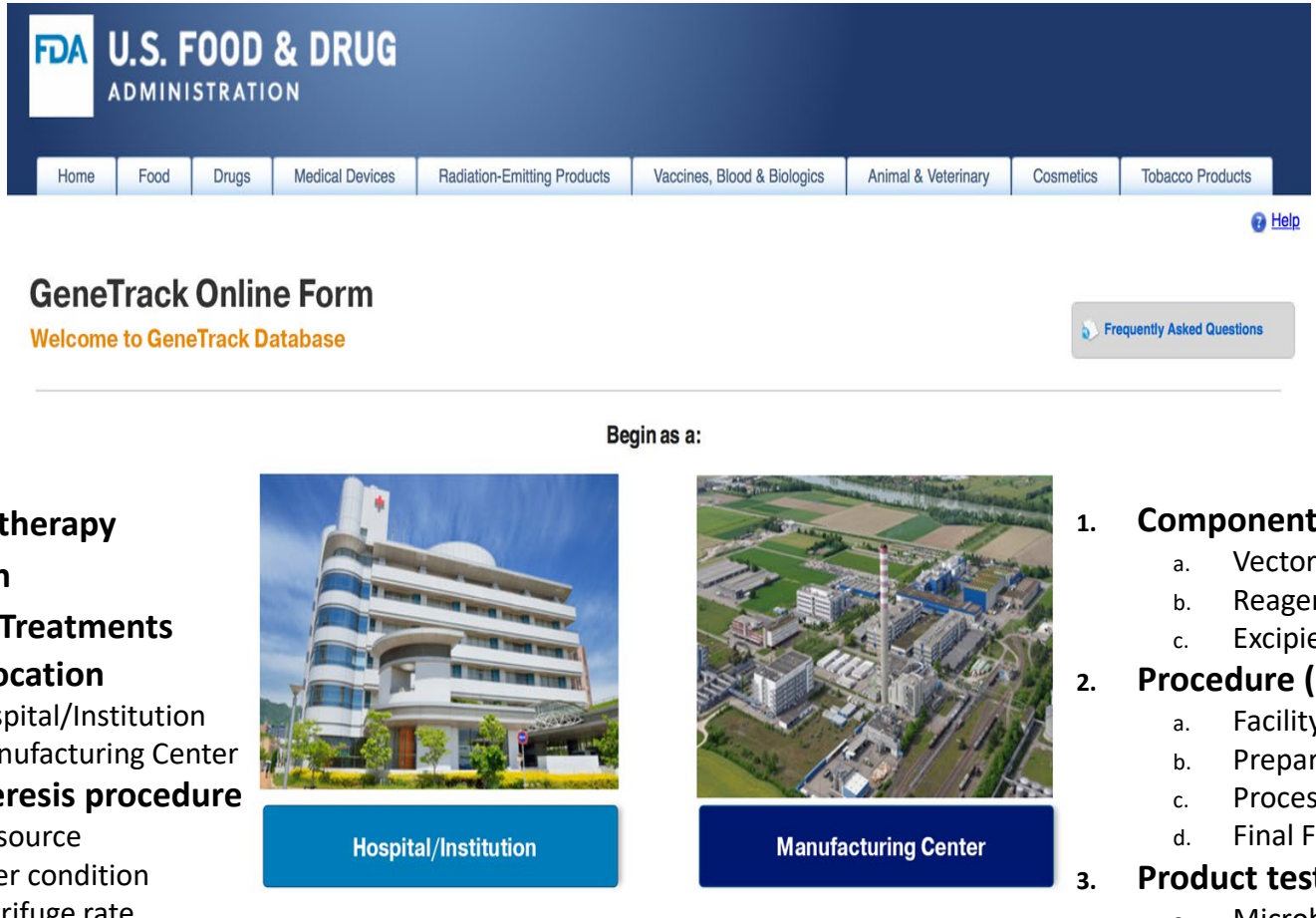
GeneTrack Online Form (step 2)

