BMT and immunotherapies for pediatric leukemia: Current and novel treatments and financial implications

Vicki Szenes, MS, RN, CPNP
Pediatric Nurse Practitioner
Memorial Sloan-Kettering Cancer Center

Meghan Wellenbrink, BSN, RN, CPHON
CAR-T Cell Clinical Nurse Coordinator
Memorial Sloan-Kettering Cancer Center

Jointly planned by the National Marrow Donor Program® /Be The Match® and The Aplastic Anemia & MDS International Foundation

Learning objectives

- Define current BMT and immunotherapy agent outcomes with mechanisms of action used to treat pediatric leukemia
- List the common side effects associated with immunotherapy and the supportive care needs for monitoring and educating patients and families
- Examine financial burdens associated with BMT and immunotherapy
- Identify educational resources available to assist in addressing a family's information and financial needs

Continuing Education

- **Social Workers:** National Marrow Donor Program, #1386, is approved as a provider for social work continuing education by the Association of Social Work Boards (ASWB) www.aswb.org, through the Approved Continuing Education (ACE) program. National Marrow Donor Program maintains responsibility for the program. ASWB Approval Period: 08/10/2016 - 08/10/2019. Social workers should contact their regulatory board to determine course approval for continuing education credits.
- Social workers participating in this course will receive 1.0 clinical continuing education clock hours.
- **Nurses**: The National Marrow Donor Program is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation (COA).
- Up to 1.0 contact hours may be claimed for this educational activity.

Continuing Education cont.

- **Insurance case managers:** This program has been pre-approved by The Commission for Case Manager Certification to provide continuing education credit to CCM® board certified case managers. The course is approved for 1.0 CE contact hour(s).
- Activity code: I00036831 Approval Number: 190001352
- **Laboratory professionals**: The NMDP is approved as a provider of continuing education in the clinical laboratory sciences through the ASCLS PACE Program. ASCLS PACE® 1861 International Drive, Suite 200, McLean, VA 22102.
- Up to 1.0 contact hours may be claimed for program #115-006-19.

Attendees will receive an email following the webinar with a link to the evaluation to receive a certificate of attendance or a continuing education certificate.

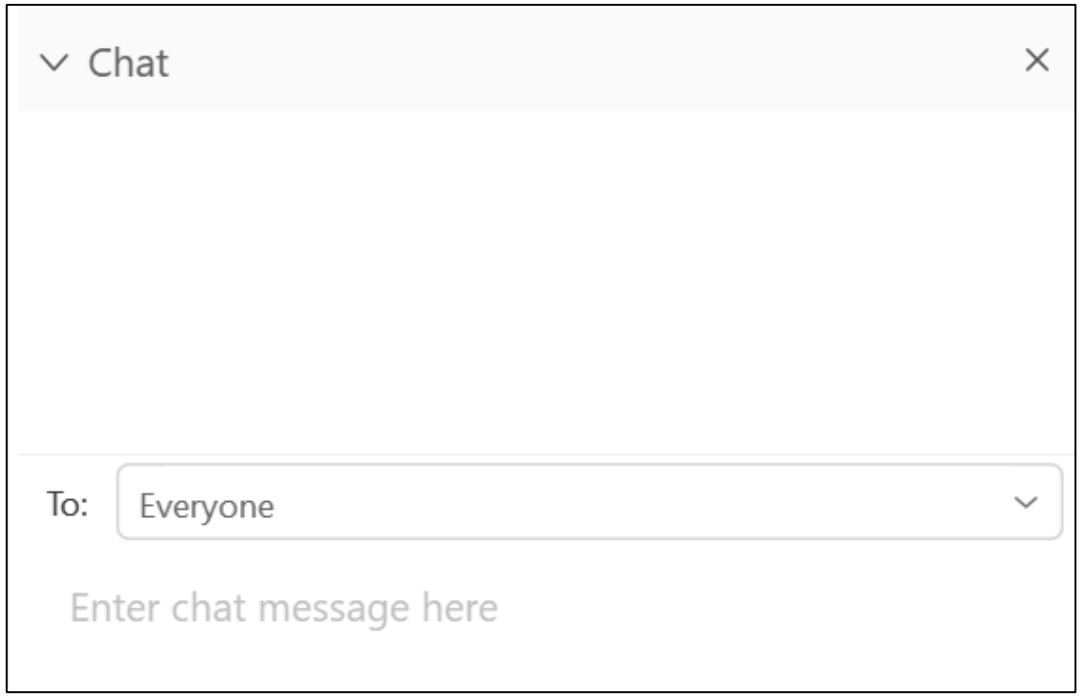
Disclosures

The planners and speakers have the following financial disclosures.

Name	Role	Disclosure
Debbie Jacobson, OPN-CG	Moderator	None
Vicki Szenes, MS, RN, CPNP	Speaker	MSKCC research support – Atara, Novartis, Jazz
Meghan Wellenbrink, BSN, RN, CPHON	Speaker	Consulting fee – Novartis
Jackie Foster, MPH, RN, OCN	Planner	Stock ownership – Pfizer
Ellyce Hayes	Planner	None
Nicole Heino	Planner	None
Alice Houk	Planner	None
Elizabeth Murphy, EdD, RN	Planner	None
Lauren Marks	Planner	None
Katie Schoeppner, MSW, LICSW	Planner	None

Questions

To ask a question, use the chat icon



For questions, support or concerns during the webinar, please email: nmdpeducation@nmdp.org

NATIONAL MARROW DONOR PROGRAM®
BE THE MATCH®
35 YEARS
AA·MDS INTERNATIONAL FOUNDATION

Vicki Szenes, MS, RN, CPNP

Pediatric Nurse Practitioner

Memorial Sloan-Kettering Cancer Center

Meghan Wellenbrink, BSN, RN, CPHON
CAR-T Cell Clinical Nurse Coordinator
Memorial Sloan-Kettering Cancer Center

Memorial Sloan Kettering Cancer Center

BMT and Immunotherapies for Pediatric Leukemia: Current and Novel Treatments and Financial Implications

We will discuss the following off label use and/or investigational use in this presentation: **CD19-specific CAR T cells**

Overview

- Bone Marrow Transplant (BMT)
- Cancer Immunotherapy – “The 3 E’s”
- Chimeric Antigen Receptors (CARs)
  - Overview
  - Screening/Collection Process
  - Infusion
  - Toxicity and Management
- CAR T cells - Future Directions
- Case study presentation

Pediatric Acute Lymphoblastic Leukemia

- Most common form of cancer in children – 30%

Treatment

  - **Chemotherapy** - high success rate
  - **Five-year event-free survival rates**
    - Low- or standard-risk B-precursor ALL > 90%
    - High-risk features/responsive to induction chemo - >80%
    - Adverse prognostic factors (hypodiploidy, slow response to induction, relapsed ALL) - poor outcomes
- Approximately 75-80% of children with newly diagnosed ALL participate in clinical trials

Hunger SP, et al. Pediatr Blood Cancer. 2013;60(6):957
Hunger SP, et al JCO. 2012: 30(14): 1663

Blood and Marrow Transplant for pediatric ALL

- **Blood and Marrow Transplant (BMT)** – curative therapy option
- **BMT indications for consultation associated with high-risk disease**:
  - Infant at diagnosis
  - Primary induction failure
  - Presence of minimal residual disease after initial therapy } Response to Tx
  - High/very high-risk at first complete remission including:
    - Philadelphia chromosome positive slow-TKI responders or with *IKZF*1 deletions
    - Philadelphia-like
    - iAMP21
    - 11q23 rearrangement
  - First relapse
  - Second complete remission and beyond, if not previously evaluated

Hunger SP, et al JCO. 2012: 30(14): 1663
National Marrow Donor Program (NMDP) /Be The Match and the American Society for Blood and Marrow Transplantation (ASBMT) and are based on current clinical practice, medical literature, National Comprehensive Cancer Network® (NCCN®) Guidelines for the treatment of cancer, and evidence-based reviews. BeTheMatchClinical.org/guidelines

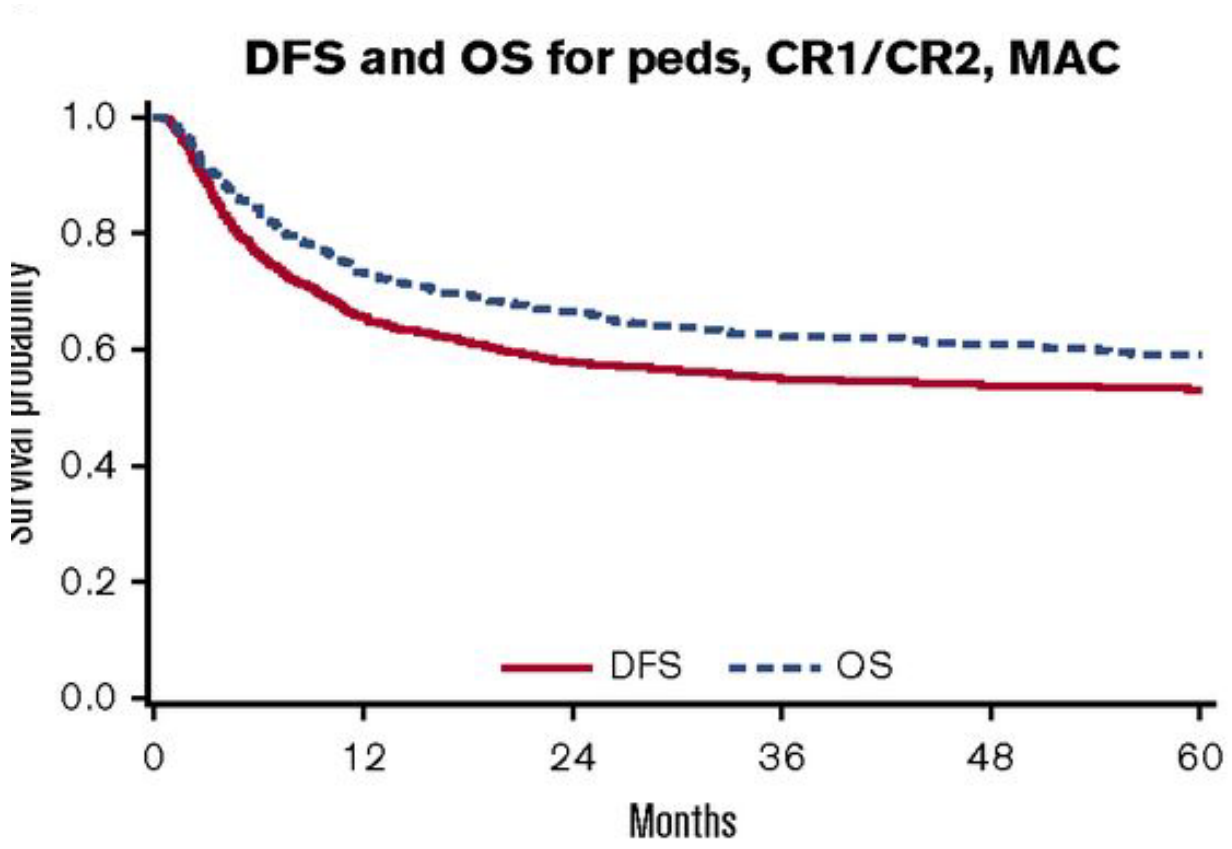
Post BMT care

- **Late effects**
  - central nervous system
  - growth impairment
  - cardiotoxicity
  - infertility
  - cataracts
  - secondary cancers
- Ongoing monitoring and screening recommended

Hunger SP, et al JCO. 2012: 30(14): 1663
National Marrow Donor Program (NMDP) /Be The Match and the American Society for Blood and Marrow Transplantation (ASBMT) and are based on current clinical practice, medical literature, National Comprehensive Cancer Network® (NCCN®) Guidelines for the treatment of cancer, and evidence-based reviews.

