



BLOOD CANCER 101: DISEASE, TREATMENT, AND THE ROLE OF THE HEALTHCARE PROVIDER

JULY 11, 2019



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LEARNING OBJECTIVES

- **Describe the different blood cancers**
- **Describe the psychosocial impact of different blood cancer diagnoses**
- **Explain the role of the social worker and nurse as members of the healthcare team**
- **Educate patients about clinical trial participation**
- **List resources for patients with blood cancers and how to access them**

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INTRODUCTIONS



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WHAT IS BLOOD CANCER?

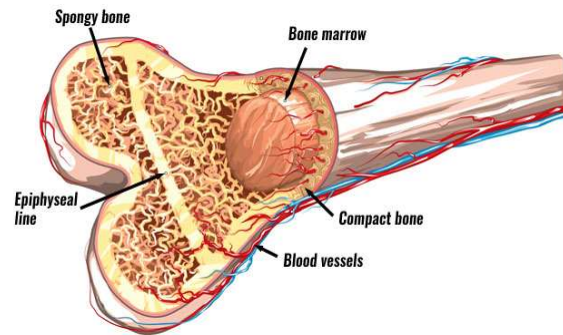
- **Cancer arising from cells responsible for blood formation or immune function**
- **Commonly occurs in your bone marrow where stem cells are located and mature**
- **In the bone marrow, normal cell production is interrupted and abnormal cells begin to grow**

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WHAT IS BONE MARROW?



Teachpe.com

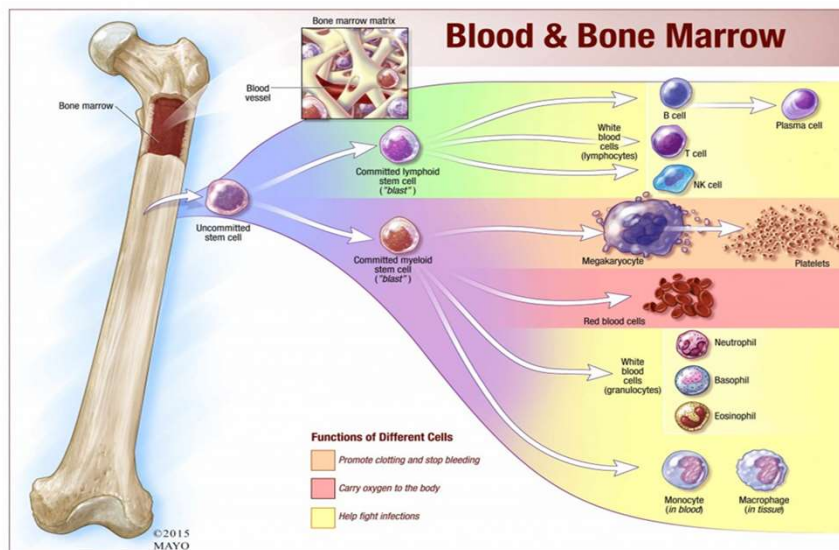
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- Bones are made up of 3 main parts
 - Compact bone
 - Spongy bone
 - Bone marrow
 - Red marrow
 - Yellow marrow

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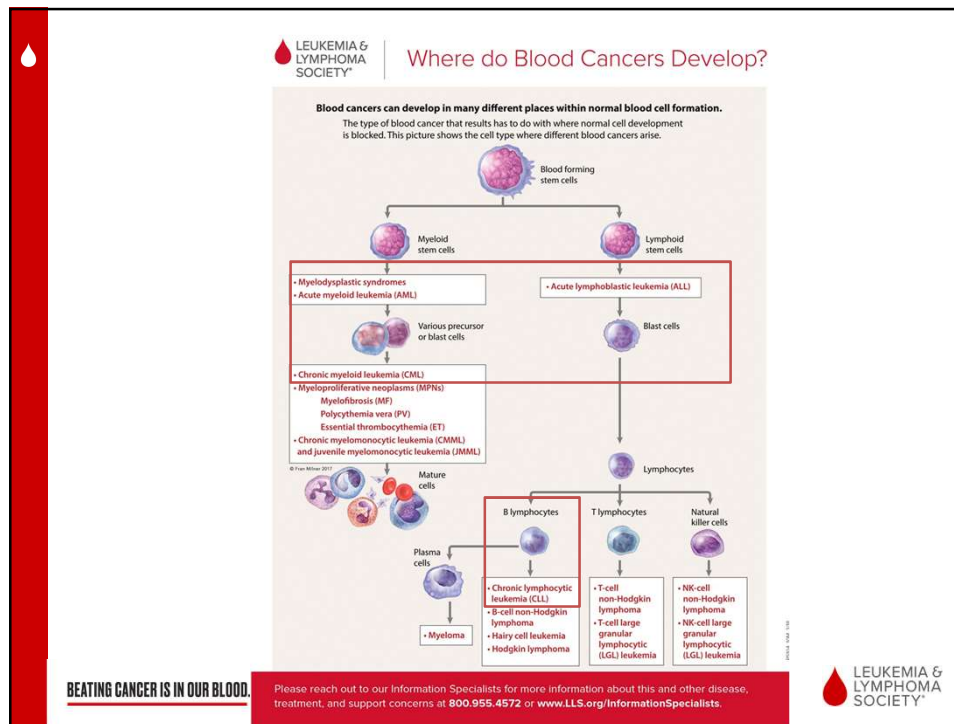
UNDERSTANDING BLOOD CELL FORMATION



