

## ***Team Advocate***

# **Acute Lymphoblastic Leukemia/ Acute Lymphocytic Leukemia**

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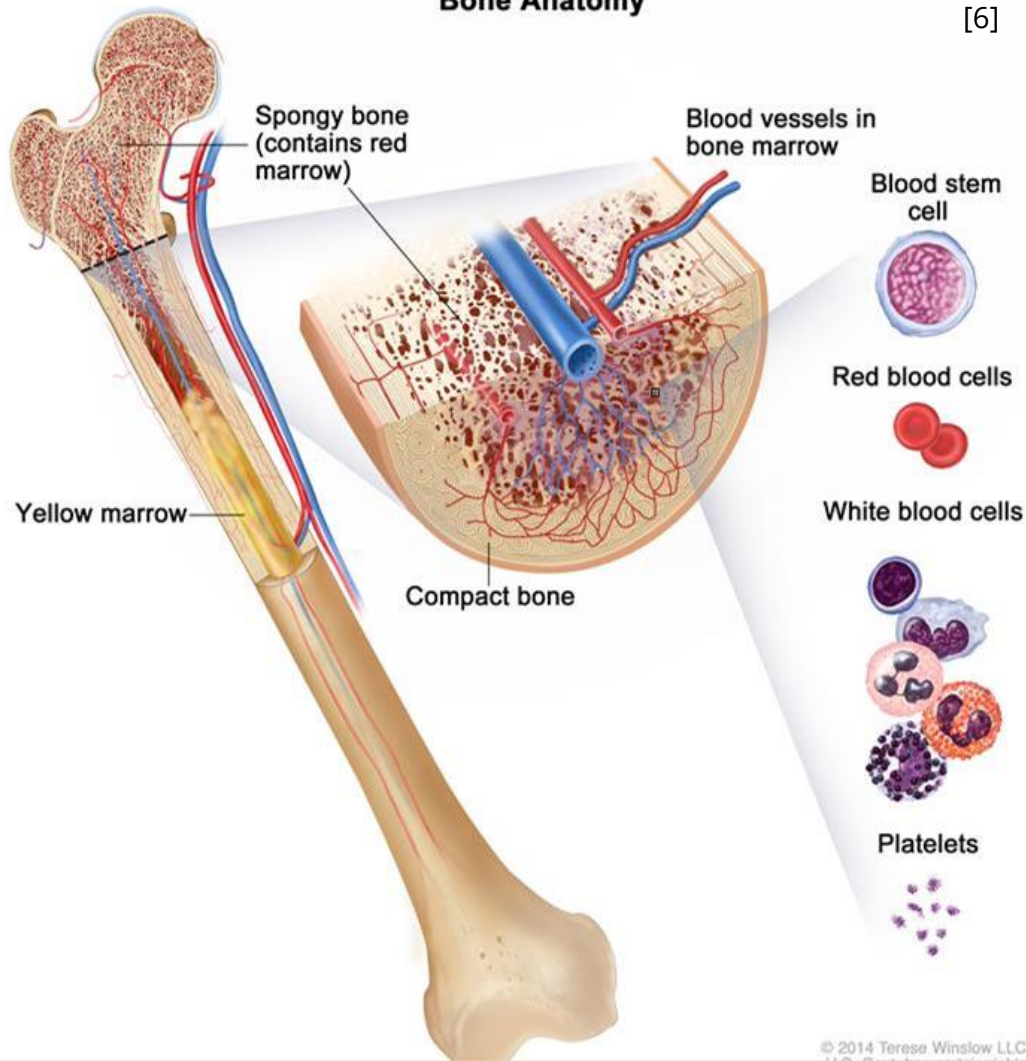
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# Abstract

**Our purpose in gathering and conducting this research is to examine Acute Lymphoblastic Leukemia from a global perspective. We aimed to determine just how diagnosis, treatment, and relapse functions in different parts of the world, and gather knowledge on how to improve the quality of care for children around the globe. We utilized mainstream search engines as well as scientific databases such as PubMed and NCDPI to gather information about ALL and established a basic understanding of the disease, how it develops, and how it is treated. We also investigated how diagnosis and treatment compares in developing and developed countries as well as the quality of care in relapse patients in different countries.**