Overall survival with BMT for Pediatric ALL

- Pediatric patients with ALL (n=1619)
  - 40% in CR1
  - 60% in CR2
- Median follow up: 72 months
- Overall survival
  1 year – 73%
  5 year – 59%

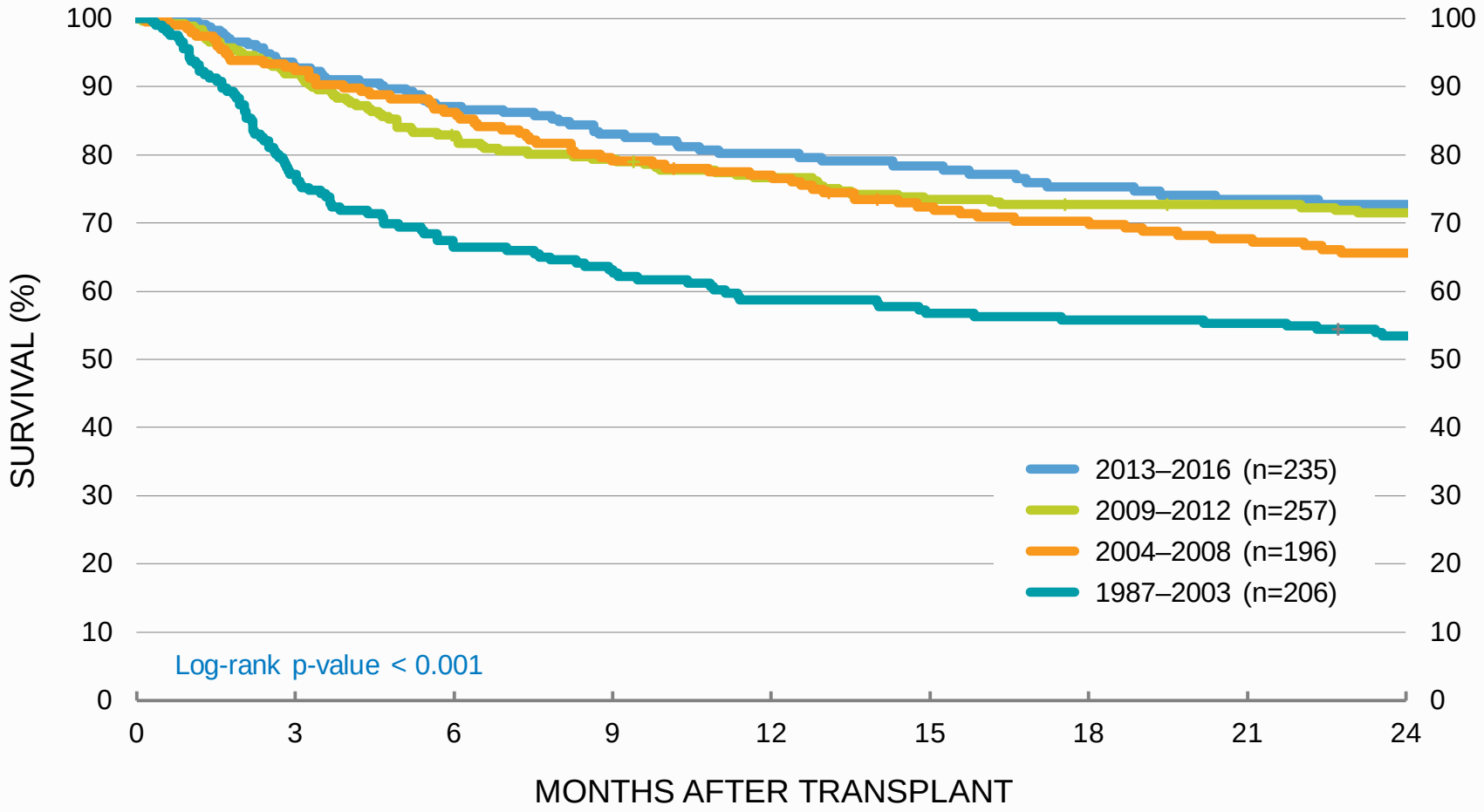


Moshe Yeshurun et al. Blood Adv 2019;3:670-680

Acute Lymphoblastic Leukemia Overall Survival

Pediatric Patient Transplantation in First Complete Remission by Year of Transplant

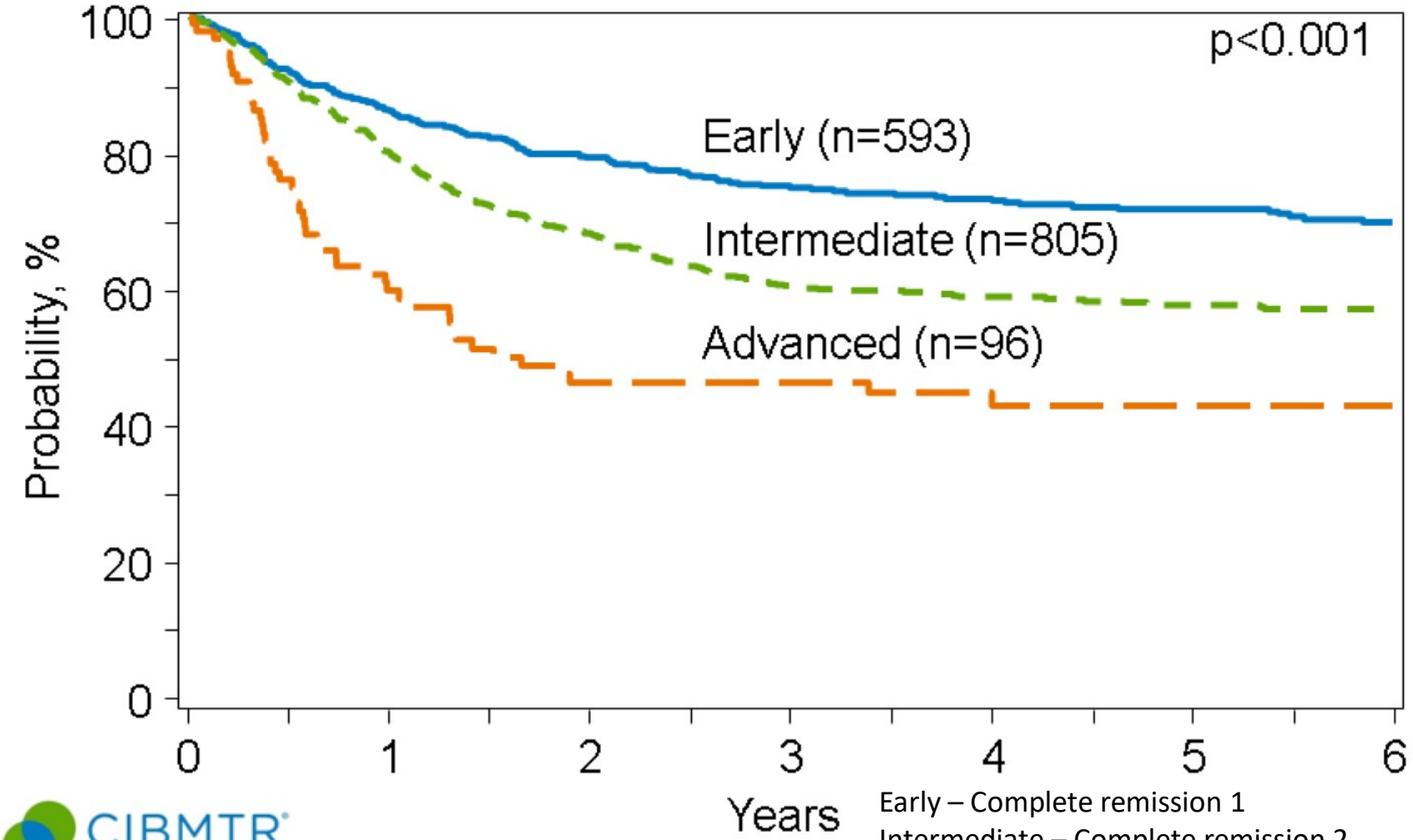
Unrelated Transplants Facilitated by NMDP/Be The Match (1987–2016)



CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

SOURCE: CIBMTR®, the research program of NMDP/Be The Match

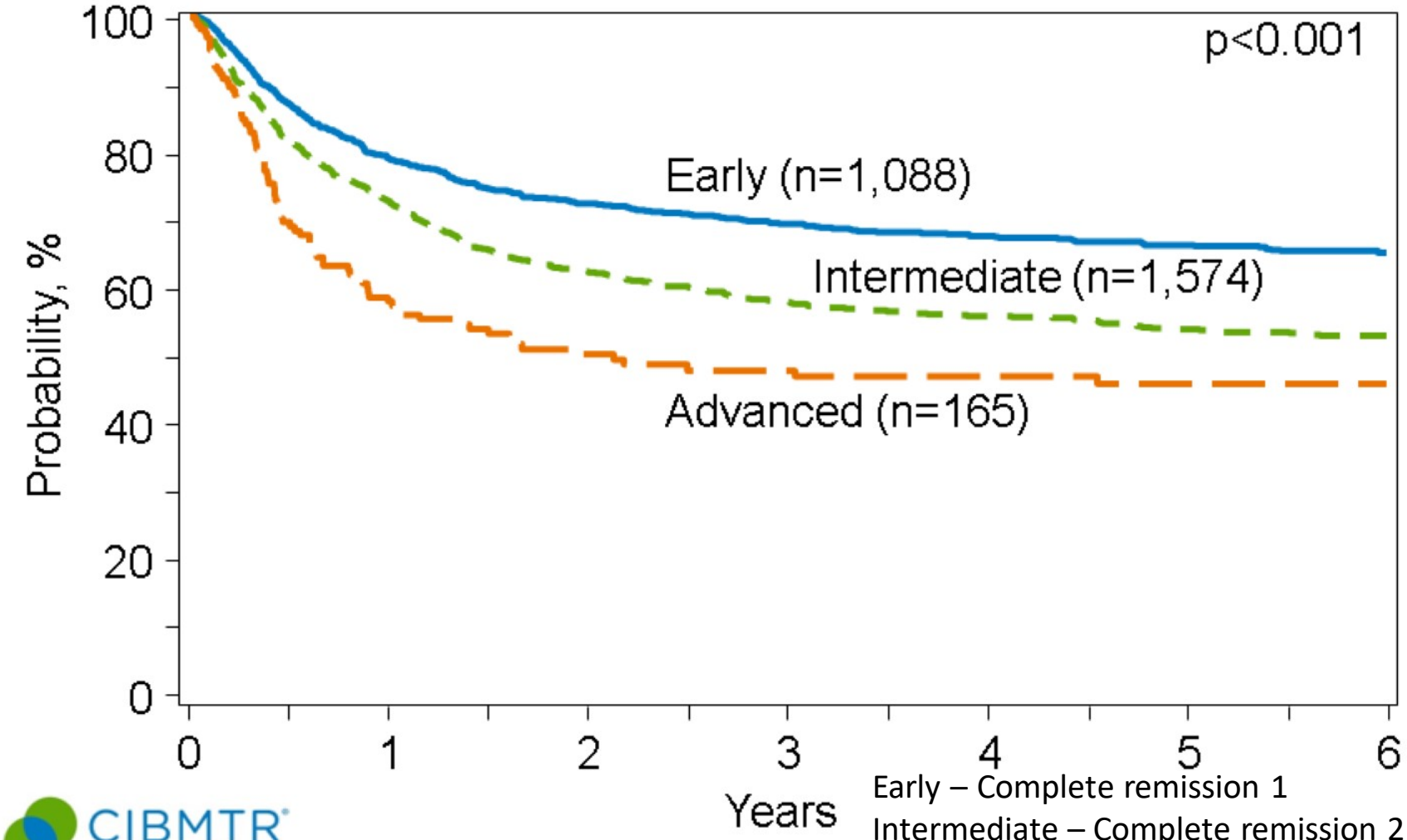
Survival after HLA-Matched Sibling Donor HCT for ALL, Age <18 Years, 2006-2016



CIBMTR
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

Early – Complete remission 1
Intermediate – Complete remission 2
Advanced – Complete remission ≥ 3

Survival after Unrelated Donor HCT for ALL, Age <18 years, 2006-2016



CIBMTR
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

Early – Complete remission 1
Intermediate – Complete remission 2
Advanced – Complete remission ≥ 3

BMT Outcomes for patients under age 3

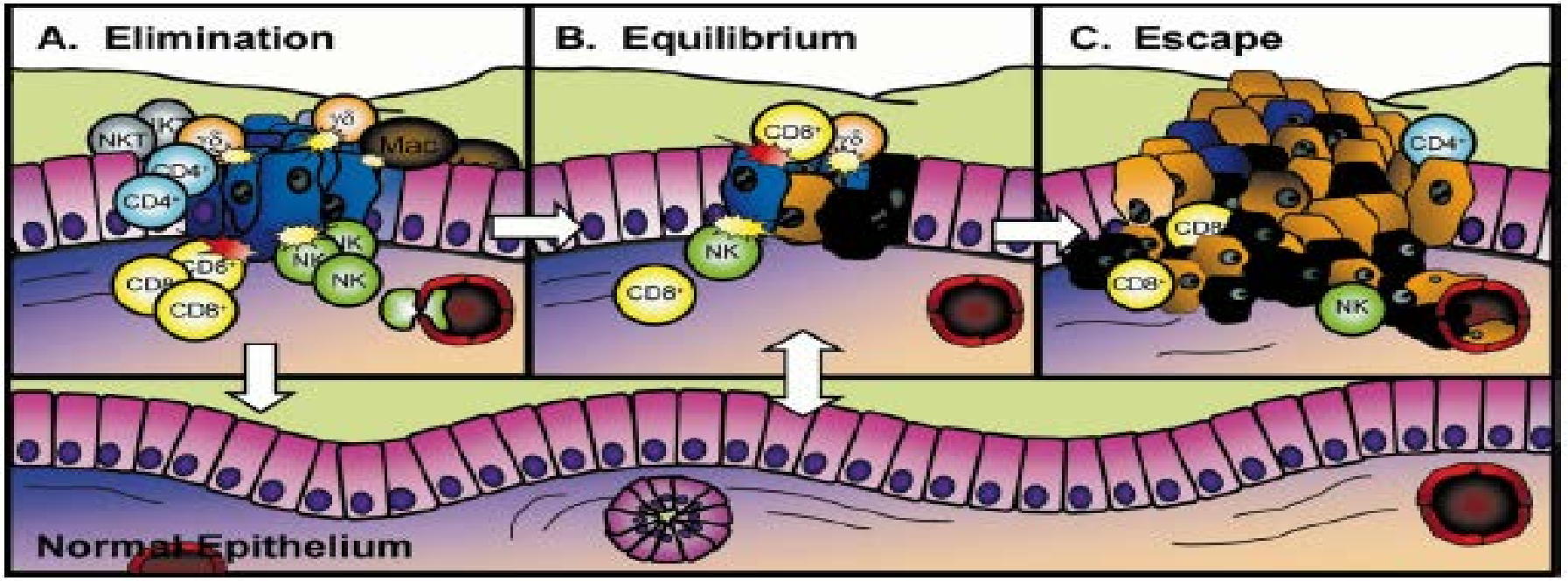
- Retrospective, international, multicenter study - 717 patients who received myeloablative BMT between 1987–2012, who survived relapse-free for ≥1 year.
- 87% - estimated 10-year OS
- 30% reported at least one late effect
  - Growth disturbance, cataracts, and hypothyroidism
- TBI and chronic graft-versus-host-disease- associated with adverse outcomes

Vrooman LM, et al. Biol Blood Marrow Transplant. 2017; 23(8): 1327–1334.

