



# Blinatumomab

[Targets \(2\)](#)[Biointeractions \(2\)](#)

## IDENTIFICATION

### Name

Blinatumomab

### Accession Number

DB09052

### Type

Biotech

### Groups

Approved, Investigational

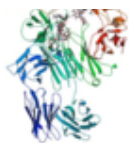
### Biologic Classification

Protein Based Therapies  
Monoclonal antibody (mAb)

### Description

Blinatumomab is a BiTE-class (bi-specific T-cell engagers) constructed monoclonal antibody indicated for the treatment of Philadelphia chromosome-negative relapsed or refractory B-cell precursor acute lymphoblastic leukemia (ALL). Blinatumomab is manufactured by Amgen Inc. and marketed under the brand Blincyto™. A full treatment regimen consisting of two cycles of four weeks each, is priced at \$178 000 USD. Blinatumomab was approved in December 2014 under the FDA's accelerated approval program, which allows approval of a drug to treat a serious or life-threatening disease based on clinical data showing the drug has an effect on a surrogate endpoint reasonably likely to predict clinical benefit to patients.

### Protein structure



## Protein chemical formula

C<sub>2367</sub>H<sub>3577</sub>N<sub>649</sub>O<sub>772</sub>S<sub>19</sub>

## Protein average weight

54100.0 Da

## Sequences

```
>single chain variable fragment fusion protein
DIQLTQSPASLAVSLGQRATISCKASQSVVDYDGDSYLNWYQQIPGQPPKLLIYDASNLVS
GIPPRFSGSGSGTDFTLNIHPVEKVDAAATYHCQQSTEDPWTFGGGTKLEIKGGGGSGGGG
SGGGGSQVQLQQSGAELVRPGSSVKISCKASGYAFSSYWMNWKQRPQGLEWIGQIWPQ
DGDNTNYNGKFKGKATLTAEDESSSTAYMQLSSLASEDSAVYFCARRETTTVGRYYYAMDYW
GQGTTVTVSSGGGSDIKLQQSGAELARPGASVKMSCKTSGYTFTRYTMHWVKQRPQGGL
EWIGYINPSRGYTNYNQKFKDKATLTTDKSSSTAYMQLSSLTSEDSAVYYCARYYDDHYC
LDYWGQGTTLTVSSVEGGSGGGSGGGSGGVDDIQLTQSPAIMSASPGKVTMTCRASS
VSYMNWYQQKSGTSPKRWIYDTSKVASGVPYRFSGSGSGTSYSLTISSEAEADAATYYCQ
QWSSNPLTFGAGTKLELKHSHHHH
```

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## Synonyms

Not Available

## External IDs [ⓘ](#)

AMG103 / MEDI 538 / MEDI-538 / MEDI538 / MT 103 / MT-103 / MT103

## Prescription Products

Search

NAME <a href="#">↕</a>	DOSAGE <a href="#">↕</a>	STRENGTH <a href="#">↕</a>	ROUTE <a href="#">↕</a>	LABELLER <a href="#">↕</a>	MARKETING					
					START <a href="#">↕</a>	END <a href="#">↕</a>	<a href="#">↕</a>	<a href="#">↕</a>	<a href="#">↕</a>	
<b>Blinicyto</b>	Powder, for solution	38.5 mcg	Intravenous	Amgen	2016-03-17	Not applicable				
<b>Blinicyto</b>	Kit	12.5 ug/1mL	Intravenous	Amgen	2014-12-18	Not applicable				



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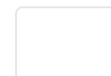
## Categories

[Amides](#)[Amino Acids, Peptides, and Proteins](#)[Antibodies](#)[Antibodies, Monoclonal](#)[Antineoplastic Agents](#)[Antineoplastic and Immunomodulating Agents](#)[Bispecific CD19-directed CD3-directed T Cell Engager](#)[Blood Proteins](#)[CD19-directed Antibody Interactions](#)[CD3 Receptor Agonists](#)[CD3-directed Antibody Interactions](#)[Globulins](#)[Immunoglobulins](#)[Immunoproteins](#)[Immunosuppressive Agents](#)[Monoterpenes](#)[Myelosuppressive Agents](#)[Norbornanes](#)[Proteins](#)[Recombinant Fusion Proteins](#)[Serum Globulins](#)[Sulfones](#)[Sulfur Compounds](#)[Terpenes](#)

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## UNII

[4FR53SIF3A](#)



853426-35-4

## PHARMACOLOGY

### Indication

Indicated for the treatment of Philadelphia chromosome-negative relapsed or refractory B-cell precursor acute lymphoblastic leukemia (ALL).

