

HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use ABECMA safely and effectively. See full prescribing information for ABECMA.

ABECMA® (idecabtagene vicleucel), suspension for intravenous infusion
Initial U.S. Approval: 2021

WARNING: CYTOKINE RELEASE SYNDROME, NEUROLOGIC TOXICITIES, HLH/MAS, PROLONGED CYTOPENIA, AND SECONDARY HEMATOLOGICAL MALIGNANCIES *See full prescribing information for complete boxed warning.*

- Cytokine Release Syndrome (CRS), including fatal or life-threatening reactions, occurred in patients following treatment with ABECMA. Do not administer ABECMA to patients with active infection or inflammatory disorders. Treat severe or life-threatening CRS with tocilizumab or tocilizumab and corticosteroids (2.2, 2.3, 5.2, 6.1).
- Neurologic toxicities, which may be severe or life-threatening, occurred following treatment with ABECMA, including concurrently with CRS, after CRS resolution, or in the absence of CRS. Monitor for neurologic events after treatment with ABECMA. Provide supportive care and/or corticosteroids as needed (2.2, 2.3, 5.3).
- Hemophagocytic Lymphohistiocytosis/Macrophage Activation Syndrome (HLH/MAS), including fatal and life-threatening reactions, occurred in patients following treatment with ABECMA. HLH/MAS can occur with CRS or neurologic toxicities (5.4).
- Prolonged Cytopenia with bleeding and infection, including fatal outcomes following stem cell transplantation for hematopoietic recovery, occurred following treatment with ABECMA (5.8).
- T cell malignancies have occurred following treatment of hematologic malignancies with BCMA- and CD19-directed genetically modified autologous T cell immunotherapies, including ABECMA (5.10).
- ABECMA is available only through a restricted program under a Risk Evaluation and Mitigation Strategy (REMS) called the ABECMA REMS (5.5).

RECENT MAJOR CHANGES

Boxed Warning	4/2024
Indications and Usage (1)	4/2024
Dosage and Administration (2.1, 2.2)	4/2024
Warnings and Precautions (5)	4/2024

INDICATIONS AND USAGE

ABECMA is a B-cell maturation antigen (BCMA)-directed genetically modified autologous T cell immunotherapy indicated for the treatment of adult patients with relapsed or refractory multiple myeloma after two or more prior lines of therapy including an immunomodulatory agent, a proteasome inhibitor, and an anti-CD38 monoclonal antibody (1).

DOSAGE AND ADMINISTRATION

For autologous use only. For intravenous use only.

- Do NOT use a leukodepleting filter (2.2).
- Administer a lymphodepleting chemotherapy regimen of cyclophosphamide and fludarabine before infusion of ABECMA (2.2).

FULL PRESCRIBING INFORMATION: CONTENTS*

WARNING: CYTOKINE RELEASE SYNDROME, NEUROLOGIC TOXICITIES, HLH/MAS, PROLONGED CYTOPENIA, AND SECONDARY HEMATOLOGICAL MALIGNANCIES

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- Confirm the patient's identity prior to infusion (2.2).
- Premedicate with acetaminophen and an H₁-antihistamine (2.2).
- Avoid prophylactic use of dexamethasone or other systemic corticosteroids (2.2).
- Confirm availability of tocilizumab prior to infusion (2.2, 5.2).
- Dosing of ABECMA is based on the number of chimeric antigen receptor (CAR)-positive T cells (2.1).
- The recommended dose range is 300 to 510 × 10⁶ CAR-positive T cells (2.1).
- Administer ABECMA at a certified healthcare facility (2.2, 5.2, 5.3, 5.4).

DOSAGE FORMS AND STRENGTHS

- ABECMA is a cell suspension for intravenous infusion (3).
- A single dose of ABECMA contains a cell suspension of 300 to 510 × 10⁶ CAR-positive T cells in one or more infusion bags (3).

CONTRAINDICATIONS

None (4).

WARNINGS AND PRECAUTIONS

- **Hypersensitivity Reactions:** Monitor for hypersensitivity reactions during infusion (5.6).
- **Infections:** Monitor patients for signs and symptoms of infection; treat appropriately (5.7).
- **Prolonged Cytopenias:** Patients may exhibit prolonged Grade 3 or higher cytopenias following ABECMA infusion. Monitor blood counts prior to and after ABECMA infusion (5.8).
- **Hypogammaglobulinemia:** Monitor and consider immunoglobulin replacement therapy (5.9).
- **Secondary Malignancies:** T cell malignancies have occurred following treatment of hematologic malignancies with BCMA- and CD19-directed genetically modified autologous T cell immunotherapies, including ABECMA. In the event that a secondary malignancy occurs after treatment with ABECMA, contact Bristol-Myers Squibb at 1-888-805-4555 (5.10).
- **Effects on Ability to Drive and Use Machines:** Advise patients to refrain from driving or operating heavy or potentially dangerous machines for at least 8 weeks after ABECMA administration (5.11).