What is Immunotherapy?

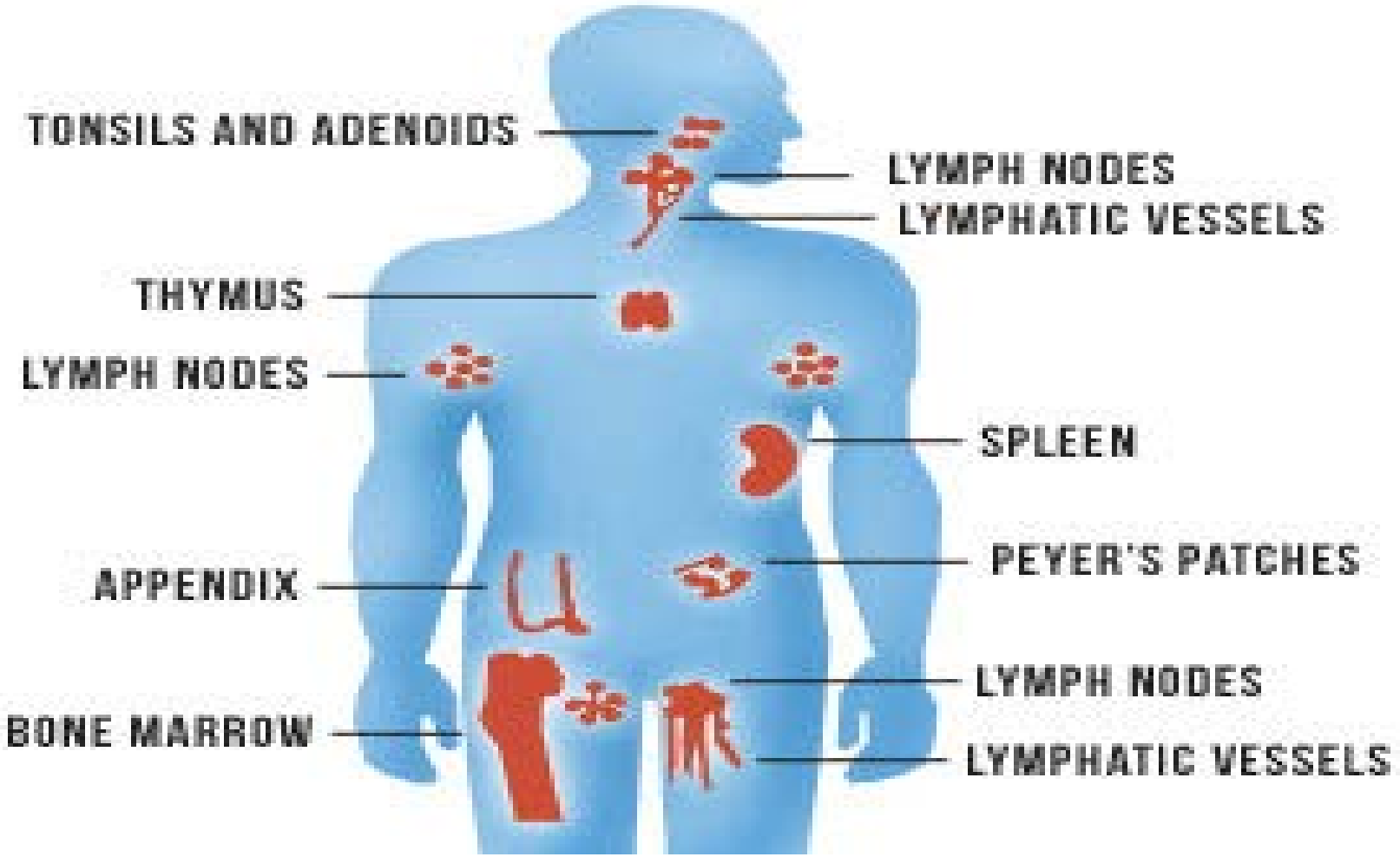
“Immunotherapy, also called biologic therapy, is a type of cancer treatment that boosts the body's natural defenses to fight the cancer. It uses substances made by the body or in a laboratory to improve or restore immune system function.”

Cancer and Immune Escape – “The 3 E’s”