### Associated Conditions

[Refractory B cell precursor Acute lymphoblastic leukemia](#)

[Relapsed B cell precursor Acute lymphoblastic leukemia](#)

### Pharmacodynamics

Not Available

### Mechanism of action

Blinatumomab is a bispecific CD19-directed CD3 T-cell engager that binds to CD19 expressed on the surface of cells of B-lineage origin and CD3 expressed on the surface of T cells. It activates endogenous T cells by connecting CD3 in the T-cell receptor (TCR) complex with CD19 on benign and malignant B cells. Blinatumomab mediates the formation of a synapse between the T cell and the tumor cell, upregulation of cell adhesion molecules, production of cytolytic proteins, release of inflammatory cytokines, and proliferation of T cells, which result in redirected lysis of CD19+ cells.

#### **A** B-lymphocyte antigen CD19

activator

Human

#### **A** T-cell surface glycoprotein CD3 delta chain

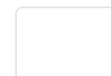
activator

Human

### Absorption

Not Available

### Volume of distribution



## Protein binding

Not Available

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## Metabolism

The metabolic pathway of blinatumomab has not been characterized. Like other protein therapeutics, blinatumomab is expected to be degraded into small peptides and amino acids via catabolic pathways.

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## Route of elimination

Not Available

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## Half life

2.11 hours, standard deviation 1.42.

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## Clearance

2.92 L/hour, standard deviation 2.83.

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## Toxicity

- Cytokine Release Syndrome (CRS), which may be life-threatening or fatal, occurred in patients receiving blinatumomab. Interrupt or discontinue blinatumomab as recommended.
  - Neurological toxicities, which may be severe, life-threatening, or fatal, occurred in patients receiving blinatumomab. Interrupt or discontinue blinatumomab as recommended.
  - In patients receiving blinatumomab in clinical trials, serious infections such as sepsis, pneumonia, bacteremia, opportunistic infections, and catheter-site infections were observed in approximately 25% of patients, some of which were life-threatening or fatal.
  - Tumor lysis syndrome (TLS), which may be life-threatening or fatal, has been observed in patients.
  - Neutropenia and febrile neutropenia, including life-threatening cases, have been observed in patients.
  - Treatment with blinatumomab was associated with transient elevations in liver enzymes.
  - Cranial magnetic resonance imaging (MRI) changes showing leukoencephalopathy have been observed in patients receiving blinatumomab, especially in patients with prior treatment with cranial irradiation and antileukemic chemotherapy (including systemic high-dose methotrexate or intrathecal cytarabine).
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## Affected organisms

Humans and other mammals



Not Available

**Pharmacogenomic Effects/ADRs** ⓘ

Not Available

**INTERACTIONS****Drug Interactions** ⓘ**ALL DRUGS**

APPROVED

VET APPROVED

NUTRACEUTICAL

ILLICIT

WITHDRAWN



INVESTIGATIONAL

EXPERIMENTAL

Search

<b>DRUG</b>	<b>INTERACTION</b>
(R)-warfarin	The risk or severity of bleeding can be increased when (R)-warfarin is combined with Blinatumomab.
(S)-Warfarin	The risk or severity of bleeding can be increased when (S)-Warfarin is combined with Blinatumomab.
2-Methoxyethanol	The risk or severity of adverse effects can be increased when 2-Methoxyethanol is combined with Blinatumomab.
4-hydroxycoumarin	The risk or severity of bleeding can be increased when 4-hydroxycoumarin is combined with Blinatumomab.
9-(N-methyl-L-isoleucine)-cyclosporin A	The risk or severity of adverse effects can be increased when Blinatumomab is combined with 9-(N-methyl-L-isoleucine)-cyclosporin A.
Abatacept	The risk or severity of adverse effects can be increased when Abatacept is combined with Blinatumomab.
Abciximab	The risk or severity of adverse effects can be increased when Abciximab is combined with Blinatumomab.
Abetimus	The risk or severity of adverse effects can be increased when Abetimus is combined with Blinatumomab.
Abituzumab	The risk or severity of adverse effects can be increased when Blinatumomab is combined with Abituzumab.
Acenocoumarol	The risk or severity of bleeding can be increased when Acenocoumarol is combined with Blinatumomab.