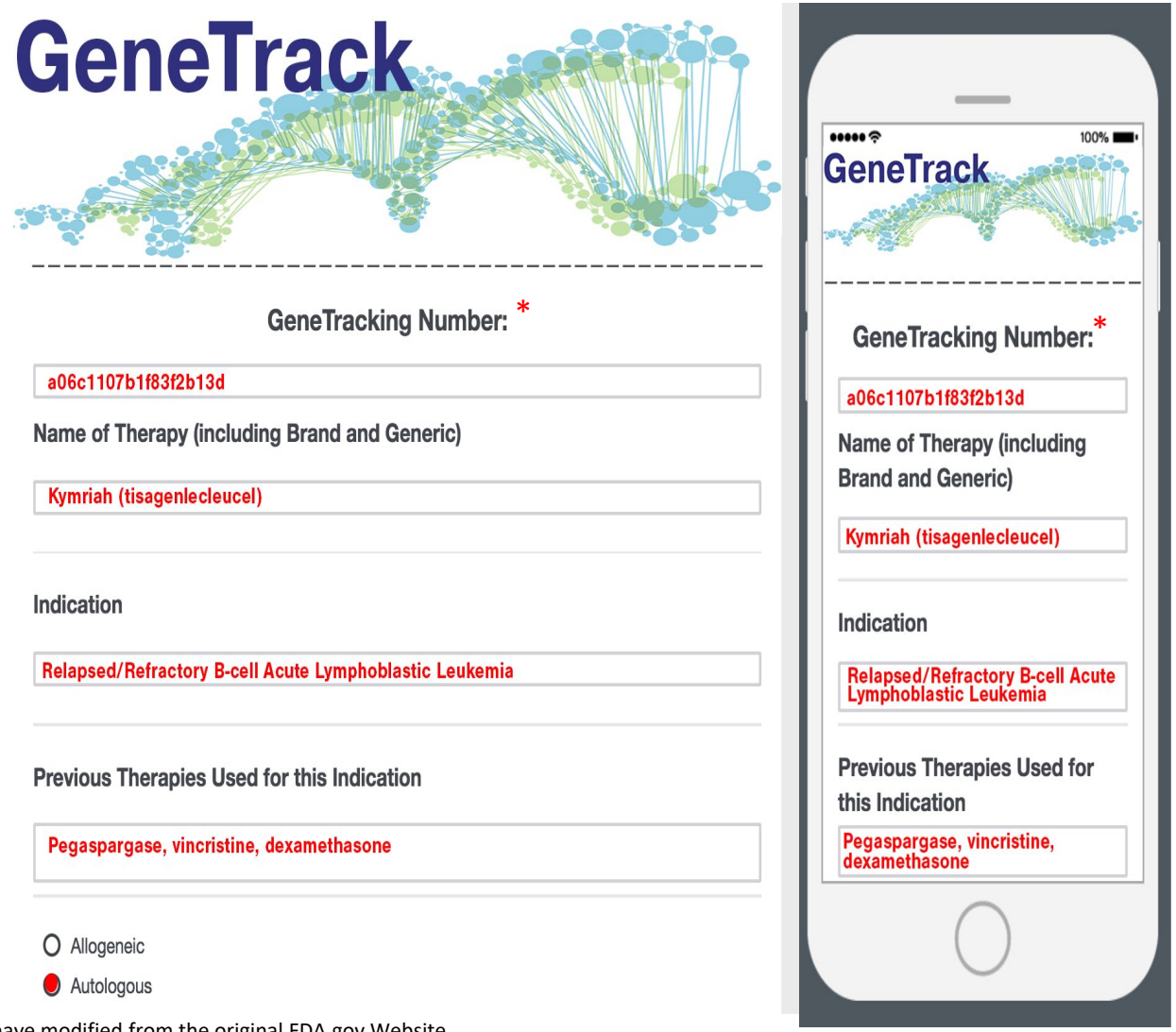


1. **Name of therapy**
2. **Indication**
3. **Previous Treatments**
4. **Facility Location**
   a) Hospital/Institution
   b) Manufacturing Center
5. **Leukapheresis procedure**
   a) Cell source
   b) Buffer condition
   c) Centrifuge rate
   d) Washing condition
6. **Additional consideration**