ADVERSE REACTIONS

The most common nonlaboratory adverse reactions (incidence greater than or equal to 20%) include pyrexia, CRS, hypogammaglobulinemia, infections – pathogen unspecified, musculoskeletal pain, fatigue, febrile neutropenia, hypotension, tachycardia, diarrhea, nausea, headache, chills, upper respiratory tract infection, encephalopathy, edema, dyspnea and viral infections (6.1).

The most common Grade 3 or 4 laboratory adverse reactions (incidence greater than or equal to 50%) include leukocyte count decreased, neutrophil count decreased, lymphocyte count decreased, platelet count decreased, and hemoglobin decreased (6.1).

To report SUSPECTED ADVERSE REACTIONS, contact Bristol-Myers Squibb at 1-800-721-5072 or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

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Revised: 4/2024

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FULL PRESCRIBING INFORMATION

WARNING: CYTOKINE RELEASE SYNDROME, NEUROLOGIC TOXICITIES, HLH/MAS, PROLONGED CYTOPENIA, AND SECONDARY HEMATOLOGICAL MALIGNANCIES

- **Cytokine Release Syndrome (CRS), including fatal or life-threatening reactions, occurred in patients following treatment with ABECMA. Do not administer ABECMA to patients with active infection or inflammatory disorders. Treat severe or life-threatening CRS with tocilizumab or tocilizumab and corticosteroids [see Dosage and Administration (2.2, 2.3), Warnings and Precautions (5.2), and Adverse Reactions (6.1)].**
- **Neurologic toxicities, which may be severe or life-threatening, occurred following treatment with ABECMA, including concurrently with CRS, after CRS resolution, or in the absence of CRS. Monitor for neurologic events after treatment with ABECMA. Provide supportive care and/or corticosteroids as needed [see Dosage and Administration (2.2, 2.3) and Warnings and Precautions (5.3)].**
- **Hemophagocytic Lymphohistiocytosis/Macrophage Activation Syndrome (HLH/MAS) including fatal and life-threatening reactions, occurred in patients following treatment with ABECMA. HLH/MAS can occur with CRS or neurologic toxicities [see Warnings and Precautions (5.4)].**
- **Prolonged Cytopenia with bleeding and infection, including fatal outcomes following stem cell transplantation for hematopoietic recovery, occurred following treatment with ABECMA [see Warnings and Precautions (5.8)].**
- **T cell malignancies have occurred following treatment of hematologic malignancies with BCMA- and CD19-directed genetically modified autologous T cell immunotherapies, including ABECMA [see Warnings and Precautions (5.10)].**
- **ABECMA is available only through a restricted program under a Risk Evaluation and Mitigation Strategy (REMS) called the ABECMA REMS [see Warnings and Precautions (5.5)].**

1 INDICATIONS AND USAGE

ABECMA is a B-cell maturation antigen (BCMA)-directed genetically modified autologous T cell immunotherapy indicated for the treatment of adult patients with relapsed or refractory multiple myeloma after two or more prior lines of therapy including an immunomodulatory agent, a proteasome inhibitor, and an anti-CD38 monoclonal antibody.

2 DOSAGE AND ADMINISTRATION

For autologous use only. For intravenous use only.

2.1 Dose

ABECMA is provided as a single dose for infusion containing a suspension of chimeric antigen receptor (CAR)-positive T cells in one or more infusion bags. The recommended dose range is 300 to 510 x 10⁶ CAR-positive T cells.

See the accompanying Release for Infusion Certificate (RFI Certificate) for additional information pertaining to dose [see *How Supplied/Storage and Handling (16)*].

2.2 Administration

ABECMA is for autologous use only. The patient's identity must match the patient identifiers on the ABECMA cassette(s) and infusion bag(s). Do not infuse ABECMA if the information on the patient-specific label(s) does not match the intended patient.

Preparing Patient for ABECMA Infusion

Confirm the availability of ABECMA prior to starting the lymphodepleting chemotherapy regimen.

Pretreatment

Administer the lymphodepleting chemotherapy regimen: cyclophosphamide 300 mg/m² intravenously (IV) and fludarabine 30 mg/m² IV for 3 days.

See the prescribing information of cyclophosphamide and fludarabine for information on dose adjustment in renal impairment.

Administer ABECMA 2 days after completion of lymphodepleting chemotherapy.

Delay the infusion of ABECMA up to 7 days if a patient has any of the following conditions:

- unresolved serious adverse events (especially pulmonary events, cardiac events, or hypotension), including those after preceding chemotherapies.
- active infections or inflammatory disorders [see *Warnings and Precautions (5.7)*].

Premedication

Administer acetaminophen (650 mg orally) and diphenhydramine (12.5 mg IV or 25 to 50 mg orally, or another H₁-antihistamine) approximately 30 to 60 minutes before infusion of ABECMA.

Avoid prophylactic use of dexamethasone or other systemic corticosteroids, as the use may interfere with the activity of ABECMA.

