How LLS is changing the landscape of blood cancer

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Cleveland Clinic Taussig Cancer Institute
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Our Mission:

3 focus areas:

• Research
• Patient access
• Advocacy

Blood cancers are **almost 10% of new cancer diagnoses**

162,000 new cases in 2015 (U.S.)

- **Lymphoma**
- **Leukemia**
- **Myeloma**

American Cancer Society, *Cancer Facts and Figures 2015*
Blood cancers are the number **three cancer killer**

Every three minutes someone is diagnosed with a blood cancer. Every ten minutes someone dies from a blood cancer.

But, we are making tremendous progress.
Since the 1960s, the survival rates for many blood cancer patients have **doubled, tripled** and even **quadrupled**.
Despite progress, more than a third of blood cancer patients still do not survive five years after their diagnosis.

More work needs to be done
There are no means for preventing or early screening for most blood cancers.

Therefore, LLS focuses on finding cures and ensuring sustainable access to quality, affordable, coordinated care.

LLS exists to **find cures** and **ensure access to treatments** for blood cancer patients.
Once unimaginable, new treatments are **saving lives today**

Moving from highly toxic treatments to more targeted therapies…

**1950s**
First chemotherapy agents for lymphoma and leukemia patients, including children

**1960s**
First combination chemotherapy developed for childhood leukemia

**1970s**
First successful bone marrow transplants performed

**1980s**
Cancer-causing oncogenes and tumor suppressor genes discovered
Once unimaginable, new treatments are **saving lives today**

... with cures and prevention as the ultimate long-term goal

- **1990s**
  - Antibody-based therapies such as Rituxan

- **2000s**
  - Targeted therapies such as Gleevec

- **2010s**
  - Genomic medicine and precision medicine; adoptive immunotherapy

- **2020 and beyond**
  - Personalized medicine
  - Cures and prevention

**someday is today**

LEUKEMIA & LYMPHOMA SOCIETY

fighting blood cancers
New drug approvals for blood cancers, 2010-present

<table>
<thead>
<tr>
<th>Year</th>
<th>Disease</th>
<th>Drug</th>
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<tbody>
<tr>
<td>2010</td>
<td>CML</td>
<td>Dasatinib, Nilotinib</td>
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<tr>
<td>2011</td>
<td>Myelofibrosis</td>
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<td></td>
<td>ALL</td>
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<td>Brentuximab vedotin</td>
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<td>Anaplastic large cell lymphoma</td>
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<td>2012</td>
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<td></td>
<td>Multiple myeloma</td>
<td>Carfilzomib</td>
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<td>2013</td>
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<td>Ibrutinib, Lenalidomide</td>
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<td></td>
<td>CLL</td>
<td>Obinutuzumab</td>
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<tr>
<td></td>
<td>Multiple myeloma</td>
<td>Pomalidomide</td>
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<td>2014</td>
<td>CLL</td>
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<td>Follicular lymphoma</td>
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<td>ALL</td>
<td>Blinatumomab</td>
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<td>2015</td>
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<td>Panobinostat</td>
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<td></td>
<td>Lymphoplasmacytic lymphoma</td>
<td>Ibrutinib</td>
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Source: www.fda.gov
Access Policy: **Challenge and Opportunity**

How many lives will be saved by rituximab, imatinimb or even newer drugs if patients:

- Can't afford the out-of-pocket costs to fill their prescription?
- Have insurance that doesn’t cover these treatments?
- Don’t have adequate insurance coverage?
- Can’t navigate the healthcare system to get access to the care they need?
Committed to Improving Patients’ Quality of Life

LLS provides free information and support services for patients and their families.

Our Co-Pay Assistance program has provided more than $197 million since inception.
Aligning the Players in the Innovation Ecosystem

Patients
Academic Research
Biopharma
Government
Health Care Professionals
Third-Party Payors
Advocacy
Patient Programs and Support
Clinical Trials
Research
Therapy Acceleration
Access

LLS
LLS: Over $1 Billion in Research Funding

Cumulative Research Funding
($Millions)

$1,041,000

Cumulative Research Funding

$0 $200 $400 $600 $800 $1,000 $1,200

CML has a consistent molecular target
CML: lives saved due to imatinib

5yr survival

55%

90%

Lives Saved
(In clinical trial settings)
Most blood cancers are genetically complex

Average of 5 recurring mutations per case in AML
LLS partners with universities, hospitals, and biotechnology and pharmaceutical companies to get treatments to patients faster than ever.
FY14 Research Commitment

Research Budget: $79.8 Million
333 Active Academic Grants
- Career Development (CDP) – “training award”
- Translational Research (TRP) – “bench to bedside”
- Specialized Center of Research (SCOR) – synergistic collaboration
- New Idea Award (NIA) – “crazy idea, concept”
- Screen to Lead (SLP) – “finding leads”
- Quest for CURES (QFC) – focused
- Other partnerships – IWMF & MPNRF

25 Therapy Acceleration Programs
- Goal is to accelerate first in class opportunities
- Pre-IND to Phase 3 studies
- Concentrated in “valley of death”
<table>
<thead>
<tr>
<th>TARGET THERAPY</th>
<th>INDICATION(S)</th>
<th>PRECLINICAL</th>
<th>PHASE I</th>
<th>PHASE II</th>
<th>PHASE III</th>
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Two Transformational Years for Immunotherapy to Treat Blood Cancer

Building a New Foundation for Blood Cancer Therapy

- Cytotoxics
- Radiation
- Stem Cell Transplant
- CAR T
- Checkpoints
- T-cell engager

someday is today
Activation of The Immune System by Two New Methods

Release the brake:
Immunocheckpoint inhibition

Step on the gas
Immunoactivation (CAR T)

1. From Chen et al., 2013 (LLS investigator)
CAR T-cell immunotherapy

• Chimeric antigen receptor (CAR) engineered T-cells
  – Redirects immune cells to attack cancer cells

• ALL, CLL, NHL

• Potential use in many cancers

Disease: Hodgkin lymphoma

Therapy: Immune checkpoint inhibitors

Findings:
• Two Phase I trials with anti PD-1 antibodies
• Extraordinary response in patients with relapsed disease (50-87%)
• Well tolerated

Why it’s important:
• New therapeutic modality with potential for 1st line treatment
• Safety profile may be superior to cytotoxics currently in use
• Utility for other blood cancer types

How did LLS help?
• LLS funded investigators who found very high expression of PD-1 in HL
• Multiple new grant awards in progress to expand utility to other lymphomas