# What is ALL?

Acute lymphoblastic leukaemia or ALL is a form of cancer that is characterized by the overproduction of immature white blood cells called **lymphoblasts**. This cancer is a result of errors in a bone marrow cell's **DNA**. This form of cancer is the most common **childhood cancer** with about **98%** of children going into remission within weeks of starting treatment. Patients are considered completely cured after **10 years** of remission.<sup>3</sup>

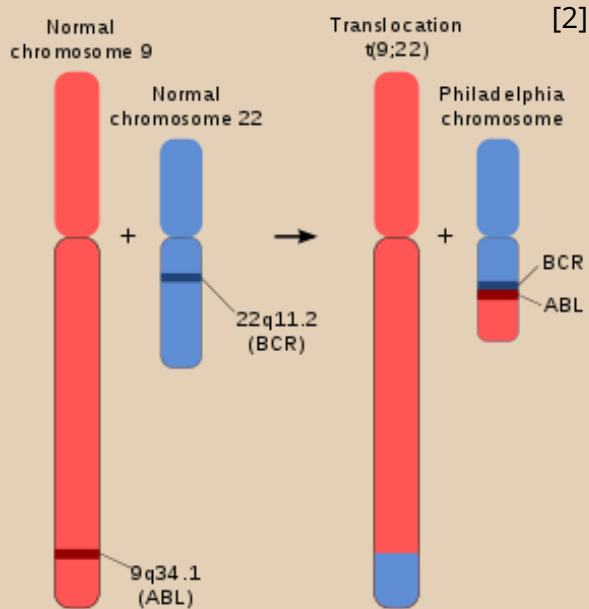


# How Does it Occur?

ALL is a type of leukemia that begins from the **white blood cells** in the **bone marrow**, or the soft inner part of bones. The bone marrow is responsible for producing lymphocytes which are white blood cells that play a vital role in the immune system. ALL results in **overproduction** of these white blood cells resulting in **symptoms** including<sup>3</sup>:

- Bleeding from the gums
- Bone pain
- Frequent infections
- Frequent or severe nosebleeds
- Pale Skin
- Shortness of breath
- Weakness, fatigue or a general decrease in energy
- Fever

# Risk Factors and Outlook



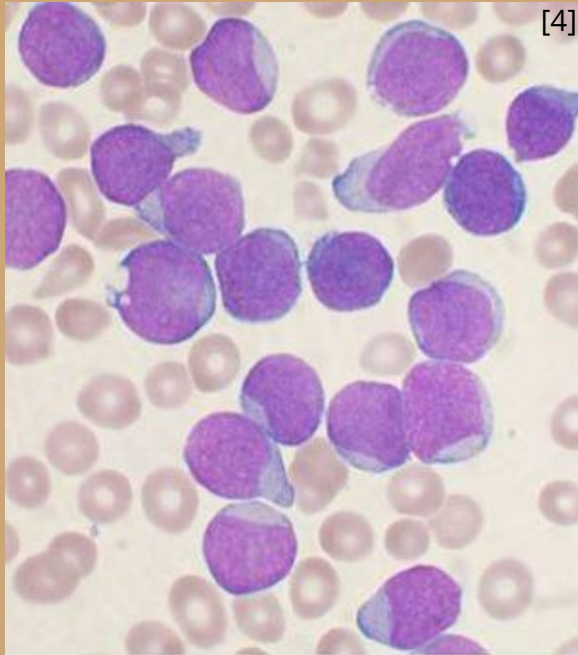
Although the cause of ALL is unknown, **risk factors** for the cancer include:

- Exposure to high levels of radiation
- Exposure to certain chemicals such as benzene
- Having an inherited genetic syndrome such as Down syndrome<sup>3</sup>

Despite the broad statistics regarding ALL showing 98% remission, the **outlook** for ALL depends on factors such as:

- Your age
- Your lab test results
- Your subtype of ALL (B-cell ALL or T-cell ALL)
- Philadelphia chromosome<sup>3</sup>