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LEUKEMIA BASICS

- **Four main types**
 - **Acute Lymphoblastic (Lymphocytic) Leukemia (ALL)**
 - **Acute Myeloid (Myelogenous) Leukemia (AML)**
 - **Chronic Lymphocytic Leukemia (CLL)**
 - **Chronic Myeloid Leukemia (CML)**
- **All begin in the bone marrow**
 - **Myeloid stem cell line**
 - **Lymphoid stem cell line**
- **ALL and AML are made of immature blasts**
- **CLL and CML have few to no blasts**
- **Each major type has its own subtypes**

Normal Blood

Leukemia

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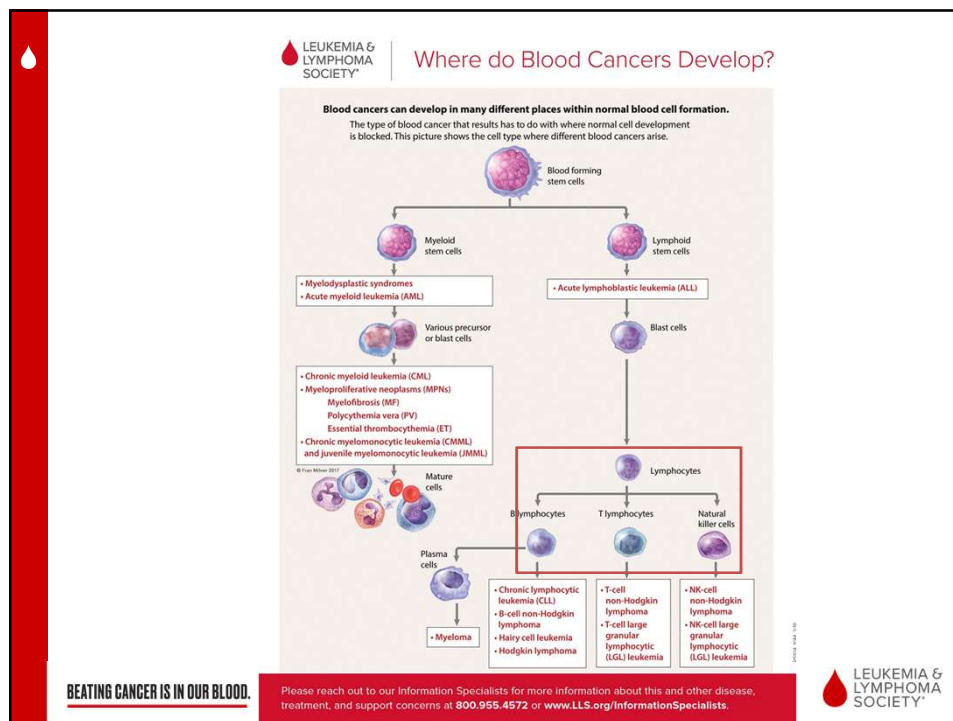
Myelodysplastic Syndromes (MDS)

- Sometimes called “pre-leukemia”; affects myeloid cell line, where 5-19% blasts are present
- Risk factors
 - Male gender, white
 - Older age (70+, typically)
 - No risks known for de novo MDS
 - Secondary MDS may be due to previous cancer treatment
- Symptoms
 - Possible to have none
 - Cytopenias (anemia, neutropenia, thrombocytopenia)