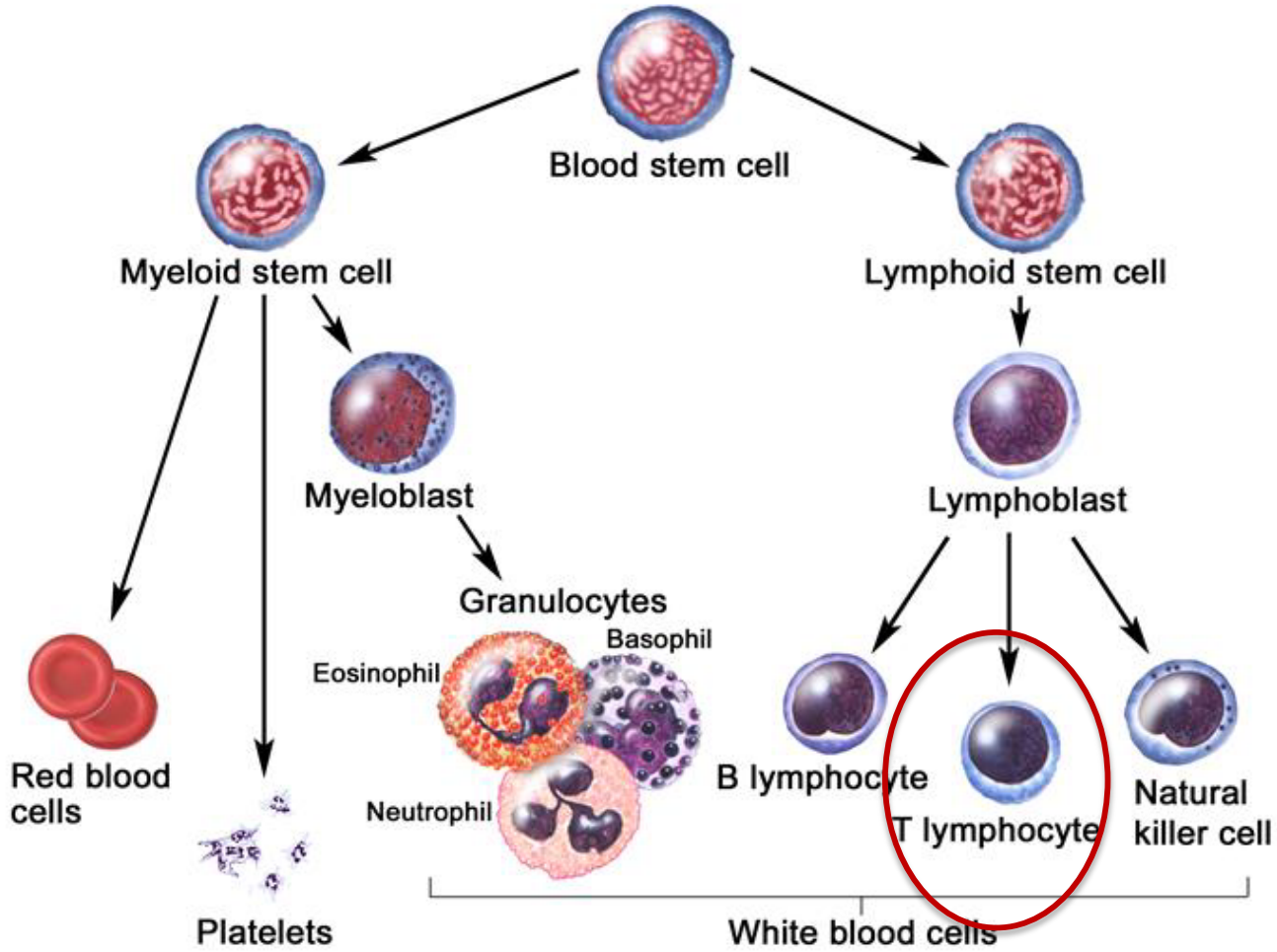


Schreiber RD. *Annu. Rev. Immunol*. 2004

ORGANS OF THE IMMUNE SYSTEM

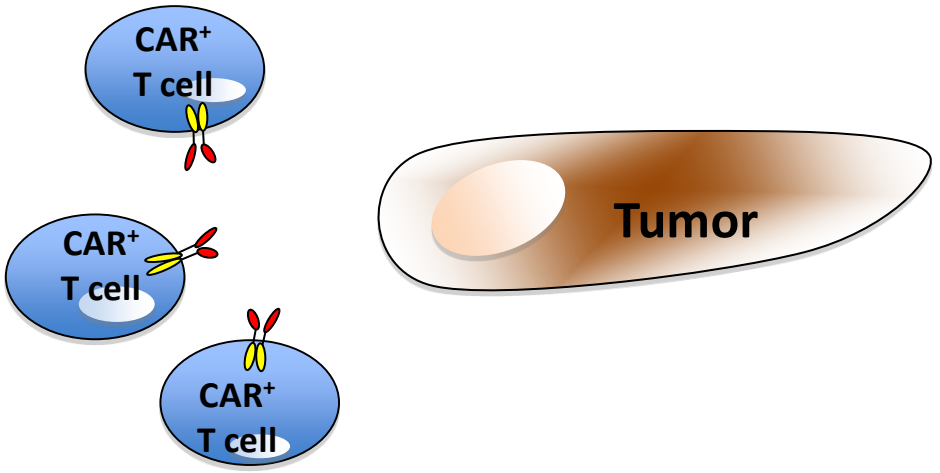


Blood Cells of the Immune System



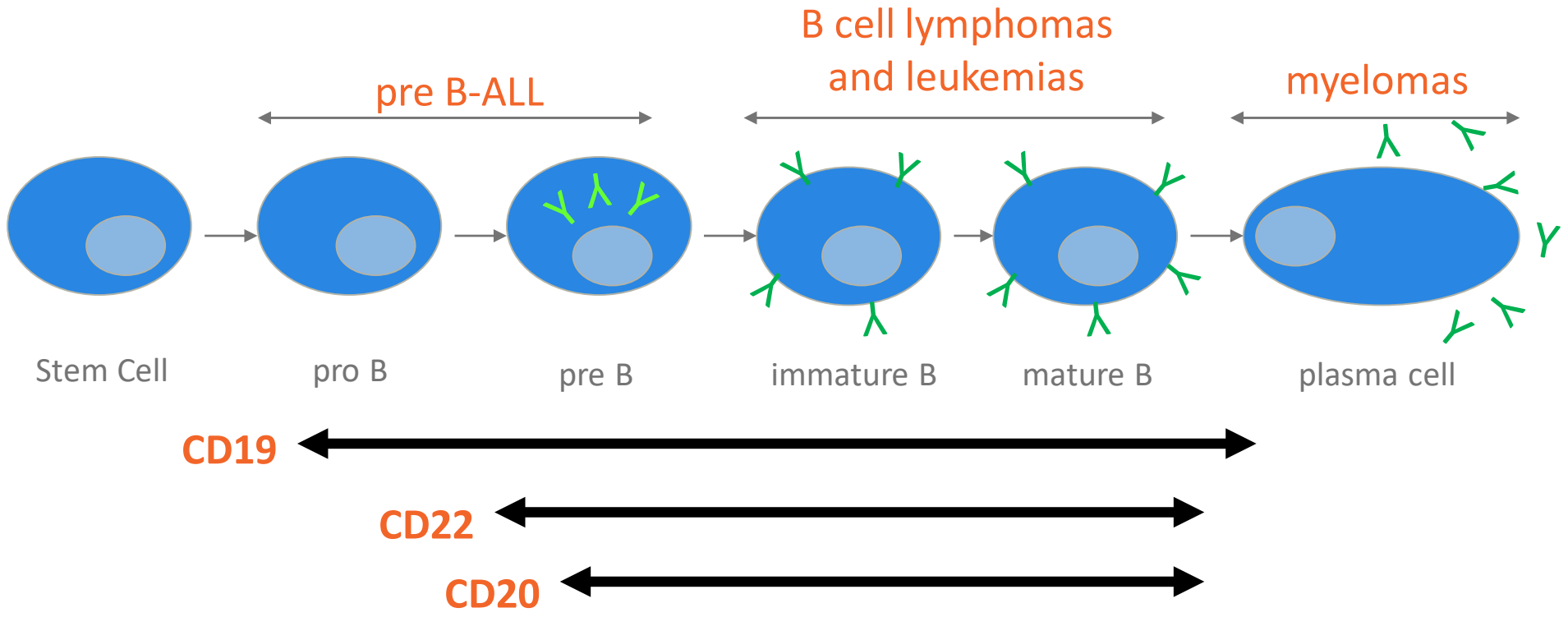
Chimeric Antigen Receptor (CAR) T cells

Targeting
Expansion
Tumor Lysis

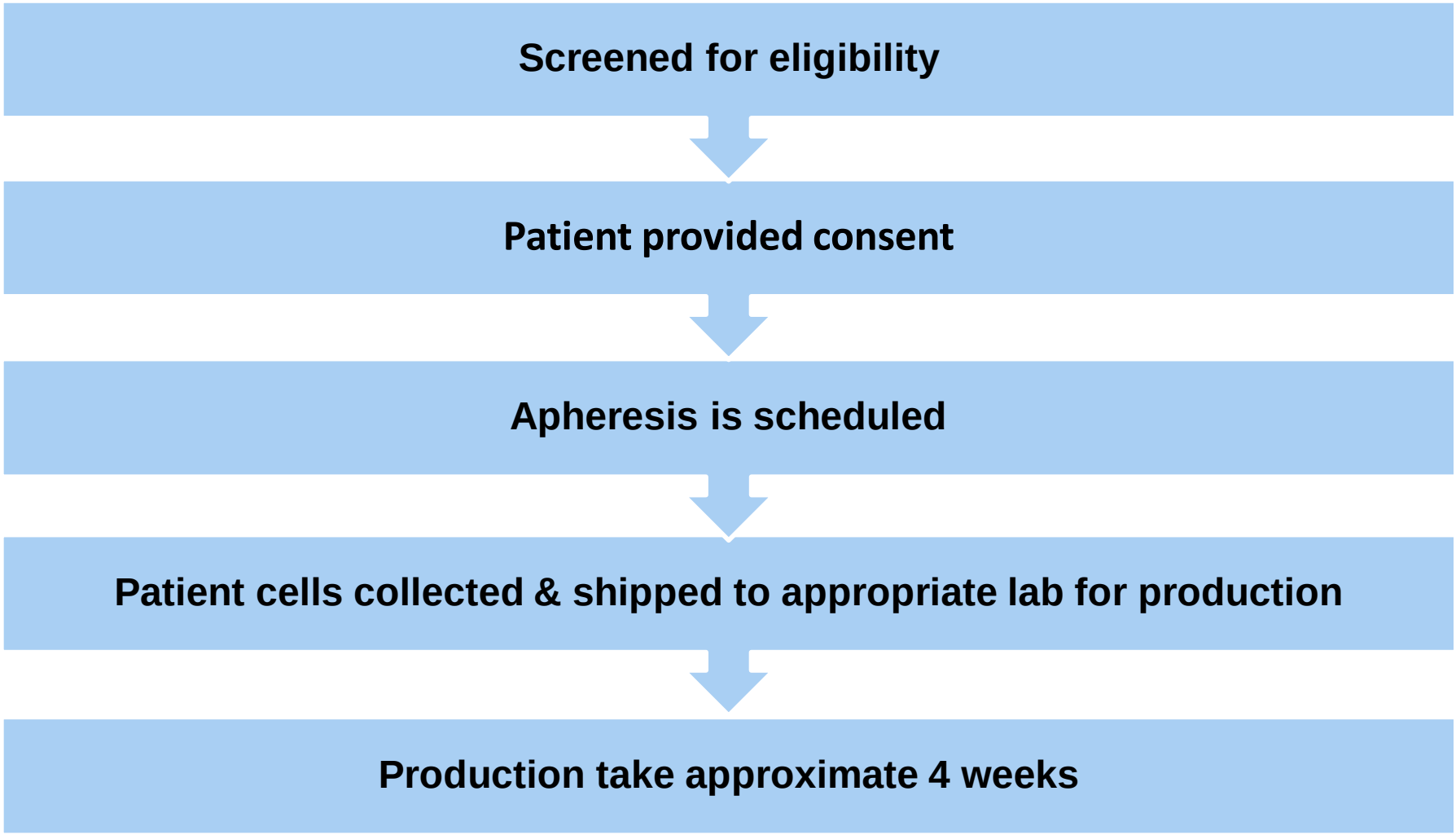


Why Target CD19?

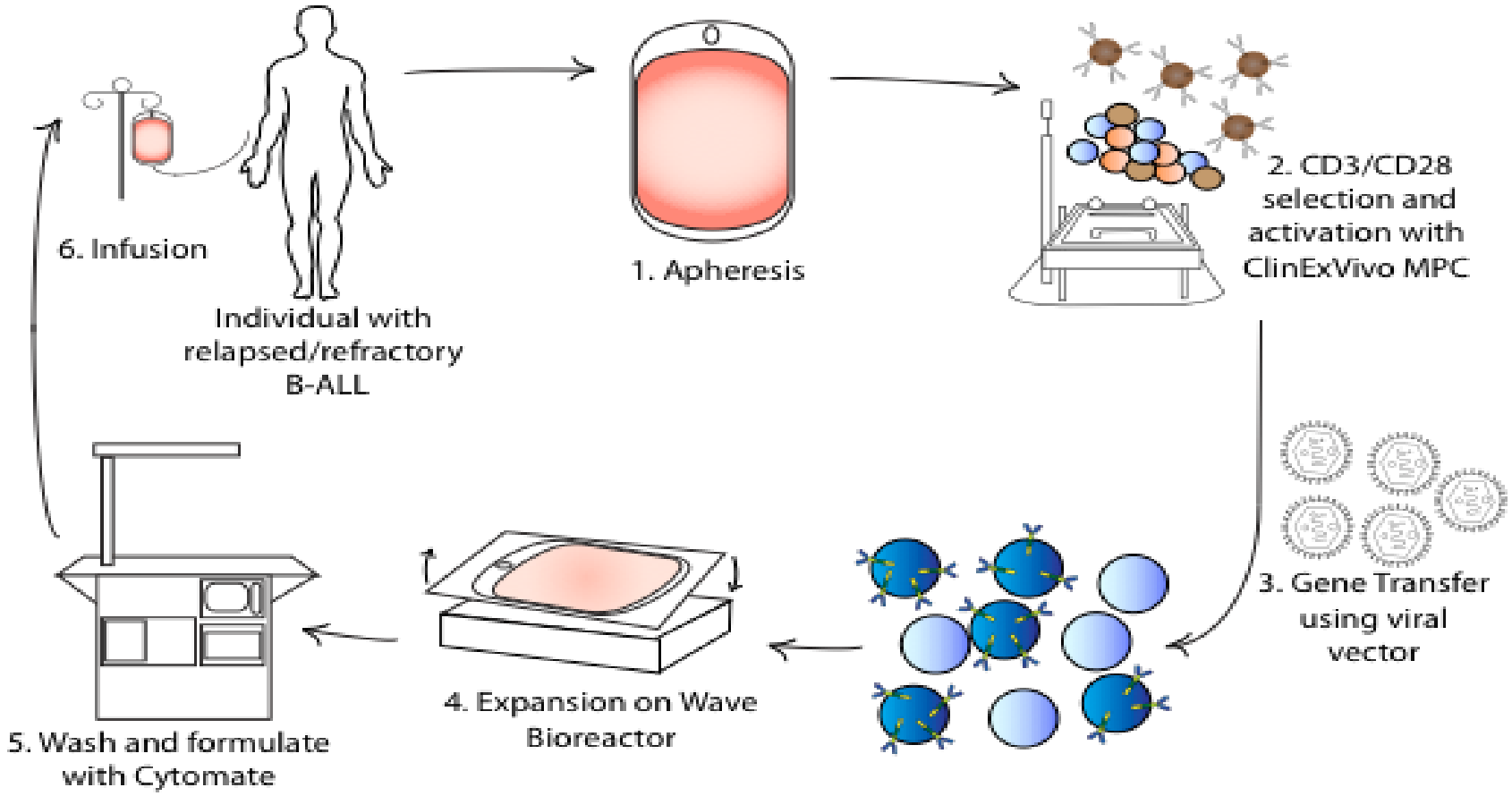
(Near Universal Expression on B-cell Malignancies)



Patient Flow: Pre Infusion

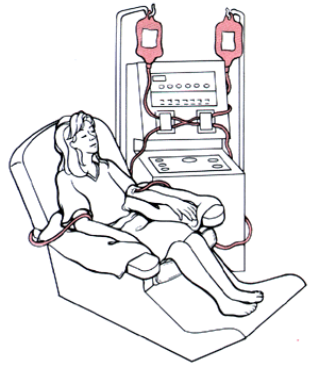


Clinical Application: An Overview



Davila et. al. Int. Journal of Heme. 2013

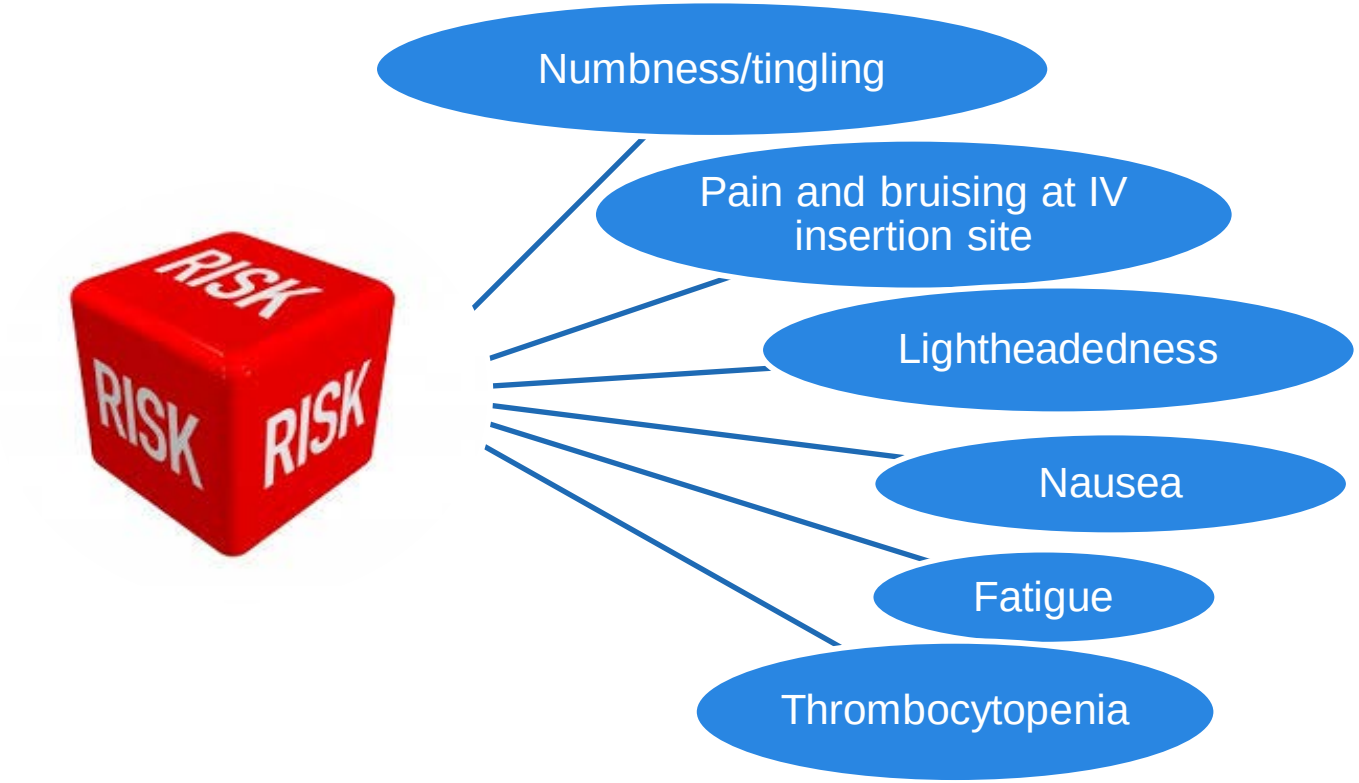
Screening for Collection
CD19-specific CAR T cells



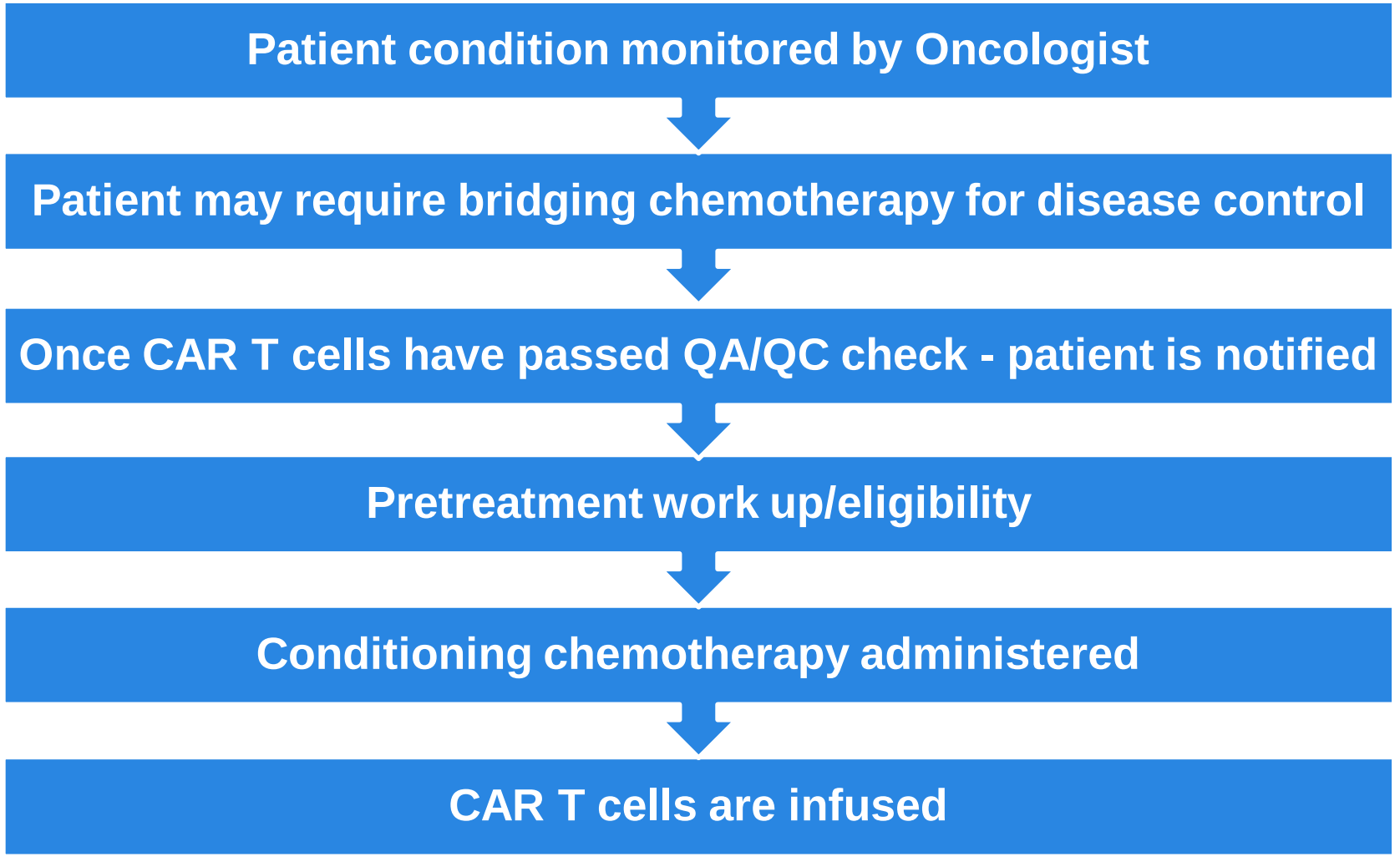
- **<u>CD19 + disease</u>**
- Relapse/Refractory disease
- Performance status
- No active infectious diseases
- Negative for HIV, Hepatitis B or C
- Not pregnant
- Adequate Lymphocytes **(ALC >0.5)**
- 6 months from allo-BMT
- Off any immune suppressive therapy
- No active GVHD