1. **Components and Materials**
   a. Vector i.e. component
   b. Reagents source
   c. Excipients
2. **Procedure (i.e. Modification)**
   a. Facility involvement
   b. Preparation
   c. Processing
   d. Final Formulation
3. **Product testing**
   a. Microbiology testing
   b. Identity testing
   c. Purity/potency testing
4. **Additional consideration**

Source: Images/Figures have modified from the original FDA.gov Website

Hospital/Institution Form



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GeneTrack Database

U.S. Department of Health & Human Services

GeneTrack Database

Enter GeneTracking Number

GeneTracking Number: a06c1107b1f83f2b13d
Name of Therapy: Kymriah (tisagenlecleucel)
Type of Gene Therapy: Autologous

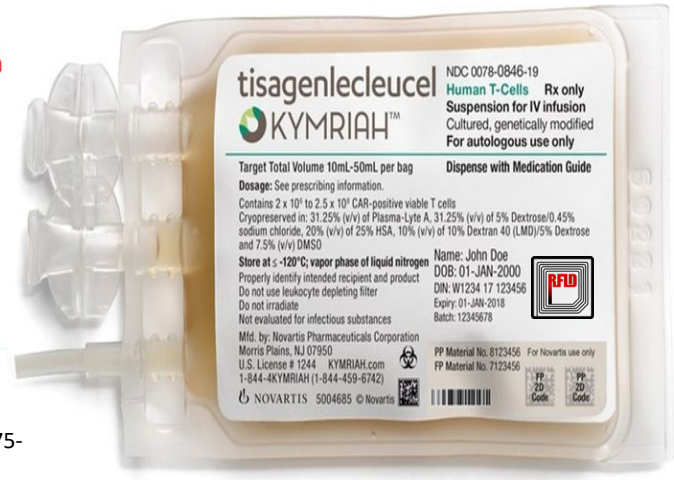
Live Tracking: Saturday, December 30
Shipment departed from
Gene BioScience facility

VIEW ALL SECTIONS | CLOSE ALL SECTIONS

INDICATION & PREVIOUS THERAPY
Indication: Relapsed/Refractory B-cell Acute Lymphoblastic Leukemia
Previous Therapy: Pegaspargase, vincristine, dexamethasone