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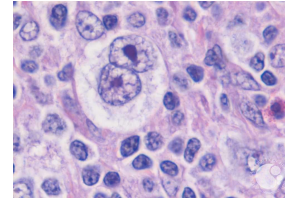
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LYMPHOMA BASICS

- Hodgkin Lymphoma (defined by the presence of Reed-Sternberg cells and treated in a very specific way)
 - Classical Hodgkin Lymphoma (95%)
 - Nodular Lymphocyte- Predominant Hodgkin Lymphoma (5%)
- Non-Hodgkin Lymphoma (NHL)
 - B cell lymphomas ~85% of all NHLs
 - T cell and NK cell lymphomas ~15% of all NHLs
 - 70-90 subtypes
 - Aggressive or indolent, sometimes intermediate
 - Stage I - IV



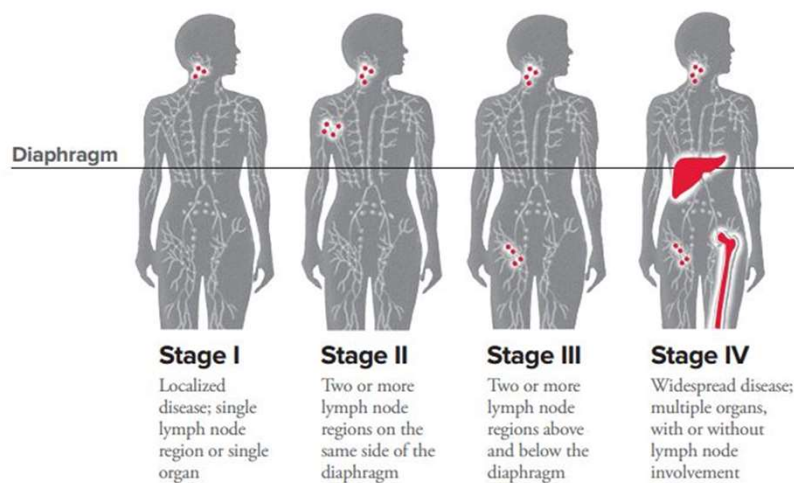
ASH Image Bank

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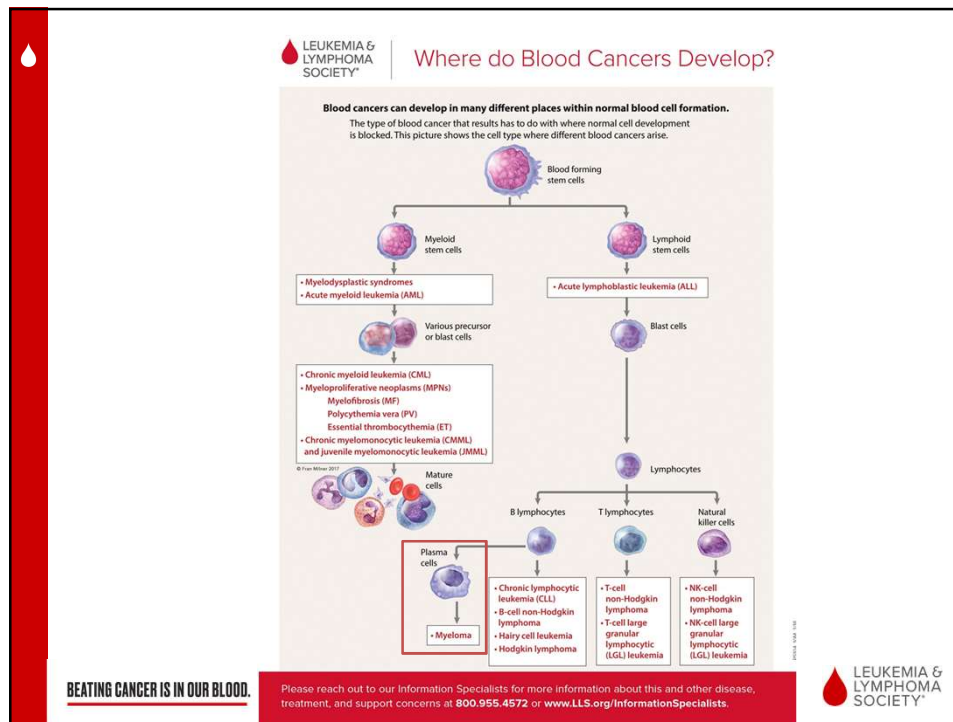
LYMPHOMA STAGING