Receipt of ABECMA

- ABECMA is shipped directly to the cell laboratory or clinical pharmacy associated with the infusion center in the vapor phase of a liquid nitrogen shipper.
- Confirm the patient's identity with the patient identifiers on the shipper.
- If the patient is not expected to be ready for same-day administration before the shipper expires and the infusion site is qualified for onsite storage, transfer ABECMA to onsite vapor phase of liquid nitrogen storage.
- If the patient is not expected to be ready for same day administration before the shipper expires and the infusion site is not qualified for onsite storage, contact Bristol-Myers Squibb at 1-888-805-4555 to arrange for return shipment.

Preparation of ABECMA for Infusion

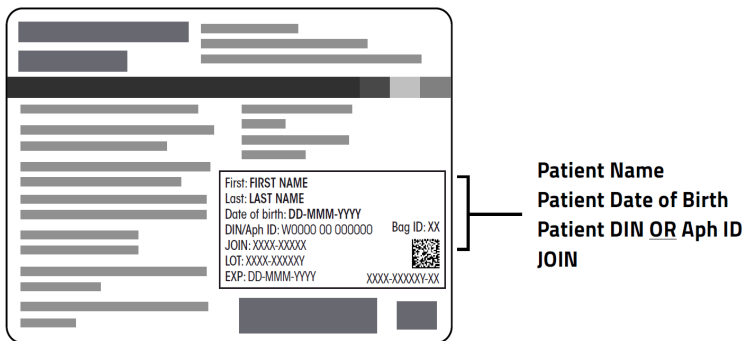
1. Coordinate the timing of ABECMA thaw and infusion. Confirm the infusion time in advance and adjust the start time of the thaw of ABECMA so that it will be available for infusion when the patient is ready.
2. Prior to thawing the product, confirm that tocilizumab and emergency equipment are available prior to the infusion and during the recovery period.

3. An ABECMA dose may be contained in one or more patient-specific infusion bag(s). Verify the number of bags received for the indicated dose of ABECMA prior to preparation of ABECMA for infusion.
4. Confirm patient identity: Prior to preparation of ABECMA, match the patient's identity with the patient identifiers on the ABECMA cassette(s), infusion bag(s), and the RFI Certificate.

Note: The patient identifier number may be preceded by the letters DIN or Aph ID.

5. Do not remove the ABECMA infusion bag(s) from the cassette(s) if the information on the patient-specific cassette label(s) does not match the intended patient. Contact Bristol-Myers Squibb at 1-888-805-4555 if there are any discrepancies between the labels and the patient identifiers.
6. Once patient identity is confirmed, remove the ABECMA infusion bag(s) from the cassette(s) and check that the patient information on the cassette label(s) matches the patient information on the bag label(s).

Figure 1: ABECMA Bag Label(s)



7. Inspect the infusion bag(s) for any breaches of container integrity such as breaks or cracks before thawing. If the bag(s) is compromised, do not administer and contact Bristol-Myers Squibb at 1-888-805-4555.
8. If more than one infusion bag has been received to achieve the treatment dose, thaw each infusion bag one at a time. Do not initiate thaw of the next bag until infusion of the previous bag is complete.
9. Place the infusion bag(s) inside a second sterile bag per local guidelines.
10. Thaw ABECMA infusion bag(s) at approximately 37°C using an approved thaw device or water bath until there is no visible ice in the infusion bag. Gently mix the contents of the bag to disperse clumps of cellular material. If visible cell clumps remain, continue to gently mix the contents of the bag. Small clumps of cellular material should disperse with gentle manual mixing. Do not wash, spin down, and/or resuspend ABECMA in new media prior to infusion.
11. ABECMA should be administered within 1 hour of the start of thaw. ABECMA is stable for 2 hours at room temperature once thawed.

ABECMA Administration

- For autologous use only.
- Do NOT use a leukodepleting filter.
- Ensure that a minimum of 2 doses of tocilizumab and emergency equipment are available prior to infusion and during the recovery period.
- Central venous access may be utilized for the infusion of ABECMA and is encouraged in patients with poor peripheral access.
 1. Confirm that the patient's identity matches the patient identifiers on the ABECMA infusion bag(s).
 2. Prime the tubing of the infusion set with normal saline prior to infusion.
 3. Infuse the entire contents of the ABECMA infusion bag within 1 hour after start of thaw by gravity flow.

4. After the entire content of the infusion bag is infused, rinse the tubing with 30 to 60 mL of normal saline at the same infusion rate to ensure all product is delivered.
5. If more than one infusion bag has been received, administer all bags as directed, following steps 1-4 for all subsequent infusion bags. Do not initiate thaw of the next bag until infusion of the previous bag is complete.

ABECMA contains human blood cells that are genetically modified with replication-incompetent, self-inactivating lentiviral vector. Follow universal precautions and local biosafety guidelines for handling and disposal of ABECMA to avoid potential transmission of infectious diseases.

Monitoring

- Administer ABECMA at a REMS-certified healthcare facility.
- Monitor patients at least daily for 7 days following ABECMA infusion at the certified healthcare facility for signs and symptoms of CRS and neurologic toxicities [see *Warnings and Precautions (5.2, 5.3)*].
- Instruct patients to remain within proximity of the certified healthcare facility for at least 4 weeks following infusion.
- Instruct patients to refrain from driving or hazardous activities for at least 8 weeks following infusion.