# Treatment



## **Induction**

The goal of induction chemotherapy is to get the leukemia to complete remission, meaning there are no leukemia cells in on a bone marrow biopsy. Common chemo drugs include vincristine, dexamethasone, daunorubicin<sup>3</sup>

## **Consolidation**

After the leukemia goes into remission, the second phase of treatment includes a short course of chemo. This is to prevent future relapse<sup>3</sup>

## **Maintenance**

A patient is put on a maintenance chemotherapy for about 2 years to prevent new development of cancer cells<sup>3</sup>

# Demographics

## Gender

From the 5,930 new cases of ALL in 2019: American Cancer Society  
- 3,280 were males and 2,650 were females<sup>1</sup>.

About 1,500 died from ALL  
- 850 were males and 650 were females<sup>1</sup>.

Rates were higher in males (38.0/mil) than in females (29.7/mil) in a 2017 CDC study "Rates and Trends of Pediatric Acute Lymphoblastic Leukemia — United States, 2001–2014"<sup>6</sup>.

## Age

- Highest risk in children < 5<sup>1</sup>.
- Risk declines slowly until mid-20s<sup>1</sup>.
- Begins to rise again slowly after 50<sup>1</sup>.

Rates were highest in children aged 1–4 years (75.2/million) in a 2017 CDC study "Rates and Trends of Pediatric Acute Lymphoblastic Leukemia — United States, 2001–2014"<sup>6</sup>.

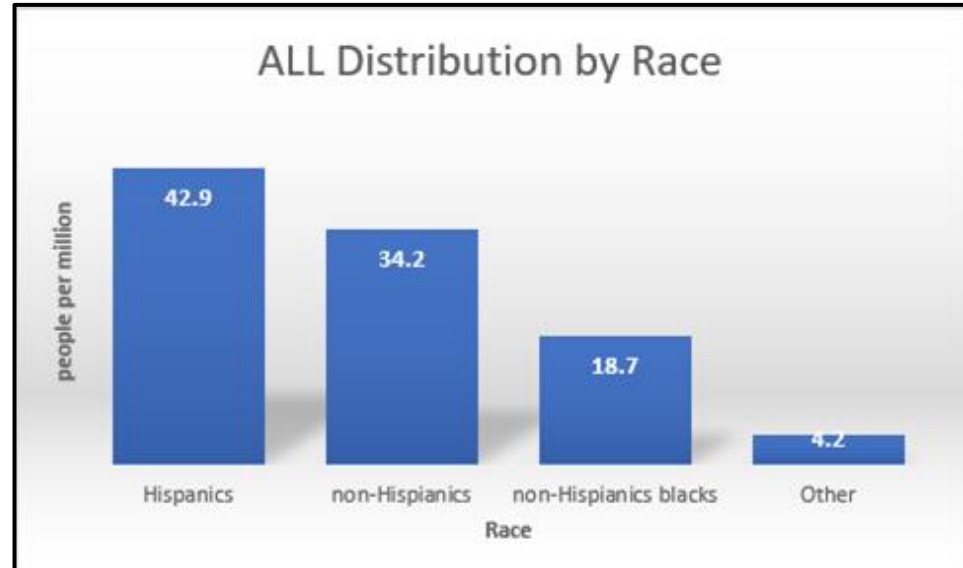
# Demographics

## Race

The highest incidence rate of ALL (42.9/million) was among Hispanics, followed by non-Hispanic whites (34.2/million) and then non-Hispanic blacks (18.7/ million)<sup>6</sup>.