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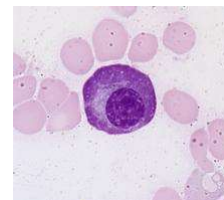
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MYELOMA BASICS

- **Cancer of the plasma cells (product of B-lymphocytes)**
- **Can be a single tumor – “plasmacytoma,” asymptomatic and slow growing – “smoldering,” or diffuse throughout the body – “multiple myeloma”**
- **CRAB criteria are important to the diagnosis:**
 - Increased **C**alcium
 - **R**enal (kidney) failure or insufficiency
 - **A**nemia
 - **B**one lesions

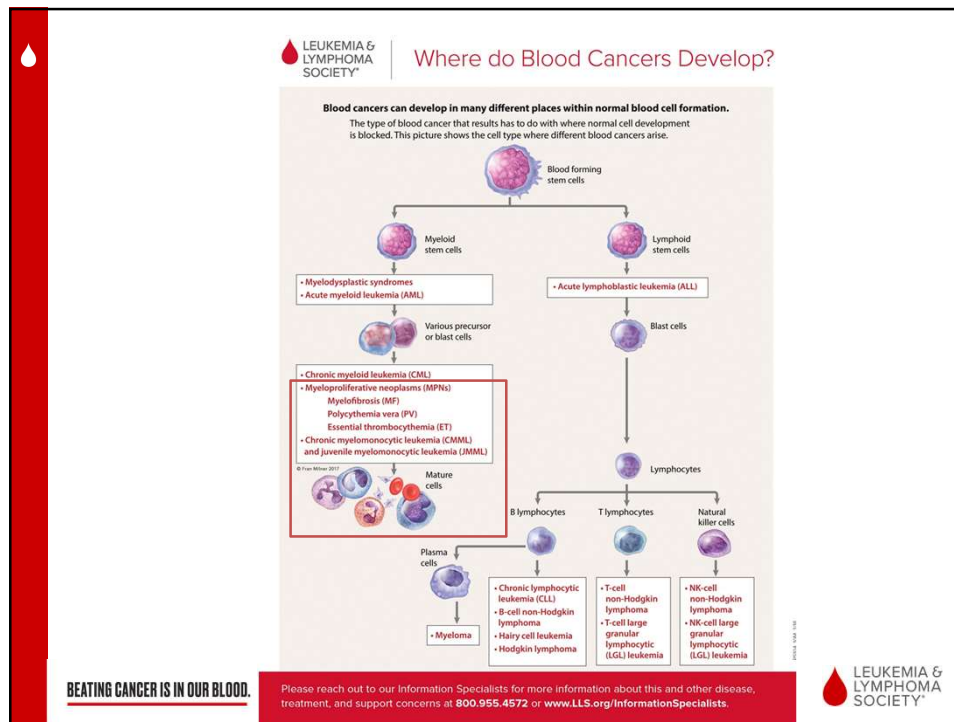


Blood Journal

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MYELOPROLIFERATIVE NEOPLASMS (MPNS)

- **Myelo** – of the bone marrow, proliferative – to grow or reproduce quickly
- Many subtypes, but mainly:
 - **Polycythemia vera (PV)** – too many red blood cells are made
 - **Essential Thrombocythemia (ET)** – too many platelets are made
 - **Myelofibrosis (MF)** – scarring of the bone marrow after it has “exhausted” itself or as a primary disease
- **JAK2 mutations are prominent in MPNs, especially PV**
- **PV/ET can transform into MF; MF can transform into AML**

JAK2 V617F Mutation Frequency

Condition	Exon 12 JAK2 Frequency
Polycythemia Vera	95-99%
Essential Thrombocythemia	50-60%
Primary Myelofibrosis	50-60%

Jason Gotlib, MD, Stanford

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HOW IS BLOOD CANCER TREATED?

- **Chemotherapy**
- **Radiation Therapy**
- **Targeted Therapy**
- **Immunotherapy**
- **Cellular Therapy**
- **Clinical Trial**

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HOW IS BLOOD CANCER TREATED?

