RECENT CANCER PRODUCT APPROVALS: CENTER FOR BIOLOGICS EVALUATION AND RESEARCH (CBER)

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Partners in Progress: Cancer Patient Advocates and FDA
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Disclosures

I have no financial relationships to disclose.

FDA Regulation of Oncology Products*

CDER

Office of Hematology and Oncology Drug Products (OHOP)

- Drugs (small molecules)
- Biologics
  - Monoclonal Antibodies
  - Therapeutic Proteins
  - Cytokines

CDRH

Office of In Vitro Diagnostics and Radiological Health (OIR)

- Companion Diagnostics

CBER

Office of Tissues and Advanced Therapies (OTAT)

- Cell therapies
- Gene Therapies
- Oncolytic viruses
- Therapeutic vaccines and immunotherapies

**Clinical reviews of the Biologics License Applications are conducted under the auspices of Oncology Center of Excellence (OCE)*

FDA

The New York Times (OCT. 15, 2014)
Cell Therapy Puts Leukemia Patients in Extended Remission

The Washington Post

Aug 30, 2017

FDA clears first gene-altering therapy — 'a living drug' — for childhood leukemia

Oct 18, 2017

US regulators approve 2nd gene therapy for blood cancer

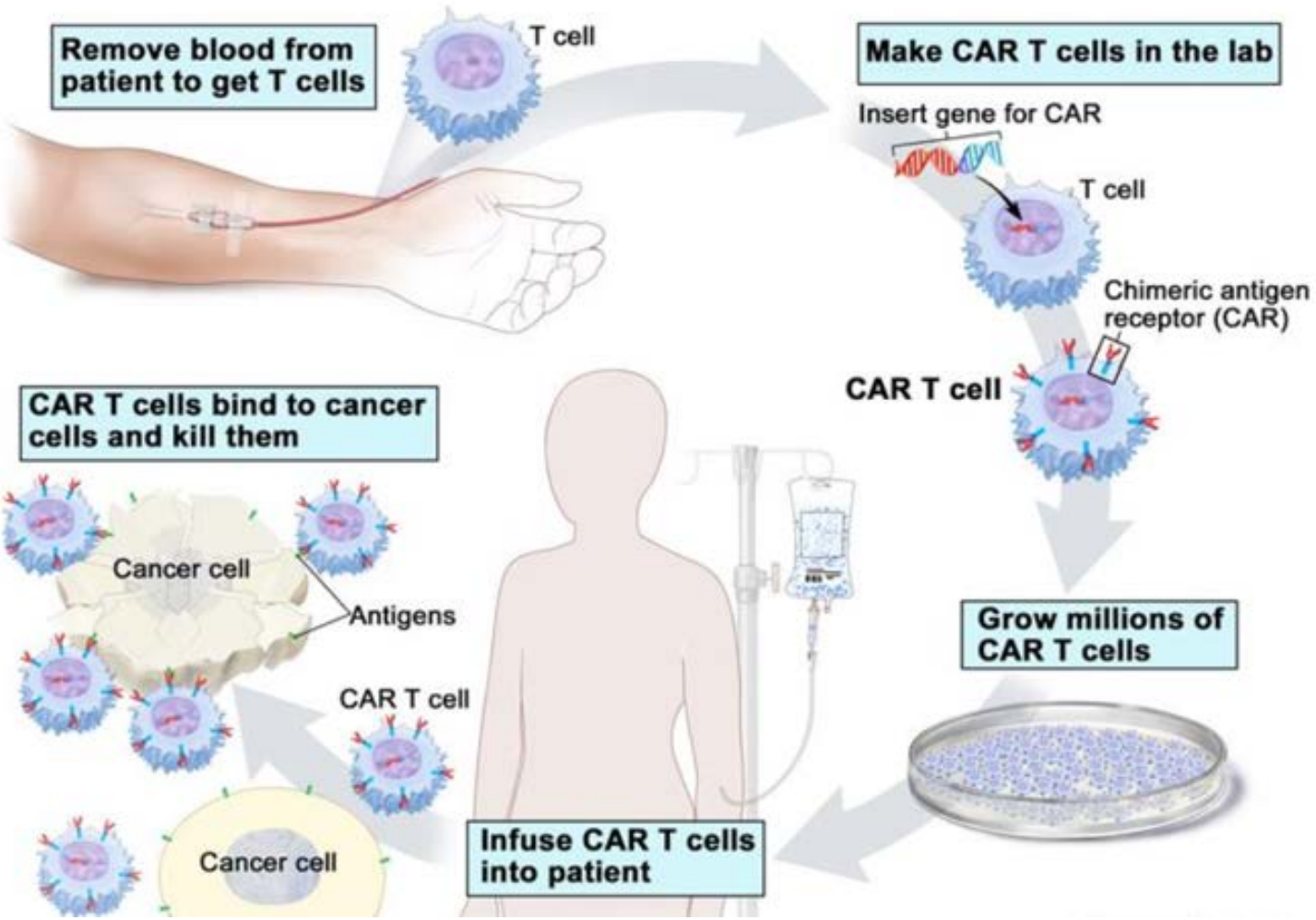
What is Chimeric Antigen Receptor (CAR) T-Cell Therapy?

- Novel type of cancer immunotherapy
- Involves training patients' own immune cells (T-cells) to attack cancer cells

The Washington Post

Emily Whitehead, shown with her parents,
was the first child treated with CAR T-cell therapy

CAR T-Cell Therapy



Source: National Cancer Institute at the National Institutes of Health

Reviews Require Multidisciplinary Input

Pharmacology & Toxicology

Project Management

Statistics

Clinical Pharmacology & Biopharmaceutics

Product Quality

Clinical

Recent FDA Approvals

- **August 2017**
  - **Tisagenlecleucel (Kymriah)**
    - Novartis Pharmaceuticals Corp.
    - Developed under FDA's expedited programs
    - Approved for the treatment of pediatric and young adult patients with relapsed or refractory B-cell precursor acute lymphoblastic leukemia (ALL)
    - The safety and efficacy were demonstrated in one multicenter clinical trial of 63 pediatric and young adult patients with relapsed or refractory B-cell precursor ALL
    - Oncology Drugs Advisory Committee meeting

Recent FDA Approvals

- **October 2017**
  - **Axicabtagene ciloleucel (Yescarta)**
    - Kite Pharma, Inc.
    - Developed under FDA's expedited programs
    - Approved for adult patients with certain types of large B-cell lymphoma after failing at least two other treatments
    - The safety and efficacy were established in a multicenter clinical trial of more than 100 adults with refractory or relapsed large B-cell lymphoma

CAR T-Cell Therapy Can Cause Severe Side Effects

- Side effects can be fatal or life-threatening
- Majority of patients experienced:
  - Cytokine Release Syndrome (CRS):
    - Systemic response to T-cell activation: flu-like symptoms, difficulty breathing, body organ toxicities
    - **FDA expanded the approval of Actemra (tocilizumab) to treat CRS**
  - Neurologic toxicities:
    - Confusion, inability to talk, seizures

FDA's Measures To Mitigate The Risks of CAR T-Cell Products

- Boxed warning for CRS and neurologic toxicities
- Approval with a Risk Evaluation and Mitigation Strategy (**REMS**)
  - CAR T-cell therapy is a novel therapy
  - Protective measures in place to ensure patients' safety:
    - Hospitals and their associated clinics must be certified
    - Education of physicians, hospital staff and patients about the recognition and management of CRS and neurotoxicity
- Post-marketing requirement studies:
  - Long-term safety follow-up

Questions?