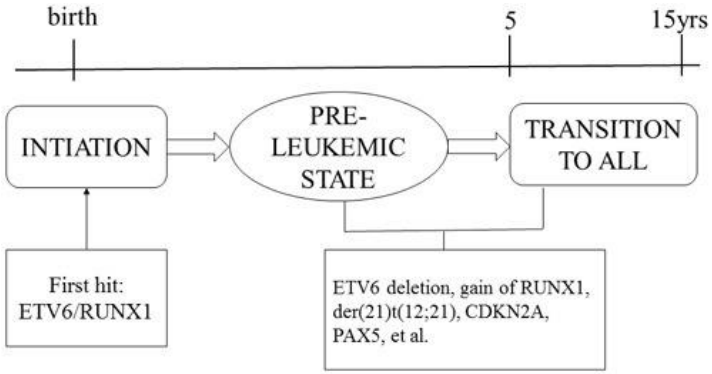
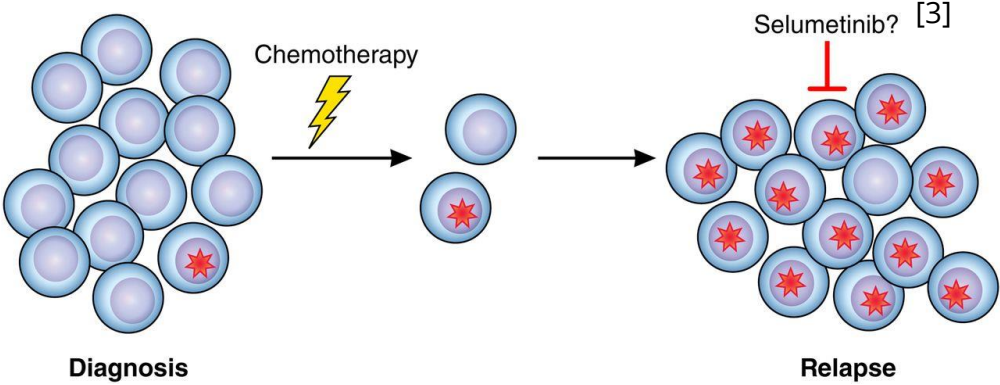
## Socioeconomic Status

Pediatric ALL rates in 25% of the highest economic status U.S. counties were higher than in 25% of the lowest economic status counties and were higher in metropolitan areas with  $\geq 1$  million persons than in nonmetropolitan areas<sup>6</sup>.





# Risk and Mechanisms of Relapse<sup>7</sup>



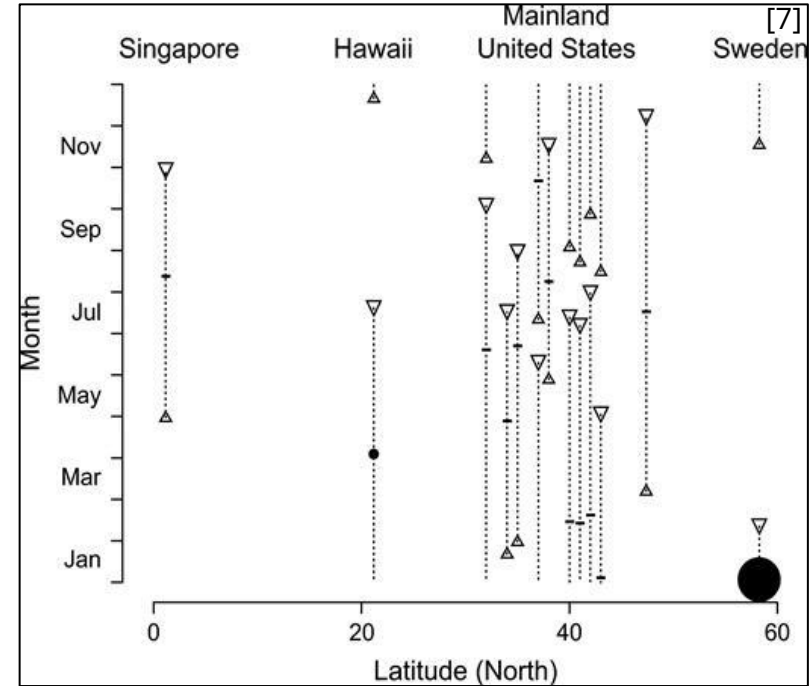
Survival rate at initial treatment:  
**88-90%**

Survival rate during relapse:  
**15-50%**

How can we change this?