Treatment varies greatly based on key factors:

- **What type of blood cancer**
 - Leukemia vs. Lymphoma
 - Acute vs. Chronic
 - Myeloid vs. Lymphoid
- **Molecular/genetic changes?**
 - BCR/ABL mutation (Philadelphia chromosome)- CML, ALL
 - FLT3, IDH1/2
- **Comorbidities of patient**
 - Heart, kidney, liver function OK to withstand chemotherapy

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CHEMOTHERAPY

Stops the growth of dividing cells

- **Used in combinations to make other treatments more effective**
- **Used with surgery or radiation-**
- **Can be given by many different routes**
 - **PO, IV, IM, IT, IP**

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Cancerresearchuk.org



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CHEMOTHERAPY SIDE EFFECTS

- **Fatigue**
- **Alopecia**
- **Neuropathy/ Confusion**
- **Mouth sores**
- **Nausea/ Diarrhea**
- **Cytopenias- Neutropenia, Anemia, Thrombocytopenia**
 - **Infection**
 - **Bleeding**
- **Skin and nail changes**
- **Mood changes**
- **Infertility and changes in libido**

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RADIATION THERAPY

Works by damaging DNA of cancer cells so that they cannot replicate

- **Types**
 - **Internal: put inside the target, ie: brachytherapy**
 - **External: comes from a machine, targets certain area of your body**
- **Used in combination with chemotherapy and surgery**

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RADIATION THERAPY SIDE EFFECTS

- **Fatigue**
- **Localized skin changes**
- **Specific side effects related to the area being treated:**
 - **Lung: fatigue, SOB, cough**
 - **Brain: fatigue, hair loss, nausea/vomiting**
 - **GI: nausea/vomiting, diarrhea, abdominal pain, bladder, fertility**
 - **Head/neck: sore throat, dry mouth, taste alteration, hair loss**

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TARGETED THERAPY

Specifically targets the changes found in cancer cells' DNA which makes it become cancerous

- **Types:**
 - **Monoclonal antibodies:**
 - rituximab, bevacizumab
 - **Cancer growth inhibitors:**
 - **Tyrosine kinase inhibitors:** dasatinib, imatinib, nilotinib
 - **Proteasome inhibitors:** bortezomib
 - **PI3K inhibitors:** idelalisib
 - **HDAC inhibitors:** panobinostat, vorinostat
 - **mTOR inhibitors:** sirolimus, everolimus
 - **Hedgehog pathway inhibitors:** glasdegib

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TARGETED THERAPY SIDE EFFECTS

- **Diarrhea**
- **Liver abnormalities- increased LFTs, hepatitis**
- **Skin and nail changes**
- **High blood pressure**
- **Alterations in blood clotting**

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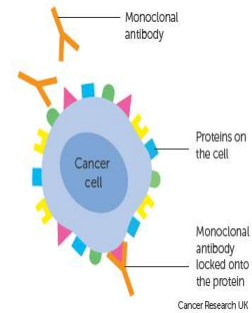
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IMMUNOTHERAPY

Harnesses your immune system to fight the cancer

Types:

- **Monoclonal antibodies**
 - rituximab, obinituzumab
- **Checkpoint inhibitors**
 - nivolumab, pembrolizumab
- **Bi-specific T- cell engagers/antibodies**
 - blinatumomab
- **Vaccines**
 - Antigen, whole cell, dendritic cell
- **Cytokines**
 - interferon and interleukin



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IMMUNOTHERAPY SIDE EFFECTS

- **Fever/chills**
- **Weakness/ fatigue**
- **Blood pressure abnormalities**
- **Shortness of breath**
- **Nausea/vomiting**
- **Swelling/ fluid retention**
- **Organ inflammation**
 - **Colitis**
 - **Hepatitis**
 - **Pneumonitis**

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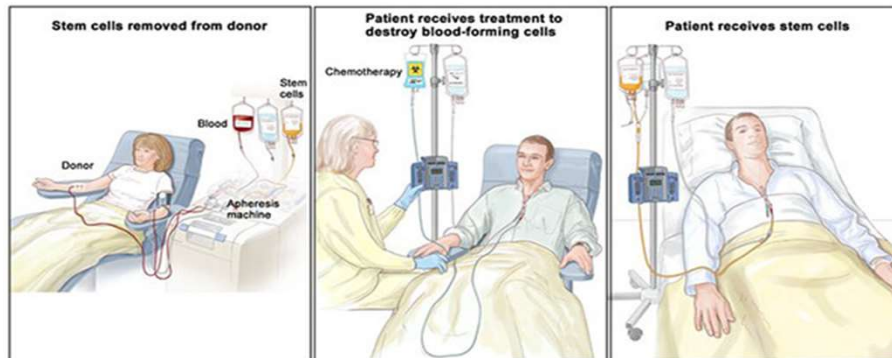
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CELLULAR THERAPY