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## Food Interactions

Not Available

## REFERENCES

### General References

1. Zugmaier G, Klinger M, Schmidt M, Subklewe M: Clinical overview of anti-CD19 BiTE((R)) and ex vivo data from anti-CD33 BiTE((R)) as examples for retargeting T cells in hematologic malignancies. Mol Immunol. 2015 Oct;67(2 Pt A):58-66. doi: 10.1016/j.molimm.2015.02.033. Epub 2015 Apr 13. [[PubMed:25883042](#)]
2. Garber K: Bispecific antibodies rise again. Nat Rev Drug Discov. 2014 Nov;13(11):799-801. doi: 10.1038/nrd4478. [[PubMed:25359367](#)]

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### External Links

KEGG Drug

[D09325](#)

PubChem Substance

[347910400](#)

ChEMBL

[CHEMBL1742992](#)

Drugs.com

[Drugs.com Drug Page](#)

Wikipedia

[Blinatumomab](#)

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### ATC Codes

L01XC19 — Blinatumomab

- [L01XC — Monoclonal antibodies](#)
- [L01X — OTHER ANTINEOPLASTIC AGENTS](#)
- [L01 — ANTINEOPLASTIC AGENTS](#)
- [L — ANTINEOPLASTIC AND IMMUNOMODULATING AGENTS](#)

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### AHFS Codes

10:00.00 — Antineoplastic Agents

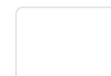
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## CLINICAL TRIALS

Clinical Trials [i](#)

PHASE <a href="#">↕</a>	STATUS <a href="#">↕</a>	PURPOSE <a href="#">↕</a>	CONDITIONS <a href="#">↕</a>	COUNT <a href="#">↕</a>
0	Recruiting	Treatment	<a href="#">Acute Lymphoblastic Leukaemias (ALL) / B-cell Non Hodgkin's Lymphoma / Pre B-Cell Acute Lymphoblastic Leukaemia</a>	1
0	Recruiting	Treatment	<a href="#">Multiple Myeloma (MM)</a>	1
1	Completed	Treatment	<a href="#">Non-Hodgkin's Lymphoma, Relapsed</a>	1
1	Recruiting	Treatment	<a href="#">B Acute Lymphoblastic Leukemia / B Acute Lymphoblastic Leukemia With t(9;22)(q34.1;q11.2); BCR-ABL1 / CD19-Positive Neoplastic Cells Present / Mixed Phenotype Acute Leukemia (MPAL) / Mixed Phenotype Acute Leukemia With t(9;22)(q34.1;q11.2); BCR-ABL1 / Recurrent B Acute Lymphoblastic Leukemia / Refractory B Acute Lymphoblastic Leukemia</a>	1





			Intermediate Between Diffuse Large B-Cell Lymphoma and Classical Hodgkin Lymphoma / CD19 Positive / Mediastinal Lymphoma / Recurrent Adult Burkitt Lymphoma / Recurrent B-Cell Lymphoma, Unclassifiable, With Features Intermediate Between Diffuse Large B-Cell Lymphoma and Classic Hodgkin Lymphoma / Recurrent B-Cell Lymphoma, Unclassifiable, With Features Intermediate Between Diffuse Large B-Cell Lymphoma and Classical Hodgkin Lymphoma / Recurrent Burkitt Lymphoma / Recurrent Diffuse Large B-Cell Lymphoma / Recurrent Grade 1 Follicular Lymphoma / Recurrent Grade 2 Follicular Lymphoma / Recurrent Grade 3 Follicular Lymphoma / Recurrent Mantle Cell Lymphoma / Recurrent Marginal Zone Lymphoma / Recurrent Mediastinal Lymphoma / Recurrent Non-Hodgkin Lymphoma / Recurrent Small Lymphocytic Lymphoma / Refractory B-Cell Lymphoma, Unclassifiable, With Features Intermediate Between Diffuse Large B-Cell Lymphoma and Classic Hodgkin Lymphoma / Refractory B-Cell Lymphoma, Unclassifiable, With Features Intermediate Between Diffuse Large B-Cell Lymphoma and Classical Hodgkin Lymphoma / Refractory Burkitt Lymphoma / Refractory Diffuse Large B Cell Lymphoma / Refractory Follicular Lymphoma / Refractory Mantle Cell Lymphoma / Refractory Marginal Zone Lymphoma / Refractory Mediastinal Lymphoma / Refractory Non-Hodgkin's lymphoma / Refractory Small Lymphocytic Lymphoma	
1	Recruiting	Treatment	Leukemia, B-Cell / Lymphoma, B-Cell	1
1	Recruiting	Treatment	Lymphoma, Large B-Cell, Diffuse (DLBCL)	1
1	Recruiting	Treatment	Non-Hodgkin's Lymphoma (NHL)	1
1	Recruiting	Treatment	Relapsed or Refractory Diffuse Large B Cell Lymphoma (DLBCL)	1
1	Withdrawn	Treatment	Lymphoma, B-Cell / Non-Hodgkin's Lymphoma (NHL)	1