Collection Process

- Peripheral/Central access for collection
  - Peripheral IV if large veins
  - Leukophereses catheter placement



Patient Flow: Production to Infusion



CAR T-cell Infusion: Conditioning

- Conditioning regimen:
  - Depletes T cells
  - Creates “favorable” environment for CAR T-cell expansion
  - Eradicate suppressor cells in the microenvironment
  - Debulks tumor/malignancy

- Conditioning regimen can vary depending on:
  - Product and different indications
  - Diagnoses for the same product

- **NO steroids** for antiemetic pre- or post-CAR T Cell Infusion

CAR-Modified T-cells: Day of Infusion (Day 0)

(NUR NPM-8001)

Assessment

- Patient is assessed and cleared by Attending/APP

Order

- Confirm order for Immune Effector Cells (IEC) product infusion is entered and released
- Check for premedication order and anticipate time of infusion
- Confirm PharmD is aware of the infusion time/location for delivery and application of appropriate label

Access/Pre Meds/Verifi-cation

- Confirm venous access (2 preferred)
- Administer pre-medications as ordered
- Verification of patient ID prior to administration of IEC

Administra-tion

- IV Push via Syringe
- IVPB bag (intravenously)
- Document patient's vital signs on the Electronic Vital Signs Flowsheet

Memorial Sloan-Kettering Cancer Center (2018). Administering of Immune Effector Cells(IEC)-Chimeric Antigen Receptor T Cells (CAR T CELLS), CTLs, Donor Lymphocyte Infusion (DLI)

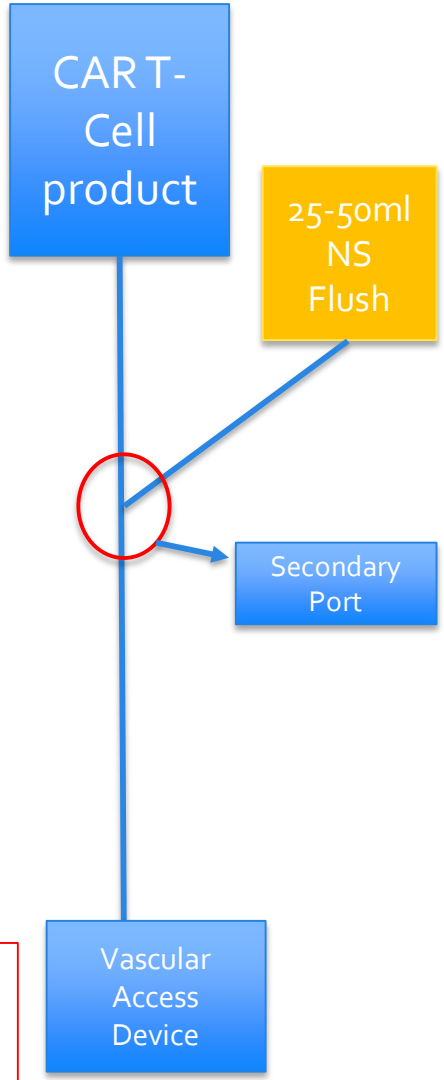
Verification Process

Verification	When?	Who?	Verifying what?
First Verification	When cell product arrives in the unit	• Laboratory staff member • Clinical Staff member receiving the cell product (Attending/APP)	• The cell product against the laboratory form (electronic or paper) • Inspect for condition of the cell product.
Second Verification *label is placed by pharmacy once the product is thawed	Prior to infusion	• 2 clinicians • Attending and APP or RN	• Verification of the product information, labeling and patient information will be done by an Attending MD and an APP against order and the Cell Distribution Report. • Patient verification is also performed immediately prior to administration (MD/APP or RN)

Third verification	Prior to infusion	• 2 RNs	• Verify the following against the product
			  • Patient identification
			  • Product against order
			  • Document in medical record

CAR T-Cell Administration (NUR NPM-8001)

- Cells Infused via IV Bag
  - ❑ Administered by RN
  - ❑ Macro IV Tubing for Cells (No Filters /No Pumps)
  - ❑ Normal Saline 25-50 ml IV bag with a secondary line to flush cells
  - ❑ Ensure you have NS liter bag, suction set up, non-rebreather, hypersensitivity kit and code card available
  - ❑ Check for blood return prior to infusion
  - ❑ Vital signs pre infusion, q 15min during infusion, and q 1hour x 2 post infusion
  - ❑ Physician/APP determines infusion rate
  - ❑ Primary RN establishes/monitors rate



gtts/min = $\frac{\text{TOTAL VOLUME X 15 (MACRO DRIP TUBING)}}{\text{TIME TO BE INFUSED}}$

http://www.manuelsweb.com/gttPerMin.htm

Memorial Sloan-Kettering Cancer Center (2018). Administering of Immune Effector Cells(IEC)-Chimeric Antigen Receptor T Cells (CAR T CELLS), CTLs, Donor Lymphocyte Infusion (DLI)

CAR T-Cell Administration

- Cells Infused via IV Push
  - Administered by Physician or APP
  - Between 5-20 minutes as per MSKCC Policy
  - 10 cc NS Flush
  - RN documents vital signs
  - RN monitors for adverse reactions during the infusion

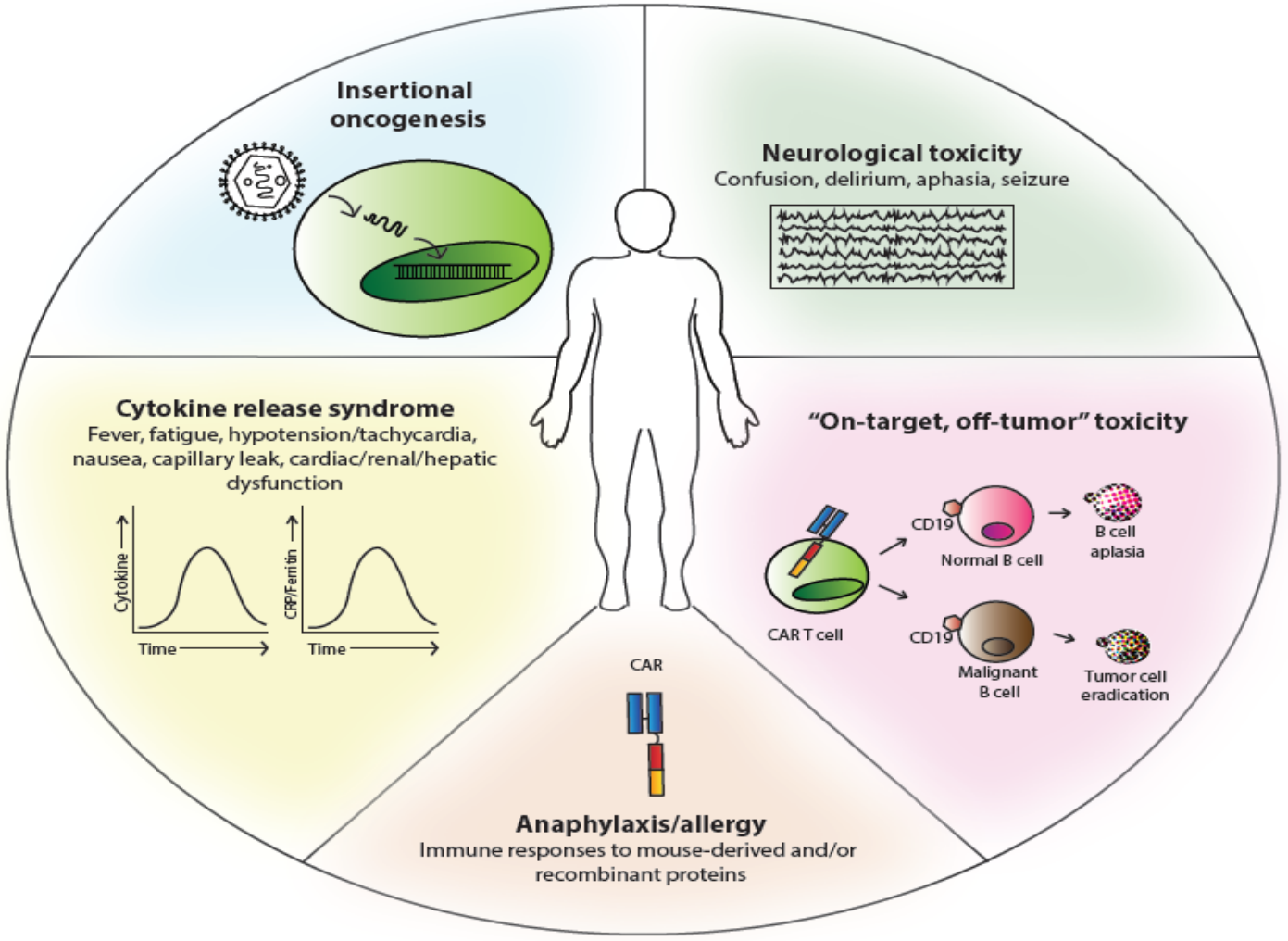
Memorial Sloan-Kettering Cancer Center (2018). Administering of Immune Effector Cells(IEC)-Chimeric Antigen Receptor T Cells (CAR T CELLS), CTLs, Donor Lymphocyte Infusion (DLI)

Clinical Consideration

- RN should not leave the room during the first 15 minutes of the infusion
- APP must be physically present on the patients unit during this time to immediately address life-threatening reactions
- APP's name and beeper number should readily be available

Memorial Sloan-Kettering Cancer Center (2018). Administering of Immune Effector Cells(IEC)-Chimeric Antigen Receptor T Cells (CAR T CELLS), CTLs, Donor Lymphocyte Infusion (DLI)

CAR T Cell Toxicity



Bonifant et. al. *Mol. Therapy Oncolytic*. 2016

Boxed Warning

KYMRIAH™ (tisagenlecleucel) suspension for intravenous infusion
Initial U.S. Approval: YYYY

WARNING: CYTOKINE RELEASE SYNDROME AND NEUROLOGICAL TOXICITIES

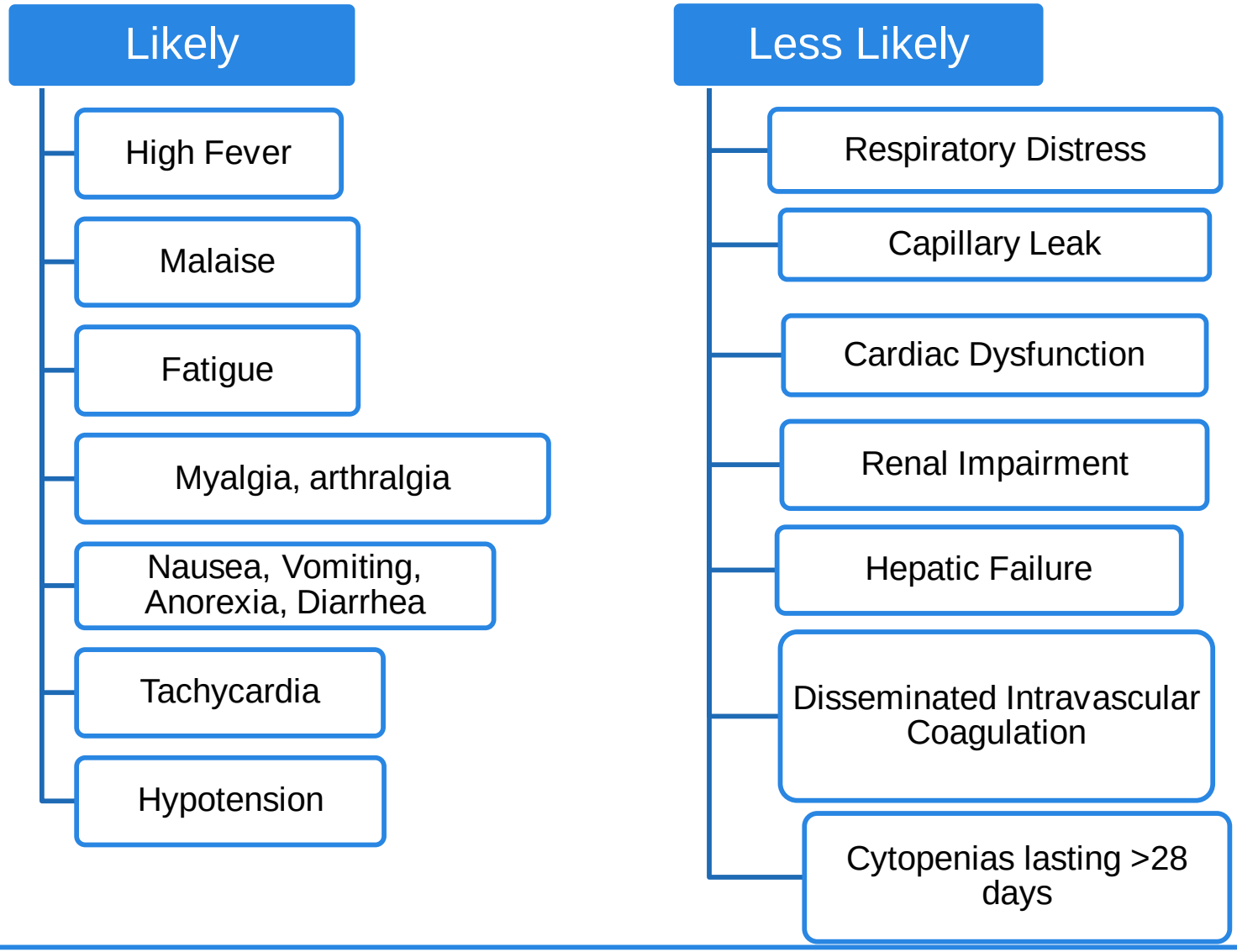
See full prescribing information for complete boxed warning.