- Hematopoietic Stem Cell Transplant
- Adoptive Cell Therapy



Credit: National Cancer Institute

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HEMATOPOIETIC STEM CELL TRANSPLANT

- Allows patient to receive high doses of chemotherapy to eradicate disease but then recover normal hematopoietic cell function
- Types:
 - Autologous
 - Allogeneic
 - Umbilical Cord Blood

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ADOPTIVE CELL THERAPY

- Therapies that use body's own defense system to fight cancer
 - Tumor-infiltrating lymphocytes (TILs)
 - Penetrate the environment around the tumor
 - Mostly used in solid tumor
 - T-cell receptors (TCRs)
 - T cells engineered to express a specific T cell receptor which can recognize cancer antigens
 - Mostly used in solid tumor
 - Chimeric Antigen Receptor T-cells (CAR T)
 - T cells taken from patient, engineered to produce chimeric antigen receptors and then injected back into the patient which then recognizes specific antigen on tumor cells

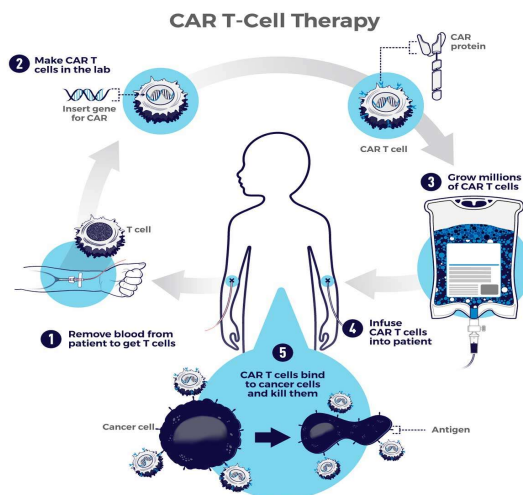
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Credit: cancer.gov



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CHIMERIC ANTIGEN RECEPTOR T-CELL THERAPY



CAR T-cell therapy is a type of treatment in which a patient's T cells are genetically engineered in the laboratory so they will bind to specific proteins (antigens) on cancer cells and kill them. (1) A patient's T cells are removed from their blood. Then, (2) the gene for a special receptor called a chimeric antigen receptor (CAR) is inserted into the T cells in the laboratory. The gene encodes the engineered CAR protein that is expressed on the surface of the patient's T cells, creating a CAR T cell. (3) Millions of CAR T cells are grown in the laboratory. (4) They are then given to the patient by intravenous infusion. (5) The CAR T cells bind to antigens on the cancer cells and kill them.

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cancer.gov



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CAR T-CELL THERAPY SIDE EFFECTS

- Cytokine release syndrome (CRS)
 - T cells naturally release cytokines, however in CRS there is a massive amount released which caused fever, hypotension
 - Anti-IL6 antibody: tocilizumab
- Neurotoxicity
 - Confusion, headache, seizure, cerebral edema
- B cell aplasia
 - Normal B cells often killed by infused CART cells since they express same targets
 - Patients will go on to receive immunoglobulin therapy

Credit: Cancer.gov

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ADOPTIVE CELL THERAPY

- Since 2017, two “off-the-shelf” T cells products available
 - tisagenlecleucel
 - axicatagene ciloleucel
- Adoptive cell therapy continues to be highly studied with many new and exciting therapies coming down the pipeline

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CLINICAL TRIALS

- A clinical trial is a carefully controlled research study conducted by doctors to improve the care and treatment of people with cancer or other illnesses
- Key step in advancing all cancer treatments
- Cancer clinical trials are 40-50% of all trials conducted in the US
- Trials available for all stages of cancer journey- newly diagnosed, relapsed/refractory
- Can be very difficult to navigate available trials

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RISKS & BENEFITS OF CLINICAL TRIALS

Benefits

- Contribution to present and the future
- Financial access to new treatments
- Early access to new therapies
- Access to physicians with extensive experience in the type of cancer
- Followed closely

Risks

- Possibility the treatment may not work
- Unknown/fear of side effects
- Randomized trials- risk of being in the standard of care arm
- Increase time away from home, work and family

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CLINICAL TRIAL SUPPORT CENTER