2.3 Management of Severe Adverse Reactions

Cytokine Release Syndrome (CRS)

Identify CRS based on clinical presentation [see *Warnings and Precautions (5.2)*]. Evaluate for and treat other causes of fever, hypoxia, and hypotension.

If CRS is suspected, manage according to the recommendations in Table 1.

Patients who experience CRS should be closely monitored for cardiac and organ function until resolution of symptoms. Consider antiseizure prophylaxis with levetiracetam in patients who experience CRS.

Patients who experience Grade 2 or higher CRS (e.g., hypotension not responsive to fluids, or hypoxia requiring supplemental oxygenation) should be monitored with continuous cardiac telemetry and pulse oximetry.

For severe or life-threatening CRS, consider intensive care unit level monitoring and supportive therapy.

For CRS refractory to first line interventions such as tocilizumab or tocilizumab and corticosteroids, consider alternate treatment options (i.e., higher corticosteroid dose, alternative anti-cytokine agents, anti-T cell therapies). Refractory CRS is characterized by fevers, end-organ toxicity (e.g., hypoxia, hypotension) not improving within 12 hours of first line interventions or development of hemophagocytic lymphohistiocytosis/macrophage activation syndrome (HLH/MAS).

If concurrent neurologic toxicity is suspected during CRS, administer:

- Corticosteroids according to the more aggressive intervention based on the CRS and neurologic toxicity grades in Tables 1 and 2
- Tocilizumab according to the CRS grade in Table 1
- Antiseizure medication according to the neurologic toxicity in Table 2

Table 1: CRS Grading and Management Guidance

CRS Grade^a	Tocilizumab^c	Corticosteroids^b
<p>Grade 1 Symptoms require symptomatic treatment only (e.g., fever, nausea, fatigue, headache, myalgia, malaise).</p>	<p>If onset 72 hours or more after infusion, treat symptomatically.</p> <p>If onset less than 72 hours after infusion, consider tocilizumab 8 mg/kg IV over 1 hour (not to exceed 800 mg).</p>	<p>Consider dexamethasone 10 mg IV every 24 hours.</p>
<p>Grade 2 Symptoms require and respond to moderate intervention.</p> <p>Oxygen requirement less than 40% FiO₂ or hypotension responsive to fluids, or low dose of one vasopressor, or Grade 2 organ toxicity.</p>	<p>Administer tocilizumab 8 mg/kg IV over 1 hour (not to exceed 800 mg).</p> <p>Repeat tocilizumab every 8 hours as needed if not responsive to intravenous fluids or increasing supplemental oxygen.</p> <p>Limit to a maximum of 3 doses in a 24-hour period; maximum total of 4 doses.</p>	<p>Consider dexamethasone 10 mg IV every 12-24 hours.</p>
	<p>If no improvement within 24 hours or rapid progression, repeat tocilizumab and escalate dose and frequency of dexamethasone (20 mg IV every 6 to 12 hours).</p> <p>If no improvement within 24 hours or continued rapid progression, switch to methylprednisolone 2 mg/kg followed by 2 mg/kg divided 4 times per day.</p> <p>After 2 doses of tocilizumab, consider alternative anti-cytokine agents. Do not exceed 3 doses of tocilizumab in 24 hours, or 4 doses in total.</p>	
<p>Grade 3 Symptoms require and respond to aggressive intervention.</p> <p>Fever, oxygen requirement greater than or equal to 40% FiO₂, or hypotension requiring high-dose or multiple vasopressors, or Grade 3 organ</p>	<p>Per Grade 2</p> <p>If no improvement within 24 hours or rapid progression, repeat tocilizumab and escalate dose and frequency of dexamethasone (20 mg IV every 6 to 12 hours).</p> <p>If no improvement within 24 hours or continued rapid progression, switch to methylprednisolone 2 mg/kg followed by 2 mg/kg divided 4 times per day.</p>	<p>Administer dexamethasone 10 mg IV every 12 hours.</p>

Table 1: CRS Grading and Management Guidance

CRS Grade ^a	Tocilizumab ^c	Corticosteroids ^b
toxicity or Grade 4 transaminitis.	After 2 doses of tocilizumab, consider alternative anti-cytokine agents. Do not exceed 3 doses of tocilizumab in 24 hours, or 4 doses in total.	
Grade 4 Life-threatening symptoms. Requirements for ventilator support, continuous veno-venous hemodialysis (CVVHD), or Grade 4 organ toxicity (excluding transaminitis).	Per Grade 2	Administer dexamethasone 20 mg IV every 6 hours.
	After 2 doses of tocilizumab, consider alternative anti-cytokine agents. Do not exceed 3 doses of tocilizumab in 24 hours, or 4 doses in total. If no improvement within 24 hours, consider methylprednisolone (1-2 g, repeat every 24 hours if needed; taper as clinically indicated) or other anti-T cell therapies.	

^a Lee criteria for grading CRS (Lee et al., 2014).