YESCARTA™ (axicabtagene ciloleucel) suspension for intravenous infusion
Initial U.S. Approval: 2017

WARNING: CYTOKINE RELEASE SYNDROME AND NEUROLOGIC TOXICITIES

See full prescribing information for complete boxed warning.

Cytokine Release Syndrome (CRS)



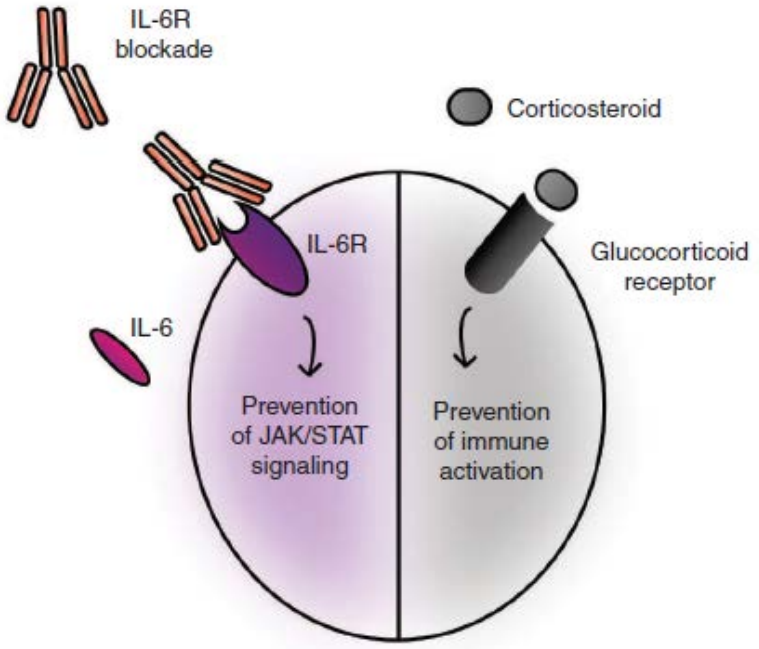
Correlates with **Tumor Burden**

Management of CRS

- Fever
  - Tmax of 108.5 F (42.5 C)
  - Median time to onset: 3 days
  - Acetaminophen
- Hypotension
  - NS/LR bolus
  - Vasopressor
- Hypoxia
  - Oxygen
  - Ventilator support

Management of CRS

- Tocilizumab
  - *Monoclonal antibody - IL-6 receptor antibody*
  - Fever and hypotension often resolve within a few hours
  - Prevailing theory is no impact on CAR T outcome or function
- Corticosteroids
  - Thought to be more efficacious for neurotoxicity
  - Prolonged use of high dose steroids may resulted in ablation of CAR T cell population



Bonifant et. al. *Mol. Therapy Oncolytic*. 2016

ASTCT Consensus Grading in CRS

	Grade 1	Grade 2	Grade 3	Grade 4
Fever†	Temperature ≥38°C	Temperature ≥38°C	Temperature ≥38°C	Temperature ≥38°C
With either:				
Hypotension	None	Not requiring vasopressors	Requiring one vasopressor with or without vasopressin	Requiring multiple vasopressors (excluding vasopressin)
And/or‡				
Hypoxia	None	Requiring low-flow nasal cannula^ or blow-by	Requiring high-flow nasal cannula^, facemask, non-rebreather mask, or Venturi mask	Requiring positive pressure (eg: CPAP, BiPAP, intubation and mechanical ventilation)

*Organ toxicities should be graded using CTCAE but do not inform CRS grading

Lee DW, Santomasso B, et al. BBMT 2018

Neurological Toxicities and Management

Symptoms	Management
Headache	Typically reversible
Tremor	Levetiracetam prophylaxis
Anxiety	Dexamethasone
Confusion	Neuro evaluations
Delirium	MRI/EEG/LP as needed
Expressive aphasia	
Myoclonus	
Seizure- like activity	
Obtundation	
Encephalopathy	

ASTCT Consensus Grading for Neurotoxicity

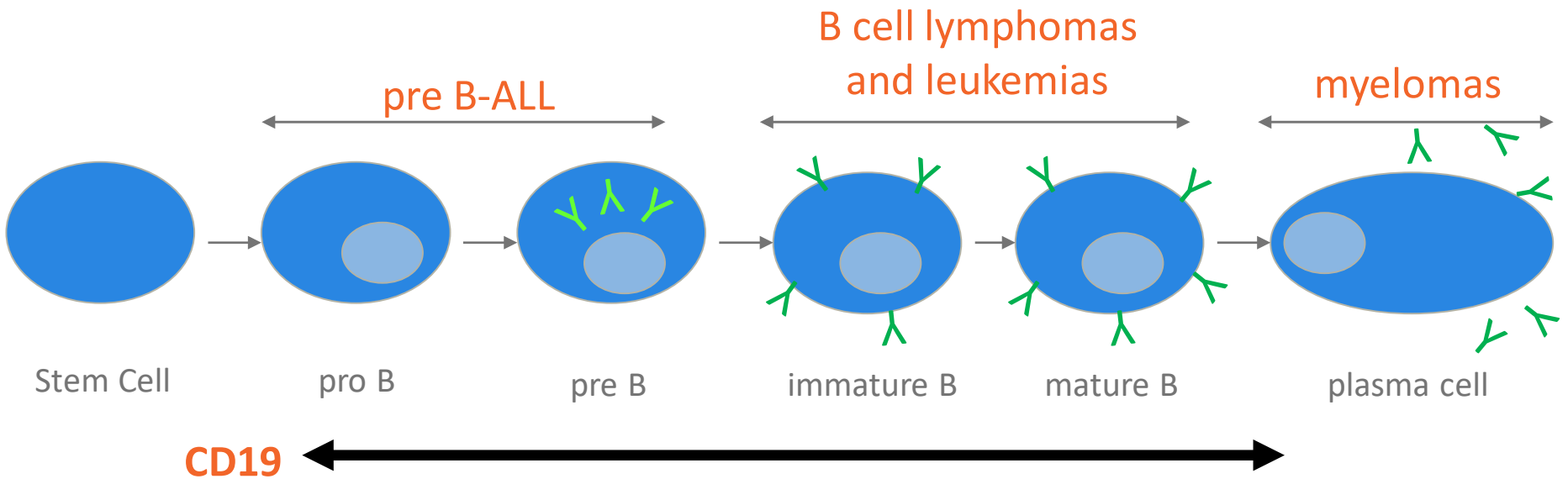
Neurotoxicity Domain	Grade 1	Grade 2	Grade 3	Grade 4
Immune Effector Cell-Associated Encephalopathy (ICE) Score for children ≥12 years^	7-9	3-6	0-2	0 (patient is unarousable and unable to perform ICE)
CAPD score for children age <12 years	1-8	1-8	**≥9**	Unable to perform CAPD
Depressed level of consciousness	Awakens spontaneously	Awakens to voice	Awakens only to tactile stimulus	Unarousable or requires vigorous or repetitive tactile stimuli to arouse. Stupor or coma
Seizure	N/A	N/A	Any clinical seizure focal or generalized that resolves rapidly; or Non-convulsive seizures on EEG that resolve with intervention	Life-threatening prolonged seizure (>5 min); or Repetitive clinical or electrical seizures without return to baseline in between.
Motor weakness	N/A	N/A	N/A	Deep focal motor weakness such as hemiparesis or paraparesis
Raised ICP / Cerebral edema	N/A	N/A	Focal/local edema on neuroimaging.	Decerebrate or decorticate posturing; cranial nerve VI palsy; papilledema; Cushing's triad, or signs of diffuse cerebral edema on neuroimaging

Lee DW, Santomasso B, et al. BBMT 2018

Long Term toxicity

B Cell Aplasia

- CD19 therapy also targets normal B cells
- Hypogammaglobulinemia may limit the patient's ability to produce antibodies
- Serum IGG levels: baseline, 1, 3, and 6 months
- IVIG if IGG <500 or clinical indicated



Management of CAR T cells Side Effects

- Patient condition/status will dictate management
- **Each patient is <u>unique and management is not always straightforward</u>**
- Management guidelines can aid in the initial recognition and management of toxicity
- Post Infusion Toxicity – need to manage all:
  - Chemotherapy Side Effect
  - Cytokine Release Syndrome (CRS)
  - Infection/Sepsis

Preventing Toxicity

- Tumor de-bulking
  - Re-induction and conditioning chemotherapy
- Levetiracetam Prophylaxis
  - Unclear benefit
- Prophylactic Tocilizumab
  - Increased Neurotoxicity (Axi-cel Prophylaxis study)
- Suicide or Elimination Gene

Locke, FL, et al. Blood. 2017 130:1547.

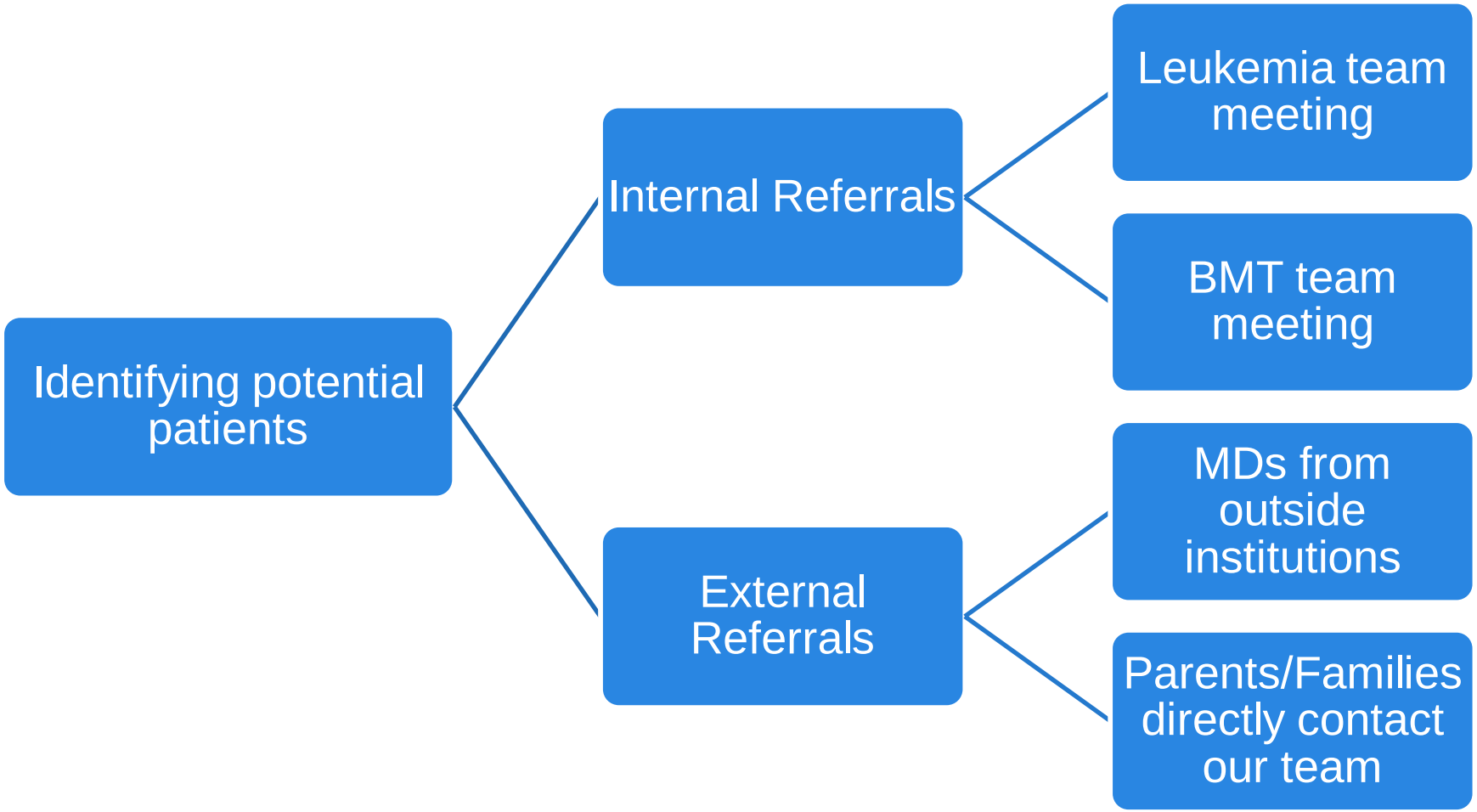
ELIANA Trial Results

- N= 79
- Overall response rate - 82% (65/79)
  - Complete Remission (CR) - 62%
  - CR –incomplete blood count recovery - 20% (16/79)
- Relapse free survival for 12 and 18 months - 66%
- Overall survival for 12 months is 76% and for 18 months is 70%.

