

# Identifying Prognostic Factors in Acute Leukemia Patients: Survival Analysis of Bone Marrow Transplant Outcomes

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## ABSTRACT

**Purpose:** Bone marrow transplantation is a critical treatment for acute leukemia, a blood cancer, but patient prognosis varies based on multiple factors. This study aims to analyze survival outcomes following transplantation, identifying baseline characteristics and post-transplant events associated with disease-free survival and relapse risk.

**Methods:** Using data from a multicenter study of 137 patients, we applied survival analysis techniques, including Kaplan-Meier estimation and Cox proportional hazards models, to examine associations between patient/donor characteristics, stage of initial disease, acute graft-versus-host disease (aGVHD), platelet recovery, and disease-free survival.

**Results:** To be completed.

**Discussion:** Our findings provide insights into key prognostic factors affecting survival after transplantation. We assess the potential protective effect of aGVHD, the role of CMV status, and the impact of methotrexate prophylaxis. These results contribute to refining risk stratification and informing clinical decision-making for leukemia patients undergoing transplantation.

## Introduction

Leukemia is a cancer of the body's blood forming tissue, including the bone marrow and the lymphatic system. In acute leukemia, immature blood cells acquire mutations and cannot carry out their normal function, multiplying rapidly and crowding out healthy blood cells in the bone marrow. Fewer healthy white blood cells, red blood cells, and platelets cause the signs and symptoms of leukemia. Scientific understanding of leukemia attributes its development to a combination of genetic and environmental factors.

Bone marrow transplants are a standard treatment for acute leukemia. Recovery following bone marrow transplantation is a complex process. Prognosis for recovery may depend on risk factors known at the time of transplantation, such as patient and/or donor age and sex, stage of initial

disease, and time from diagnosis to transplantation. The ultimate prognosis may change as the patient's post-transplantation experience unfolds, with the occurrence of events at random times during the recovery process, including the development of acute graft-versus-host disease (aGVHD) and the return of platelet counts to a normal level. Transplantation can be considered a failure when a patient's leukemia returns (relapse) or they die while in remission.

*Details of differences between ALL and AML, and the scientific relevance of our set of variables.*

## Methods

### *Study design and data source*

A multicenter study was conducted to evaluate whether patient and donor characteristics as well as unfolding clinical events are predictive of death in

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patients receiving allogeneic marrow transplantation. All patients enrolled were prepared with a radiation-free conditioning regimen consisting of a combination of oral Busulfan and intravenous cyclophosphamide. Enrollment took place at four different hospitals in the US and in Australia. The investigators were interested in whether the following characteristics measured at the time of transplantation (baseline) were associated with the risk of a negative outcome (death or relapse): patient age and sex, donor age and sex, patient and donor cytomegalovirus (CMV) immune status, the wait time from diagnosis to transplantation, disease group, French-American-British (FAB) classification based on standard morphological criteria, and prophylactic use of methotrexate to prevent aGVHD. A total of 137 patients were enrolled between March 1, 1984 and June 30, 1989. Patients were followed until death or end of the study. Previous studies have suggested that the patient's CMV status may be associated with morbidity and mortality. The importance of the donor's CMV status has been controversial.

#### *Statistical analysis*

Descriptive statistics were used to characterize the sample by patient demographic, acute graft-versus-host disease (aGVHD), platelet recovery, and survival outcomes.

Provide an estimate of disease-free survival time for patients enrolled in this study. What are the main characteristics of this summary?

How do patients in different disease groups or in different FAB classifications compare to each other with respect to other available baseline measurements?

Are any of the measured baseline variables associated with differences in disease-free survival?

It is generally thought that aGVHD has an anti-leukemic effect. Based on the available data, is occurrence of aGVHD after transplantation associated with improved disease-free survival? Is it associated with a decreased risk of relapse? In view of this, do you consider aGVHD as an important prognostic event?

Among the patients who develop aGVHD, are any of the measured baseline factors associated with differences in disease-free survival?

Is prophylactic use of methotrexate associated with an increased or decreased risk of developing aGVHD? Provide an estimate of the survival function of time from transplant until onset of aGVHD separately for patients either administered methotrexate or not. In doing so, consider the importance of accounting for relevant confounding factors.

Based on the available data, is recovery of normal platelet levels associated with improved disease-free survival? Is it associated with a decreased risk of relapse?

## **Results and Discussion**

*A*

Text.

*B*

Text.

### *Conclusions*

To be completed.

### **Contributions**

To be completed.

### **Tables and Figures**

To be completed.

### **References**

To be completed.