^b If corticosteroids are initiated, continue corticosteroids for at least 3 doses, and taper over a maximum of 7 days.

^c Refer to tocilizumab Prescribing Information for details.

Neurologic Toxicity

Monitor patients for signs and symptoms of neurologic toxicities (Table 2). Rule out other causes of neurologic signs or symptoms. Provide intensive care supportive therapy for severe or life-threatening neurologic toxicities. If neurologic toxicity is suspected, manage according to the recommendations in Table 2.

If concurrent CRS is suspected during the neurologic toxicity event, administer:

- Corticosteroids according to the more aggressive intervention based on the CRS and neurologic toxicity grades in Tables 1 and 2
- Tocilizumab according to CRS grade in Table 1
- Antiseizure medication according to neurologic toxicity in Table 2

Table 2: Neurologic Toxicity Grading and Management Guidance

Neurologic Toxicity Grade ^a	Corticosteroids and Antiseizure Medications
Grade 1	Start non-sedating, antiseizure medicines (e.g., levetiracetam) for seizure prophylaxis. If 72 hours or more after infusion, observe patient. If less than 72 hours after infusion, consider dexamethasone 10 mg IV every 12 to 24 hours for 2 to 3 days.

Table 2: Neurologic Toxicity Grading and Management Guidance

Neurologic Toxicity Grade ^a	Corticosteroids and Antiseizure Medications
Grade 2	<p>Start non-sedating, antiseizure medicines (e.g., levetiracetam) for seizure prophylaxis. Start dexamethasone 10 mg IV every 12 hours for 2-3 days, or longer for persistent symptoms.</p> <p>Consider taper for a total corticosteroid exposure of greater than 3 days. Corticosteroids are not recommended for isolated Grade 2 headaches.</p> <p>If no improvement after 24 hours or worsening of neurologic toxicity, increase the dose and/or frequency of dexamethasone up to a maximum of 20 mg IV every 6 hours.</p>
Grade 3	<p>Start non-sedating, antiseizure medicines (e.g., levetiracetam) for seizure prophylaxis. Start dexamethasone 10 to 20 mg IV every 6 to 12 hours. Corticosteroids are not recommended for isolated Grade 3 headaches.</p> <p>If no improvement after 24 hours or worsening of neurologic toxicity, escalate to methylprednisolone (2 mg/kg loading dose, followed by 2 mg/kg divided into 4 times a day; taper within 7 days).</p> <p>If cerebral edema is suspected, consider hyperventilation and hyperosmolar therapy. Give high-dose methylprednisolone (1-2 g, repeat every 24 hours if needed; taper as clinically indicated) and cyclophosphamide 1.5 g/m².</p>
Grade 4	<p>Start non-sedating, antiseizure medicines (e.g., levetiracetam) for seizure prophylaxis. Start dexamethasone 20 mg IV every 6 hours.</p> <p>If no improvement after 24 hours or worsening of neurologic toxicity, escalate to high-dose methylprednisolone (1-2 g, repeat every 24 hours if needed; taper as clinically indicated).</p> <p>If cerebral edema is suspected, consider hyperventilation and hyperosmolar therapy. Give high-dose methylprednisolone (1-2 g, repeat every 24 hours if needed; taper as clinically indicated), and cyclophosphamide 1.5 g/m².</p>

^a NCI CTCAE criteria for grading neurologic toxicities version 4.03.

3 DOSAGE FORMS AND STRENGTHS

ABECMA is a cell suspension for intravenous infusion.

A single dose of ABECMA contains a cell suspension of 300 to 510 x 10⁶ chimeric antigen receptor (CAR)-positive T cells in one or more infusion bags [see *How Supplied/Storage and Handling (16)*].

4 CONTRAINDICATIONS

None.

5 WARNINGS AND PRECAUTIONS

5.1 Early Death

In KarMMa-3, a randomized (2:1), controlled trial, a higher proportion of patients experienced death within 9 months after randomization in the ABECMA arm (45/254; 18%) compared to the standard regimens arm (15/132; 11%) [see *Clinical Studies (14)*]. Early deaths occurred in 8% (20/254) and 0% prior to ABECMA infusion and standard regimen administration, respectively, and 10% (25/254) and 11% (15/132) after ABECMA infusion and standard regimen administration, respectively. Out of the 20 deaths that occurred prior to ABECMA infusion, 15 occurred from disease progression, 3 occurred from adverse events and 2 occurred from unknown causes. Out of the 25 deaths that occurred after ABECMA infusion, 10 occurred from disease progression, 11 occurred from adverse events, and 4 occurred from unknown causes.

5.2 Cytokine Release Syndrome (CRS)

CRS, including fatal or life-threatening reactions, occurred following treatment with ABECMA. Among patients receiving ABECMA for relapsed or refractory multiple myeloma in the KarMMa and KarMMa-3 studies (N=349), CRS occurred in 89% (310/349), including \geq Grade 3 CRS (Lee grading system) in 7% (23/349) of patients and Grade 5 CRS in 0.9% (3/349) of patients. The median time-to-onset of CRS, any grade, was 1 day (range: 1 to 27 days), and the median duration of CRS was 5 days (range: 1 to 63 days). In the pooled studies, the rate of \geq Grade 3 CRS was 10% (7/71) for patients treated in dose range of 460 to 510 x 10⁶ CAR-positive T cells and 5.4% (13/241) for patients treated in dose range of 300 to 460 x 10⁶ CAR-positive T cells.