# American Journal of Epidemiology-Seasonality of ALL

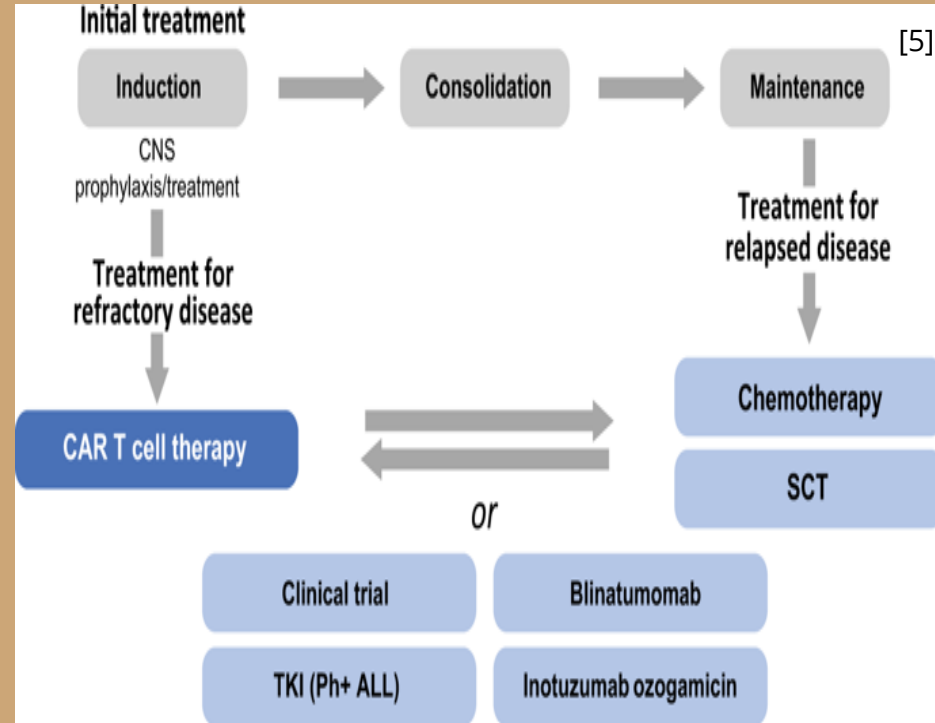
- Dates of peak over a range of geographic locations like Singapore, Hawaii, and mainland United States, and Western Sweden<sup>4</sup>.
- Found that despite the wide range of geographics, there is little evidence of any seasonality in the diagnosis of acute lymphoblastic leukemia in most populations and no strong evidence of influence of climate<sup>4</sup>.
- The number of cases of ALL were similar across regions, although the variations in the annual number was considerable<sup>4</sup>.



# Treatment in Developed Nations

## Developed Nations

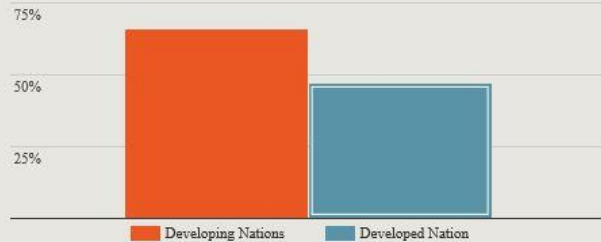
- In high-income countries, 8 to 9 of every 10 children with ALL are long-term survivors and are considered cured<sup>5</sup>.
  - Due to pediatric oncology becoming a specialty, institutions providing treatment and biomedical research at the same time, and the establishment of national cooperative pediatric oncology groups<sup>5</sup>.
- Reported cure rates exceed 80% with less than 3% mortality from infection<sup>5</sup>.



# Treatment in Developing Nations

## Disparity in Cancer Survival

[8]



66% of people in low- and middle-income countries will **not survive their cancer**, compared to only 47% in high-income countries.

## Developing Nations

- Low - and mid- income countries have a less developed hospital infrastructure leading to limited accuracy and promptness of diagnosis<sup>5</sup>.
- Most treatments that are started are abandoned due to cultural and socio economic reasons<sup>5</sup>.
- Early deaths reach 15% or more because of substandard hospital infrastructure, fewer medical resources, and delayed diagnosis and treatment intervention<sup>5</sup>.
- Major barrier against better outcomes in ALL include infections during maintenance phase<sup>2</sup>.

# References

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# Pictures Reference

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