Efficacy and Safety of Blinatumomab in Relapsed or Refractory Philadelphia Chromosome-Positive B-cell Precursor Acute Lymphoblastic Leukemia: A Systematic Review

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Introduction

Philadelphia chromosome-positive B-cell acute lymphoblastic leukemia (Ph+ B-ALL) is an aggressive hematologic malignancy with poor prognosis, especially in relapsed/refractory (R/R) cases.
Blinatumomab, a bispecific T-cell engager (BiTE) targeting CD19, has shown promise in this population, but its role remains under investigation.

Aim

To synthesize current evidence on the efficacy and safety of blinatumomab in adult patients with relapsed or refractory Ph+ B-cell precursor acute lymphoblastic leukemia through a systematic review of published literature.

Objectives

Systematically evaluate the efficacy and safety of blinatumomab in adult patients (>18 years) with R/R Ph^+ B-ALL using published clinical and real-world data.

Methods

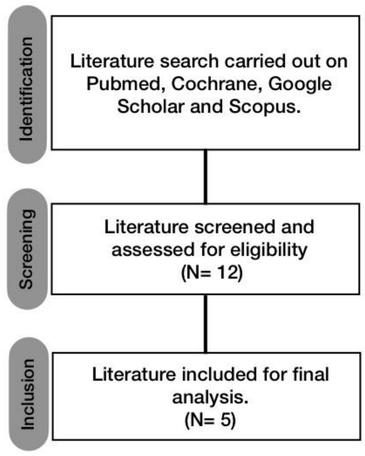
Design: Systematic review of prospective and retrospective studies published between January 2015 and May 2025 from PubMed, Cochrane, Google Scholar, and Scopus. PRISMA methodology was followed for screening, data extraction, and quality assessment.

Setting: Multinational trials and registry-based studies including both academic and community treatment centers.

Participants: Literature addressing adult patients (≥18 years) with histologically confirmed R/R Ph^+ B-ALL treated with blinatumomab after ≥1 tyrosine kinase inhibitor (TKI) failure, were included for review. Studies were excluded if patients had concurrent myeloid malignancies, lacked quantitative outcome reporting, or were post allogeneic hematopoietic stem cell transplant (alloHSCT).

Interventions: Blinatumomab was administered in cycles per standard protocols (as a continuous intravenous infusion). Some patients received it as monotherapy, whereas others received it post TKI therapy or in combination with consolidation regimens.

Main Outcome Measures: Primary outcomes included complete remission/complete hematologic remission (CR/CRh) rates, minimal residual disease (MRD) negativity, and overall survival (OS). Secondary outcomes included adverse events and durability of response.



Results

- Number of studies: five studies (366 participants)
- CR/CRh: Ranged from 35 to 44%
- MRD negativity: Achieved in up to 88% responders
- Median OS: 9.0 to 13.5 months
- 2-year survival: Reached 69% in TKI combination cohort
- Relapse free survival: Ranged from 6.8 to 32 months
- Adverse events: Common ≥3 Adverse events included: Febrile neutropenia, Tremors and Infection
- Overall, low treatment related mortality across all included studies.

Summary

Blinatumomab demonstrates encouraging results in terms of remission rates, MRD clearance, and survival outcomes in relapsed or refractory Ph+ B-ALL, with a manageable safety profile. Despite these findings, the evidence remains preliminary, and prospective controlled studies are necessary to establish its role in future therapeutic strategies.

Discussion

This systematic review highlights that blinatumomab shows promising efficacy and tolerability in R/R Ph+ B-ALL, particularly in patients previously exposed to TKI therapy. The high MRD negativity rates and survival outcomes suggest its potential utility as a bridge to transplant or consolidation. However, the current body of evidence is largely composed of non-randomized studies with heterogeneous protocols and small sample sizes. Further prospective, randomized trials are essential to:

- Define optimal treatment sequencing
- Validate predictors of response
- Confirm long-term clinical benefit in broader population.

References

1.Long-term follow-up of blinatumomab in patients with relapsed/refractory Philadelphia chromosome-positive B-cell precursor acute lymphoblastic leukaemia, *European Journal of Cancer.*

2. Ponatinib and blinatumomab for Philadelphia chromosome positive acute lymphoblastic leukaemia, *The Lancet. Haemotology.*

3. Blinatimomab compared with standard of care for the treatment of patients with relapsed/refractory Philadelphia chromosome positive B-precursor acute lymphoblastic leukemia, *Cancer.*

4. Real-world outcomes of adult B-cell acute lymphoblastic leukemia patients treated with blinatumomab, *Blood Advances.*

5.Blinatumomab is associated with favourable outcomes in patients with B-cell lineage acute lymphoblastic leukemia and positive measurable residual disease at a threshold of 10-4 and higher, *American Journal of Hematology.*

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