Toxicity	% Patients
CRS	77% (Grade 3 or 4 48%)
Neurological events within 8 Weeks	40%
Grade 3 or 4 Thrombocytopenia	43%
Grade 3 or 4 Neutropenia	54%
Neutropenic Fever	62%

Grupp SA, et al. Blood 2018 132:895.

Patient Identification



Clinical/Financial Authorization

Clinical team obtains “clinical approval”

Patient Financial Services (PFS) starts the financial approval process

Letter of Medical Necessity, CPT codes, pertinet information sent to insurance company

- Current commercial CAR T products have up to a $500,000 price tag
- We have a dedicated team for CAR-related financial services
- Our institution achieves Single Case Agreements (SCA) for each patient
- Our institution has seen a 1-13 day range for obtaining the SCA

Bridging Therapy

Patients may need additional treatment prior to collection if there are delays in treatment

(approval and/or production)

- Potential delayed count recovery

- Side effects and unexpected complications from this treatment

Resources for our patients

- The FDA requires patients stay within two hours of the institution for 30 days following CAR T.
  - Due to Manhattan traffic our institution has mandated that they stay within 1 hour.
  - Many of our patients require housing following their infusions.
- Ronald McDonald Housing (RMH)
- Social Work plays a huge role in ensuring patients have the resources they need.
  - In contact with the original institution right off the bat to evaluate/anticipate patient needs
  - Prepare family for coping with side effects of treatment
  - Preparing for the possibility of the PICU and what that entails.

Data Management

- Foundation for the Accreditation of Cellular Therapy (FACT)
  - National Accrediting agency for BMT and Immune Effector Cell (IEC) Therapy
  - Mandated requirements for capturing all adverse events

- Manufacturers reporting requirements

- FDA mandated to track patients for up to 15 years.

Future Directions

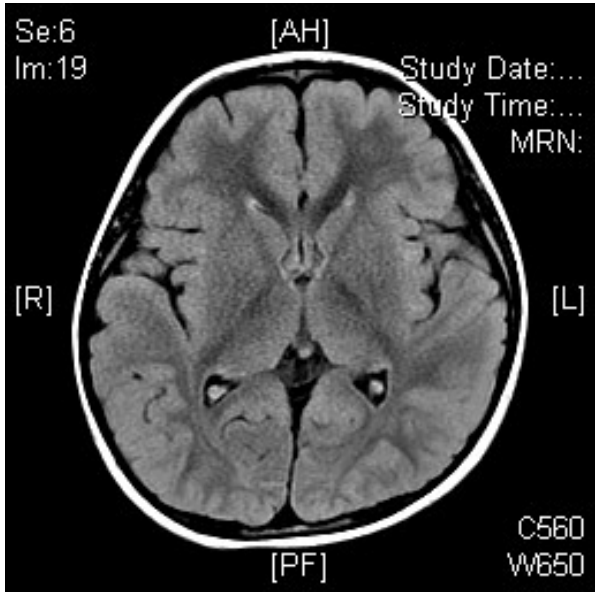
- Hematologic Malignancies
  - BIANCA Trial
    - Pediatric R/R NHL – CAR T cells
  - Comparison trials NHL (adult)
    - Auto-HSCT vs CAR T cells

- Solid Tumors
  - Successfully target/eradicate solid tumors
    - Armored CAR T cells – recruit the immune system or counter act the suppressive microenvironment.
  - Combination with check-point blockade

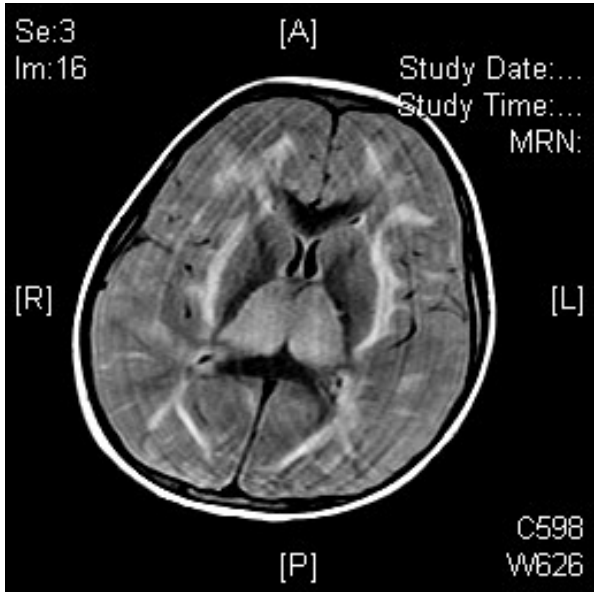
Case Presentation

- M.W. - 4 y/o male with refractory pre-B cell ALL
  - MRD Cohort: (Bone Marrow Aspirate: 0.41%)
  - Conditioning Chemotherapy + 19-28z CAR T cells (MSK CAR T cell)
    - Cyclophosphamide (1500mg/m^2/dose daily x 2 days)
    - Fludarabine (25mg/m^2/dose given daily x 3 days)
- **Day +3** – Fever
- **Day +4** – Compensated shock →IVF only (PICU transfer)
- **Day+5** – Dizziness; Right sided weakness + **<u>Seizure/post-ictal</u>**
    - Lorazepam, increased levetiracetam
    - Tocilizumab
    - CT negative
    - VEEG – diffuse cerebral dysfunction (no focal epileptiform activity)
    - Seizure #2 in the afternoon – Dexamethasone + Valproate
- **Day +6** – MRI +*Diffuse supratentorial white matter vasogenic edema*
    - Improving Neuro Sx - +Left hemiparesis

Vasogenic Edema (FLAIR)



Baseline



Day +6

Case Study

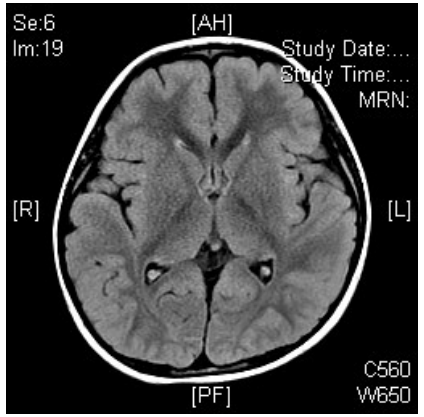
- **Day +7** – Improving neurologic symptoms but left hemiparesis still present; speaking

- **Day +9** – Transfer to Floor (5 day steroid pulse completed)

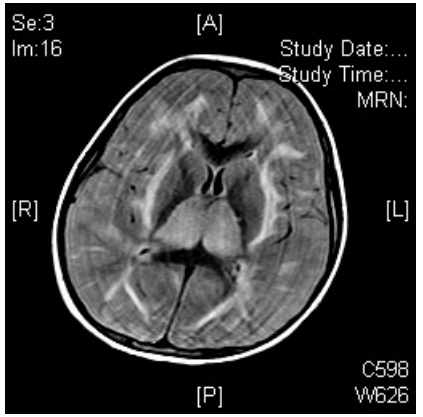
- **Day +14** – Discharged from hospital
  - MRI: *improvement in diffuse supratentorial white matter signal abnormality and diffuse cerebral edema*
  - *BMA - MRD negative CR*

- ***Day +47*** *– Received a 9/10 matched unrelated donor T cell depleted BMT*

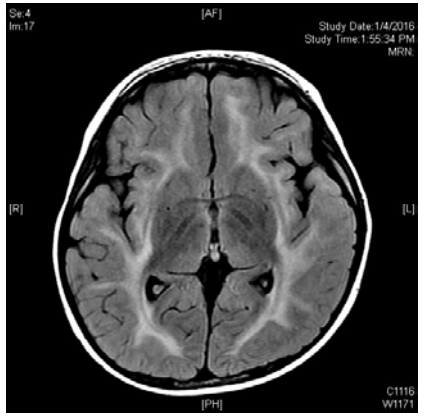
Vasogenic Edema (FLAIR)



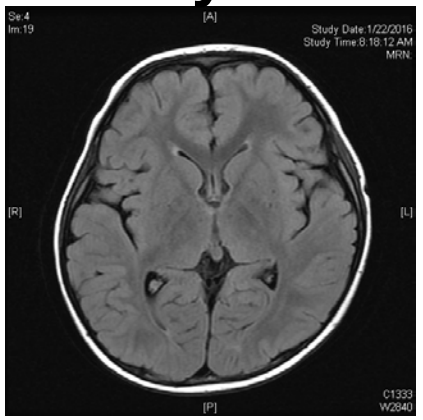
Baseline



Day +6



Day +14



Day + 32

Conclusions (1)

- Immunology and CAR T cells
  - B & T cells play an integral role in our immune system
  - Autologus cells are sent to the lab for genetic modification
  - Autologus CAR T cells can identify and destroy the CD19 protein on B cells

- Collection
  - Rapid coordination
  - Multidisciplinary approach
  - Organized with referring institution, donor room, lab and patient's family

Conclusions (2)

- Infusion
  - Timing of infusion involves multiple staff members
  - Close monitoring is imperative

- Treatment/Toxicity Management
  - Patient's require complex nursing care
  - Nursing plays an important role in monitoring and recognizing immunotherapy related toxicities and BMT late effects
  - Prompt response to neurological and vital sign changes

AAMDSIF Mission

To support patients, families and caregivers coping with aplastic anemia, myelodysplastic syndromes (MDS), paroxysmal nocturnal hemoglobinuria (PNH) and related bone marrow failure diseases.

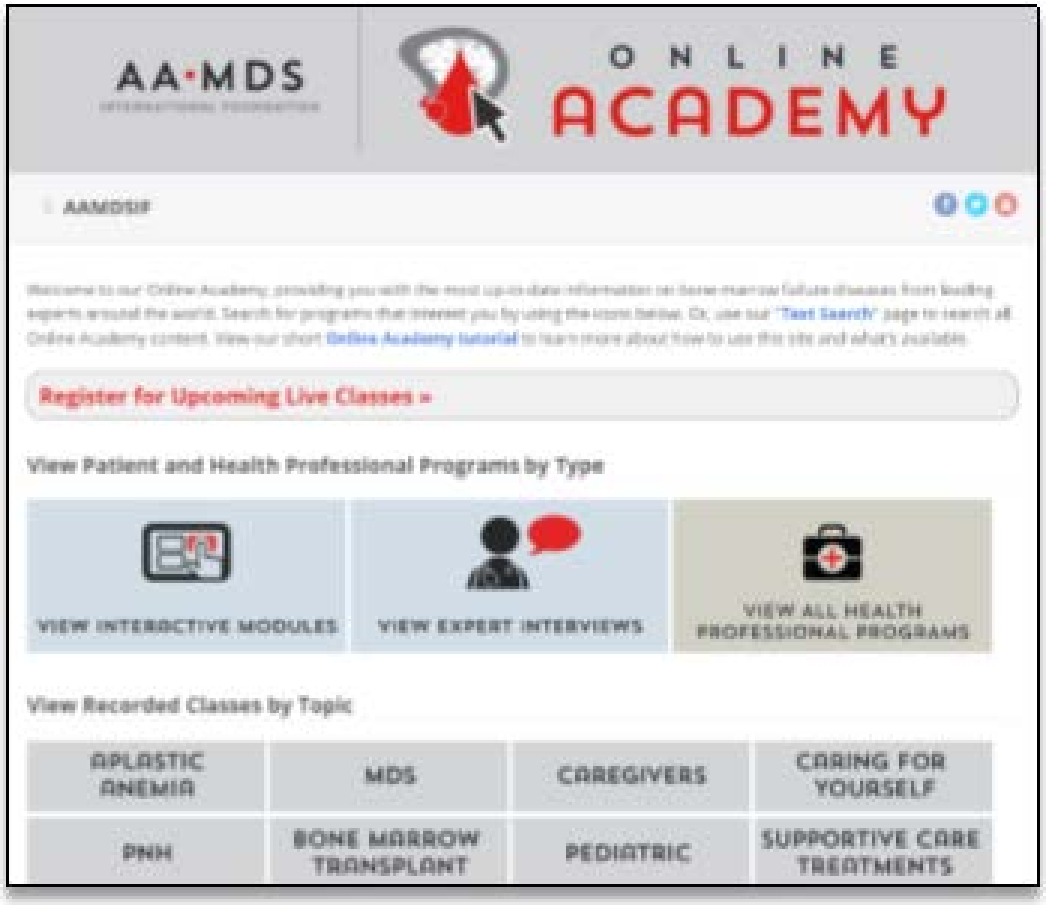
AA·MDS
INTERNATIONAL FOUNDATION

AAMDSIF Health Professional Education

- Biennial Scientific Symposium
- Satellite Symposium at ASH Annual Meeting
- Satellite Symposium at ONS Congress
- Regional Bone Marrow Failure Disease Symposia
- **"MDS Rounds"** CE program for community hospitals