LLS IS COMMITED TO PROVIDING RESOURCES TO HELP PATIENTS ACCESS CLINICAL TRIALS

- Highly trained nurses navigators
- Provide education to patient
- Provide patient with a professional, detailed, *individualized* search to discuss with their HCP
- Provide follow-up throughout the process
- Speak to sites, HCP and pharma companies re: trials
- Personal connection

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ONCOLOGY NURSES' ROLE WITH ACUTE BLOOD CANCERS

- Direct patient care: symptom management, address physical needs
- Interdisciplinary Collaboration
- Coordination of care
- Patient Education
- Psychosocial Support for Patient and Caregiver

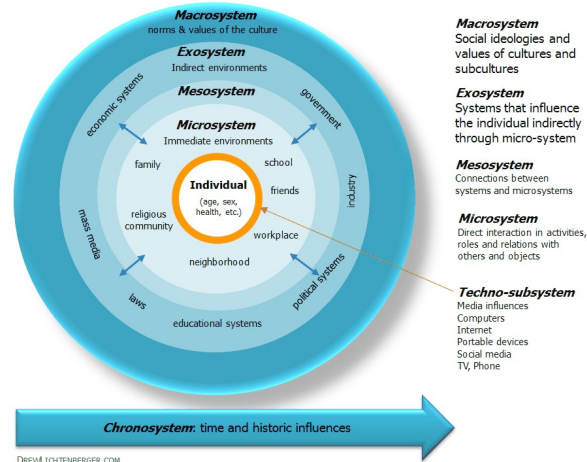
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ONCOLOGY SOCIAL WORKER'S ROLE WITH ACUTE BLOOD CANCERS

Bronfenbrenner's Bioecological Model of Human Development



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ONCOLOGY NURSES' ROLE WITH CHRONIC BLOOD CANCERS

- **Direct patient care: symptom management, address physical needs**
- **Interdisciplinary Collaboration**
- **Coordination of care**
- **Patient Education**
- **Psychosocial Support for Patient and Caregiver**

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ONCOLOGY SOCIAL WORKER'S ROLE WITH CHRONIC BLOOD CANCERS



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RELIABLE RESOURCES

- LLS.org
- National Cancer Institute – cancer.gov
- American Cancer Society – cancer.org
- Disease specific, such as International Myeloma Foundation, Cutaneous Lymphoma Foundation, CLL Society, Aplastic Anemia and Myelodysplastic Syndrome Foundation, Lymphoma Research Foundation, MPN Research Foundation, etc.
- Patient Power – patientpower.info
- OncLive – onclive.com
- Websites of NCI designated cancer centers – Mayo Clinic, Cleveland Clinic, Memorial Sloan Kettering, Oncolink (Penn Medicine)
- PubMed.gov
- ClinicalTrials.gov

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Resources for HCPs

- ❑ Online & In-person free CME & CE courses: www.LLS.org/CE
- ❑ **New** Podcast series for healthcare professionals – www.LLS.org/CE:
Listen as we speak with experts about diagnosis, treatment and survivorship to educate HCPs treating with blood cancer.

Clinical Trials and Research

- ❑ Clinical Trials: Learn more about clinical trials:
www.LLS.org/ClinicalTrials
- ❑ Research: Focused on finding cures and driving research:
www.LLS.org/Research

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Resources for Patients

- ❑ Telephone and Web Education Programs: www.LLS.org/Programs and www.LLS.org/Educationvideos
- ❑ Support Resources: www.LLS.org/Support
 - ❑ Financial Assistance
 - Co-Pay
 - Travel Assistance
 - Referral to Medication Access programs
 - ❑ LLS Chapters
 - ❑ LLS Community (social media platform)
 - ❑ Patti Robinson Kaufman First Connection Program (peer-to-peer)
 - ❑ One-On-One Nutrition Consultations (PearlPoint)

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Resources for Patients

- **Information Specialists** – Personalized assistance for managing treatment decisions, side effects, and dealing with financial and psychosocial challenges.
- **Clinical Trial Nurse Navigators** – RNs navigate patients to find an appropriate clinical trial and sift through the information.

M - F, 9 am to 9 pm ET:

- Phone: (800) 955-4572
- Live chat: www.LLS.org/InformationSpecialists
- Email: infocenter@LLS.org

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FREE GUIDES, BOOKLETS, AND FACT SHEETS

Supporting Patients, Caregivers and Professionals


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Q & A

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**THANK
YOU**

We have one goal:
**A world without
blood cancers**

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