COMPONENTS & MATERIALS
Cell source: Immune T - cell

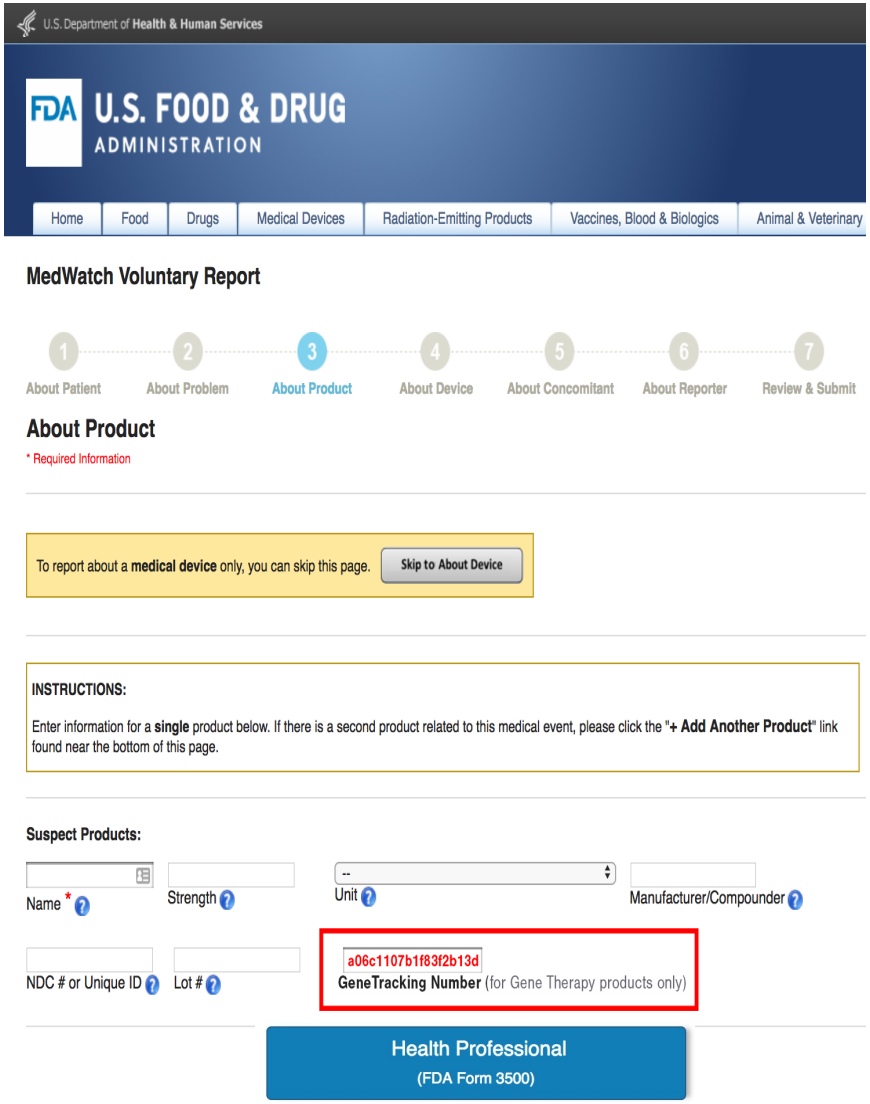
FACILITY OF PROCESSING
Hospital/Institution: Gene Institution/Hospital
Manufacturing Center: Gene BioScience