Showing 1 to 10 of 48 entries

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## PHARMACOECONOMICS

### Manufacturers

Not Available



## Dosage forms

FORM	↕	ROUTE	↕	STRENGTH	↕
Kit		Intravenous		12.5 ug/1mL	
Powder, for solution		Intravenous		38.5 mcg	

Showing 1 to 2 of 2 entries

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## Prices

Not Available

## Patents

PATENT NUMBER	↕	PEDIATRIC EXTENSION	↕	APPROVED	↕	EXPIRES (ESTIMATED)	↕	↕
<a href="#">US7235641</a>		No		2007-06-26		2023-12-22		
<a href="#">US7575923</a>		No		2009-08-18		2018-04-21		
<a href="#">US7635472</a>		No		2009-12-22		2023-05-31		
<a href="#">US8247194</a>		No		2012-08-21		2024-05-05		
<a href="#">US20120328618</a>		No		2009-10-27		2029-10-27		
<a href="#">US20130323247</a>		No		2008-11-07		2028-11-07		

Showing 1 to 6 of 6 entries

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## PROPERTIES

### State

Solid

### Experimental Properties

Not Available

**Description**

Not Available

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**Kingdom**

Organic Compounds

---

**Super Class**

Organic Acids

---

**Class**

Carboxylic Acids and Derivatives

---

**Sub Class**

Amino Acids, Peptides, and Analogues

---

**Direct Parent**

Peptides

---

**Alternative Parents**

Not Available

---

**Substituents**

Not Available

---

**Molecular Framework**

Not Available

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**External Descriptors**

Not Available

## TARGETS

1. B-lymphocyte antigen CD19



Protein

### Organism

Human

### Pharmacological action

Yes

### Actions

Activator

### General Function

Receptor signaling protein activity

### Specific Function

Assembles with the antigen receptor of B-lymphocytes in order to decrease the threshold for antigen receptor-dependent stimulation.

### Gene Name

CD19

### Uniprot ID

[P15391](#)

### Uniprot Name

B-lymphocyte antigen CD19

### Molecular Weight

61127.985 Da

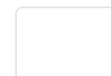
### References

1. Zugmaier G, Klinger M, Schmidt M, Subklewe M: Clinical overview of anti-CD19 BiTE((R)) and ex vivo data from anti-CD33 BiTE((R)) as examples for retargeting T cells in hematologic malignancies. Mol Immunol. 2015 Oct;67(2 Pt A):58-66. doi: 10.1016/j.molimm.2015.02.033. Epub 2015 Apr 13. [[PubMed:25883042](#)]

## 2. T-cell surface glycoprotein CD3 delta chain

### Kind

Protein



## Pharmacological action

Yes

## Actions

Activator

## General Function

Transmembrane signaling receptor activity

## Specific Function

The CD3 complex mediates signal transduction.

## Gene Name

CD3D

## Uniprot ID

[P04234](#)

## Uniprot Name

T-cell surface glycoprotein CD3 delta chain

## Molecular Weight

18929.38 Da

## References

1. Zugmaier G, Klinger M, Schmidt M, Subklewe M: Clinical overview of anti-CD19 BiTE((R)) and ex vivo data from anti-CD33 BiTE((R)) as examples for retargeting T cells in hematologic malignancies. Mol Immunol. 2015 Oct;67(2 Pt A):58-66. doi: 10.1016/j.molimm.2015.02.033. Epub 2015 Apr 13. [[PubMed:25883042](#)]

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