AA·MDS INTERNATIONAL FOUNDATION

Online Academy for Professionals and Patients
www.aamds.org/learn



AA·MDS INTERNATIONAL FOUNDATION

AAMDSIF Patient Support and Education

- Free patient education materials
- Print and electronic newsletters
- Patient information specialist
- Peer support network
- Community Connection support groups

www.aamds.org

AA·MDS INTERNATIONAL FOUNDATION

AAMDSIF 2019 Patient & Family Conferences

May 18, 2019
Rockville, Maryland

July 22, 2019
Milwaukee, Wisconsin

September 21, 2019
Pittsburgh, Pennsylvania

October 26, 2019
St. Louis, Missouri

November 16, 2019
Jacksonville, Florida

To Register:

Online: https://www.aamds.org/conferences

Call: (800) 747-2820 x2

Email: conferences@aamds.org

Cost: Conference registration is **FREE**

NATIONAL MARROW DONOR PROGRAM®

BE THE MATCH®

AA·MDS INTERNATIONAL FOUNDATION

Programs and resources for you and your patients

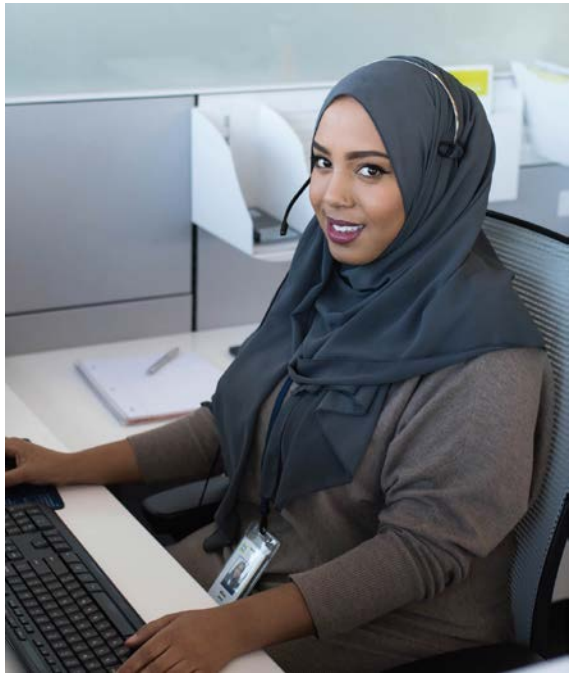
Debbie Jacobson, OPN-CG
Manager, Patient Support Center
Patient Advocacy and Navigation
National Marrow Donor Program /Be The Match

Be The Match *Patient Support Center*

Our services include:

- Patient and caregiver navigation services provided by certified oncology patient navigators
- Confidential telephone counseling and one-on-one support for your patients and families
- Peer support from trained Be The Match volunteers
- Support groups and webinars
- Financial grants for patients
- Information and support in many languages
- Educational books, DVDs, newsletters and fact sheets

Learn more: BeTheMatch.org/one-on-one



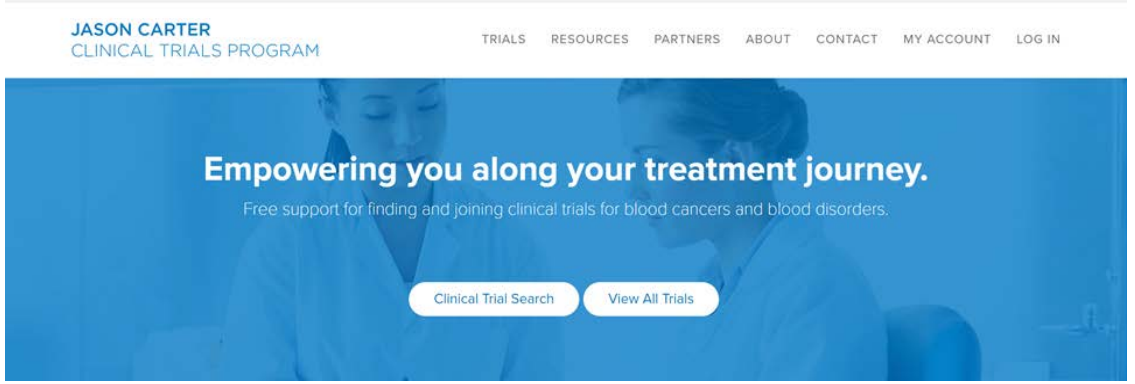
Bilan, MSW
BMT Patient Navigator
Phone: 1 (888) 999-6743
Email: patientinfo@nmdp.org

NATIONAL MARROW DONOR PROGRAM®
BE THE MATCH®

Jason Carter Clinical Trials Program

To help your patients with blood cancers, blood disorders, and immune systems diseases find and join clinical trials

- **One-on-one support** for patients & families to help answer questions and guide their clinical trials search
- **Online search tool**: JasonCarterClinicalTrialsProgram.org
- **Easy-to-understand resources** to learn about cancer treatments and clinical trials

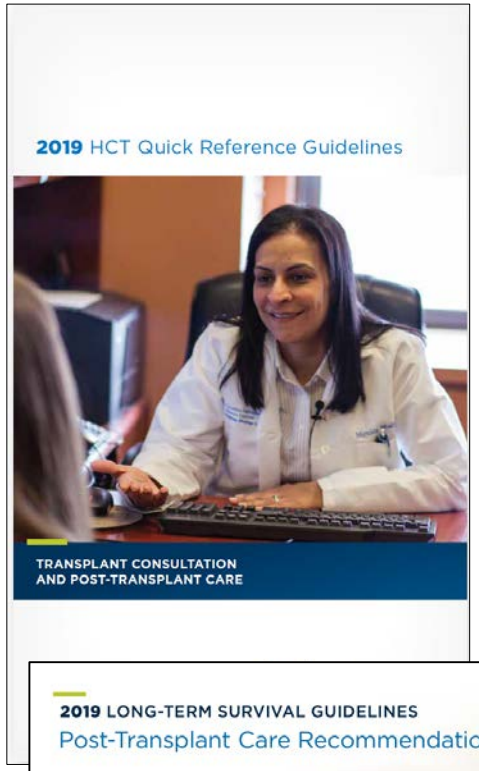


Contact: Scott Kerwin, RN, MN, CCRC, CCRN
Clinical Trial Patient Education Specialist
Anna Eames, MS, CGC
Clinical Trial Patient Education Specialist

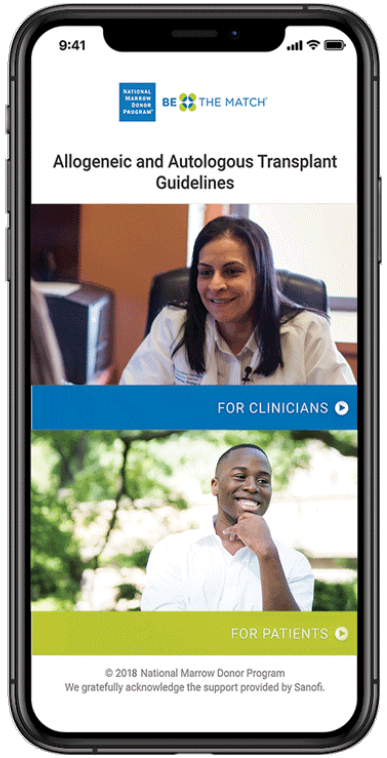
Phone: 1 (888) 814-8610

Email: clinicaltrials@jcctp.org

Quick Reference Guidelines for Transplant Consultation and Post-Transplant Care



- Referral Guidelines – 2019 update
  - NMDP/Be The Match & ASBMT: *Recommended Timing for Transplant Consultation*
  - Up-to-date referral for HCT consultation timing for more than 20 diseases
- Long-Term Survival Guidelines
  - Part I: Long-term screening
  - Part II: Vaccinations
  - Part III: Screening for chronic GVHD



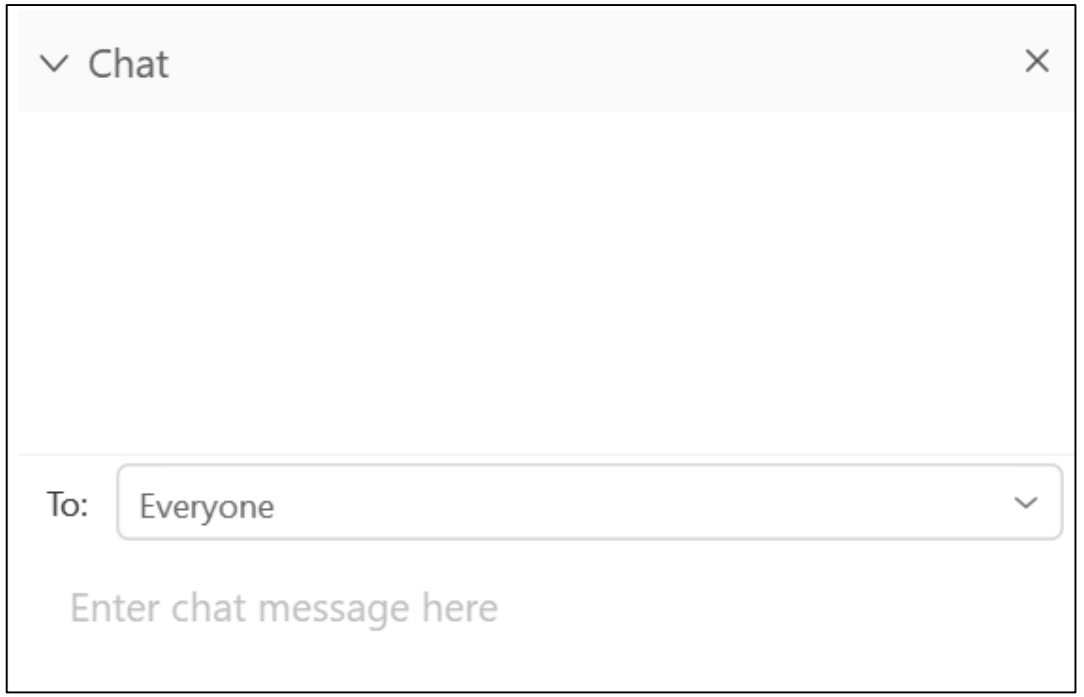
Available in mobile app, print and online:

BeTheMatchClinical.org/guidelines

Questions

Vicki Szenes, MS, RN, CPNP
Meghan Wellenbrink, BSN, RN, CPHON

To ask a question, use the chat icon



NATIONAL MARROW DONOR PROGRAM®
BE THE MATCH®

35 YEARS AA·MDS INTERNATIONAL FOUNDATION

Thank you for participating!

Webinar Evaluation

- Attendees will receive an email following the webinar with a link to the evaluation.
- All attendees completing the online program evaluation will receive a certificate of attendance or a continuing education certificate.

References

- Bonifant, C. L., Jackson, H. J., Brentjens, R. J., & Curran, K. J. (2016). Toxicity and management in CAR T-cell therapy. Molecular Therapy-Oncolytics, 3, 16011.
- Curran, K. J., & Brentjens, R. J. (2015). Chimeric antigen receptor T cells for cancer immunotherapy. Journal of Clinical Oncology, 33(15), 1703-1706.
- Davila, M. L., Riviere, I., Wang, X., Bartido, S., Park, J., Curran, K., ... & Qu, J. (2014). Efficacy and toxicity management of 19-28z CAR T cell therapy in B cell acute lymphoblastic leukemia. Science translational medicine, 6(224), 224ra25-224ra25.
- Davila, M. L., & Sadelain, M. (2016). Biology and clinical application of CAR T cells for B cell malignancies. International journal of hematology, 104(1), 6-17.
- Fitzgerald, J. C., Weiss, S. L., Maude, S. L., Barrett, D. M., Lacey, S. F., Melenhorst, J. J., ... & Frey, N. V. (2017). Cytokine release syndrome after chimeric antigen receptor T cell therapy for acute lymphoblastic leukemia. Critical care medicine, 45(2), e124-e131.

References

- Grupp, S. A., Maude, S. L., Rives, S., Baruchel, A., Boyer, M. W., Bittencourt, H., ... & Myers, G. D. (2018). Updated analysis of the efficacy and safety of tisagenlecleucel in pediatric and young adult patients with relapsed/refractory (r/r) acute lymphoblastic leukemia.
- Grupp, S. A., Kalos, M., Barrett, D., Aplenc, R., Porter, D. L., Rheingold, S. R., ... & Milone, M. C. (2013). Chimeric antigen receptor–modified T cells for acute lymphoid leukemia. *New England Journal of Medicine*, *368*(16), 1509-1518.
- Lee, D. W., Gardner, R., Porter, D. L., Louis, C. U., Ahmed, N., Jensen, M., ... & Mackall, C. L. (2014). Current concepts in the diagnosis and management of cytokine release syndrome. *Blood*, *124*(2), 188-195
- Maude, S. L. (2017). Future directions in chimeric antigen receptor T cell therapy. *Current Opinion in Pediatrics*, *29*(1), 27-33.
- Nguyen, K., Devidas, M., Cheng, S. C., La, M., Raetz, E. A., Carroll, W. L., ... & Loh, M. L. (2008). Factors influencing survival after relapse from acute lymphoblastic leukemia: a Children's Oncology Group study. *Leukemia*, *22*(12), 2142-2150.
- Sramkova, L., Muzikova, K., Fronkova, E., Krejci, O., Sedlacek, P., Formankova, R., ... & Trka, J. (2007). Detectable minimal residual disease before allogeneic hematopoietic stem cell transplantation predicts extremely poor prognosis in children with acute lymphoblastic leukemia. *Pediatric blood & cancer*, *48*(1), 93-100.