The most common manifestations of CRS (greater than or equal to 10%) included pyrexia (87%), hypotension (30%), tachycardia (26%), chills (19%), and hypoxia (16%). Grade 3 or higher events that may be associated with CRS include hypotension, hypoxia, hyperbilirubinemia, hypofibrinogenemia, ARDS, atrial fibrillation, hepatocellular injury, metabolic acidosis, pulmonary edema, coagulopathy, renal failure, multiple organ dysfunction syndrome and hemophagocytic lymphohistiocytosis/macrophage activation syndrome (HLH/MAS) [see *Adverse Reactions (6.1)*].

Identify CRS based on clinical presentation. Evaluate for and treat other causes of fever, hypoxia, and hypotension. CRS has been reported to be associated with findings of HLH/MAS, and the physiology of the syndromes may overlap. HLH/MAS is a potentially life-threatening condition. In patients with progressive symptoms of CRS or refractory CRS despite treatment, evaluate for evidence of HLH/MAS. Please see Section 5.4; Hemophagocytic Lymphohistiocytosis/Macrophage Activation Syndrome.

Of the 349 patients who received ABECMA in clinical trials, 226 (65%) patients received tocilizumab; 39% (135/349) received a single dose, while 26% (91/349) received more than 1 dose of tocilizumab. Overall, 24% (82/349) of patients received at least 1 dose of corticosteroids for treatment of CRS. Almost all patients who received corticosteroids for CRS also received tocilizumab. For patients treated in dose range of 460 to 510 x 10⁶ CAR-positive T cells, 76% (54/71) of patients received tocilizumab and 35% (25/71) received at least 1 dose of corticosteroids for treatment of CRS. For patients treated in dose range of 300 to 460 x 10⁶ CAR-positive T cells, 63% (152/241) of patients received tocilizumab and 20% (49/241) received at least 1 dose of corticosteroid for treatment of CRS.

Ensure that a minimum of 2 doses of tocilizumab are available prior to infusion of ABECMA.

Monitor patients at least daily for 7 days following ABECMA infusion at the REMS-certified healthcare facility for signs and symptoms of CRS. Monitor patients for signs or symptoms of CRS for at least 4 weeks after infusion.

At the first sign of CRS, institute treatment with supportive care, tocilizumab and/or corticosteroids as indicated [see *Dosage and Administration (2.3)*].

Counsel patients to seek immediate medical attention should signs or symptoms of CRS occur at any time [see *Patient Counseling Information (17)*].

5.3 Neurologic Toxicities

Neurologic toxicities, including immune-effector cell-associated neurotoxicity (ICANS), which may be severe or life-threatening, occurred concurrently with CRS, after CRS resolution, or in the absence of CRS following treatment with ABECMA.

In patients receiving ABECMA in the KarMMa and KarMMa-3 studies, CAR T cell-associated neurotoxicity occurred in 40% (139/349), including Grade 3 in 4% (14/349) and Grade 4 in 0.6% (2/349) of patients. The median time to onset of neurotoxicity was 2 days (range: 1 to 148 days). The median duration of CAR T cell-associated neurotoxicity was 8 days (range: 1 to 720 days) in all patients including those with ongoing neurologic events at the time of death or data cut off. CAR T cell-associated neurotoxicity resolved in 123 of 139 (88%) patients and median time to resolution was 5 days (range: 1 to 245 days). One-hundred and thirty four out of 349 (38%) patients with neurotoxicity had CRS. The onset of neurotoxicity during CRS was observed in 93 patients, before the onset of CRS in 12 patients, and after the CRS event in 29 patients. The rate of Grade 3 or 4 CAR T cell-associated neurotoxicity was 5.6% (4/71) and 3.7% (9/241) for patients treated in dose range of 460 to 510 x 10⁶ CAR-positive T cells and 300 to 460 x 10⁶ CAR-positive T cells, respectively. The most frequent (greater than or equal to 5%) manifestations of CAR T cell-associated neurotoxicity include encephalopathy (21%), headache (15%), dizziness (8%), delirium (6%), and tremor (6%).

At the safety update for KarMMa-3 study, one patient developed fatal neurotoxicity 43 days after ABECMA. In KarMMa, one patient had ongoing Grade 2 neurotoxicity at the time of death. Two patients had ongoing Grade 1 tremor at the time of data cutoff.

Cerebral edema has been associated with ABECMA in a patient in another study in multiple myeloma. Grade 3 myelitis and Grade 3 parkinsonism have occurred after treatment with ABECMA in another study in multiple myeloma.