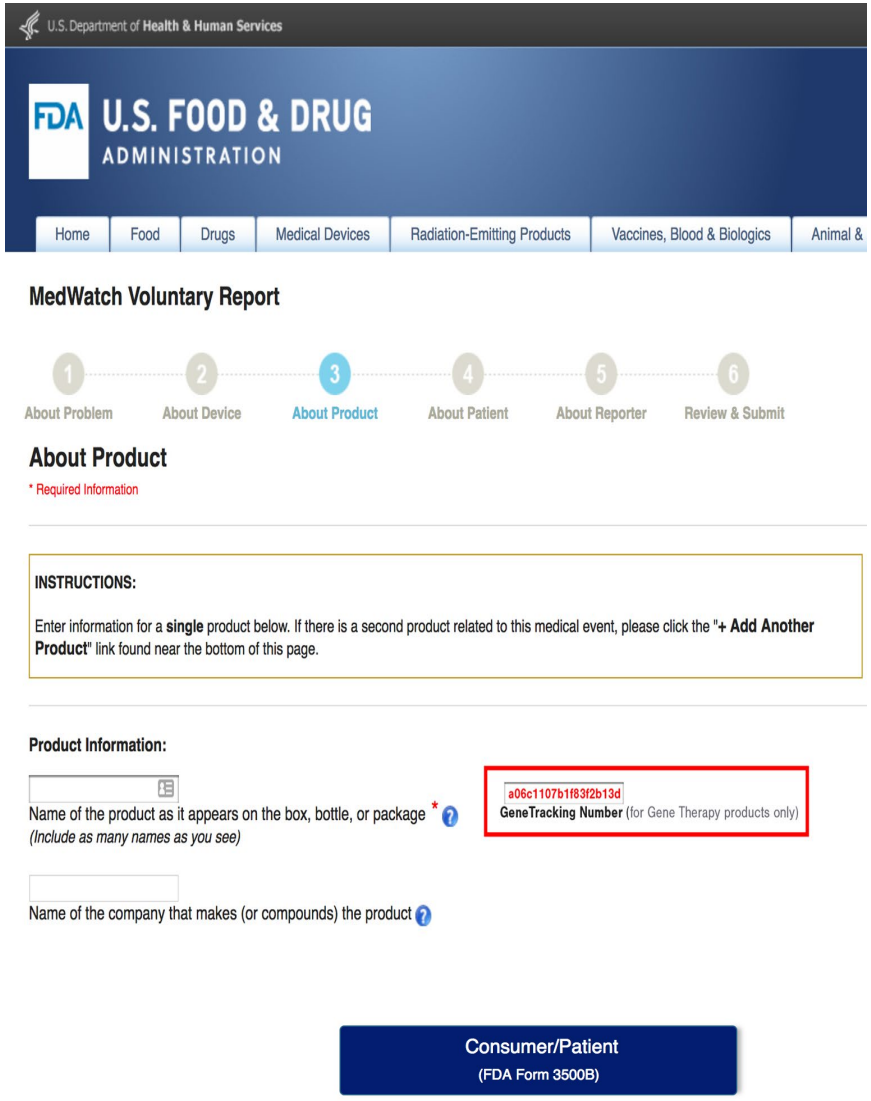


Source:

1. Images/Figures have modified from the original FDA.gov and NIH.gov Websites (AccessGUDID)
2. Novartis Pharmaceuticals Corporation Fiercepharma news, https://www.fiercepharma.com/pharma/at-475-000-per-treatment-novartis-kymriah-a-bargain-or-just-another-example-skyrocketing

MedWatch Integration





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Feasibility and Future Direction

- **Feasibility**
  - Easy implementation with already existing database framework (i.e. Global Unique Device Identification Database (GUDID)
  - Minimal cost to implement GeneTrack compared to the drug cost per treatment
- **Future Direction**
  - Incorporate real-world evidence across the total product lifecycle to improve patient safety and health outcomes.

Conclusion

- Limited tools available to capture CAR-T manufacturing and post-market distribution
- GeneTrack has many advantages
  - Improve transparency
  - Streamline the manufacturer process
  - Enhance the communication between multi-stakeholder (Patients, Stakeholders, and Industry Sponsors)
  - Individualize CAR-T cell therapy adverse events report
  - Easy implementation

Acknowledge

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University of Maryland School of Pharmacy

Thank you for your time!
Questions?

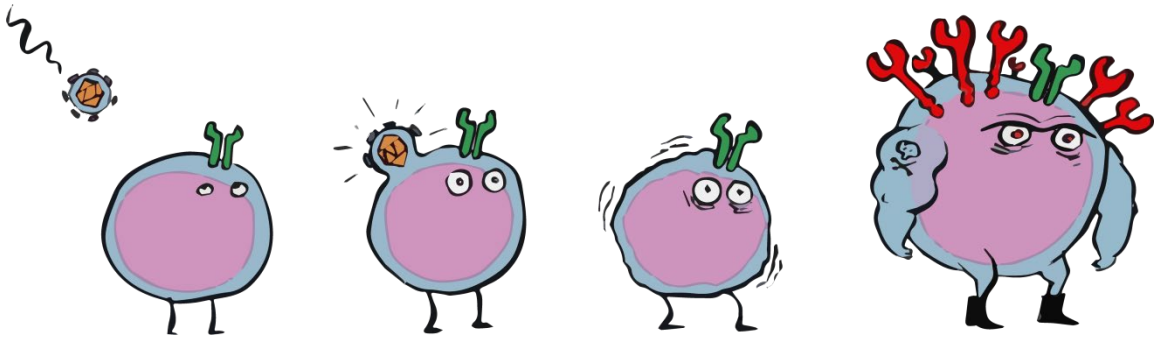

Image Source: https://www.qs-2.com/fda-approves-cancer-gene-therapy-drug/