Monitor patients at least daily for 7 days following ABECMA infusion at the REMS-certified healthcare facility for signs and symptoms of neurologic toxicities. Rule out other causes of neurologic symptoms. Monitor patients for signs or symptoms of neurologic toxicities for at least 4 weeks after infusion and treat promptly. Neurologic toxicity should be managed with supportive care and/or corticosteroids as needed [see *Dosage and Administration (2.3)*].

Counsel patients to seek immediate medical attention should signs or symptoms of neurologic toxicity occur at any time [see *Patient Counseling Information (17)*].

5.4 Hemophagocytic Lymphohistiocytosis (HLH)/Macrophage Activation Syndrome (MAS)

In patients receiving ABECMA in the KarMMa and KarMMa-3 studies, HLH/MAS occurred in 2.9% (10/349) of patients. All events of HLH/MAS had onset within 10 days of receiving ABECMA, with a median onset of 6.5 days (range: 4 to 10 days) and occurred in the setting of ongoing or worsening CRS. Five patients with HLH/MAS had overlapping neurotoxicity. The manifestations of HLH/MAS include hypotension, hypoxia, multiple organ dysfunction, renal dysfunction, and cytopenia.

In KarMMa-3, one patient had Grade 5, two patients had Grade 4 and two patients had Grade 3 HLH/MAS. The patient with Grade 5 HLH/MAS also had Grade 5 candida sepsis and Grade 5 CRS. In another patient who died due to stroke, the Grade 4 HLH/MAS had resolved prior to death. Two cases of Grade 3 and one case of Grade 4 HLH/MAS had resolved.

In KarMMa, one patient treated in the 300×10^6 CAR-positive T cells dose cohort developed fatal multi-organ HLH/MAS with CRS. In another patient with fatal bronchopulmonary aspergillosis, HLH/MAS was contributory to the fatal outcome. Three cases of Grade 2 HLH/MAS resolved.

HLH/MAS is a potentially life-threatening condition with a high mortality rate if not recognized early and treated. Treatment of HLH/MAS should be administered per institutional standards.

5.5 ABECMA REMS

Because of the risk of CRS and neurologic toxicities, ABECMA is available only through a restricted program under a Risk Evaluation and Mitigation Strategy (REMS) called the ABECMA REMS [*see Boxed Warning and Warnings and Precautions (5.2, 5.3)*].

The required components of the ABECMA REMS are:

- Healthcare facilities that dispense and administer ABECMA must be enrolled and comply with the REMS requirements.
- Certified healthcare facilities must have on-site, immediate access to tocilizumab.
- Ensure that a minimum of 2 doses of tocilizumab are available for each patient for infusion within 2 hours after ABECMA infusion, if needed for treatment of CRS.
- Further information is available at www.AbecmaREMS.com or contact Bristol-Myers Squibb at 1-866-340-7332.

5.6 Hypersensitivity Reactions

Allergic reactions may occur with the infusion of ABECMA. Serious hypersensitivity reactions, including anaphylaxis, may be due to dimethyl sulfoxide (DMSO) in ABECMA.

5.7 Infections

ABECMA should not be administered to patients with active infections or inflammatory disorders. Severe, life-threatening, or fatal infections occurred in patients after ABECMA infusion.

In all patients receiving ABECMA in the KarMMa and KarMMa-3, infections (all grades) occurred in 61% of patients. Grade 3 or 4 infections occurred in 21% of patients. Grade 3 or 4 infections with an unspecified pathogen occurred in 12%, viral infections in 7%, bacterial infections in 4.3%, and fungal infections in 1.4% of patients. Overall, 15 patients had Grade 5 infections (4.3%); 8 patients (2.3%) with infections of pathogen unspecified, 3 patients (0.9%) with fungal infections, 3 patients (0.9%) with viral infections, and 1 patient (0.3%) with bacterial infection.

Monitor patients for signs and symptoms of infection before and after ABECMA infusion and treat appropriately. Administer prophylactic, pre-emptive, and/or therapeutic antimicrobials according to standard institutional guidelines.

Febrile neutropenia was observed in 38% (133/349) of patients after ABECMA infusion and may be concurrent with CRS. In the event of febrile neutropenia, evaluate for infection and manage with broad-spectrum antibiotics, fluids, and other supportive care as medically indicated.

Viral Reactivation

Cytomegalovirus (CMV) infection resulting in pneumonia and death has occurred following ABECMA administration. Monitor and treat for CMV reactivation in accordance with clinical guidelines.

Hepatitis B virus (HBV) reactivation, in some cases resulting in fulminant hepatitis, hepatic failure, and death, can occur in patients treated with drugs directed against plasma cells.

Perform screening for CMV, HBV, hepatitis C virus (HCV), and human immunodeficiency virus (HIV) in accordance with clinical guidelines before collection of cells for manufacturing.

Consider antiviral therapy to prevent viral reactivation per local institutional guidelines/clinical practice.

5.8 Prolonged Cytopenias

Patients may exhibit prolonged cytopenias following lymphodepleting chemotherapy and ABECMA infusion.

In patients receiving ABECMA in the KarMMa and KarMMa-3 studies, 40% of patients (139/349) experienced prolonged Grade 3 or 4 neutropenia and 42% (145/349) experienced prolonged Grade 3 or 4 thrombocytopenia that had not resolved by Month 1 following ABECMA infusion. In 89% (123/139) of patients who recovered from Grade 3 or 4 neutropenia after Month 1, the median time to recovery from ABECMA infusion was 1.9 months. In 76% (110/145) of patients who recovered from Grade 3 or 4 thrombocytopenia, the median time to recovery was 1.9 months. Five patients underwent stem cell therapy for hematopoietic reconstitution due to prolonged cytopenia. The rate of Grade 3 or 4 thrombocytopenia was 62% (44/71) and 56% (135/241) for patients treated in dose range of 460 to 510 x 10⁶ CAR-positive T cells and 300 to 460 x 10⁶ CAR-positive T cells, respectively.

Monitor blood counts prior to and after ABECMA infusion. Manage cytopenia with myeloid growth factor and blood product transfusion support according to local institutional guidelines.

5.9 Hypogammaglobulinemia

Plasma cell aplasia and hypogammaglobulinemia can occur in patients receiving treatment with ABECMA.

In all patients receiving ABECMA in the KarMMa and KarMMa-3 studies, hypogammaglobulinemia was reported as an adverse event in 13% (46/349) of patients; laboratory IgG levels fell below 500 mg/dL after infusion in 37% (130/349) of patients treated with ABECMA.

Hypogammaglobulinemia either as an adverse reaction or laboratory IgG level below 500 mg/dL after infusion occurred in 45% (158/349) of patients treated with ABECMA. Forty-one percent of patients received intravenous immunoglobulin (IVIG) post-ABECMA for serum IgG <400 mg/dL.

Monitor immunoglobulin levels after treatment with ABECMA and administer IVIG for IgG <400 mg/dL. Manage per local institutional guidelines, including infection precautions and antibiotic or antiviral prophylaxis.

Use of Live Vaccines

The safety of immunization with live viral vaccines during or following ABECMA treatment has not been studied. Vaccination with live virus vaccines is not recommended for at least 6 weeks prior to the start of lymphodepleting chemotherapy, during ABECMA treatment, and until immune recovery following treatment with ABECMA.

5.10 Secondary Malignancies

Patients treated with ABECMA may develop secondary malignancies. In KarMMa-3, myeloid neoplasms (four cases of myelodysplastic syndrome and one case of acute myeloid leukemia) occurred in 2.2% (5/222) of patients following treatment with ABECMA compared to none in the standard regimens arm at the time of the safety

update. The median time to onset of myeloid neoplasm from ABECMA infusion was 338 days (Range: 277 to 794 days). Three of these five patients have died following the development of myeloid neoplasm. One out of the five cases of myeloid neoplasm occurred after initiation of subsequent antimyeloma therapy.

T cell malignancies have occurred following treatment of hematologic malignancies with BCMA- and CD19-directed genetically modified autologous T cell immunotherapies, including ABECMA. Mature T cell malignancies, including CAR-positive tumors, may present as soon as weeks following infusion, and may include fatal outcomes [see *Boxed Warning, Adverse Reactions (6.3), Patient Counseling Information (17)*].

Monitor life-long for secondary malignancies. In the event that a secondary malignancy occurs, contact Bristol-Myers Squibb at 1-888-805-4555 for reporting and to obtain instructions on collection of patient samples for testing of secondary malignancy.

5.11 Effects on Ability to Drive and Use Machines

Due to the potential for neurologic events, including altered mental status or seizures, patients receiving ABECMA are at risk for altered or decreased consciousness or coordination in the 8 weeks following ABECMA infusion. Advise patients to refrain from driving and engaging in hazardous occupations or activities, such as operating heavy or potentially dangerous machinery, during this initial period.

6 ADVERSE REACTIONS

The following adverse reactions are described elsewhere in the labeling:

- *Early Death [see Warnings and Precautions (5.1), Clinical Studies (14)]*
- *Cytokine Release Syndrome [see Warnings and Precautions (5.2)]*
- *Neurologic Toxicities [see Warnings and Precautions (5.3)]*
- *Hemophagocytic Lymphohistiocytosis (HLH)/Macrophage Activation Syndrome (MAS) [see Warnings and Precautions (5.4)]*
- *Hypersensitivity Reactions [see Warnings and Precautions (5.6)]*
- *Infections [see Warnings and Precautions (5.7)]*
- *Prolonged Cytopenias [see Warnings and Precautions (5.8)]*
- *Hypogammaglobulinemia [see Warnings and Precautions (5.9)]*

6.1 Clinical Trials Experience

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in clinical practice.

The safety data described in the WARNINGS and PRECAUTIONS section reflect exposure to ABECMA in 349 patients with relapsed or refractory multiple myeloma: one randomized, open-label study with 222 patients in KarMMa-3 and one single-arm, open-label study with 127 patients in KarMMa.

KarMMa-3 Study

The safety data described in this section reflect the exposure to ABECMA in the KarMMa-3 study, in which 222 patients with relapsed or refractory multiple myeloma received ABECMA across a dose range of 175 to 529 x 10⁶ CAR-positive T cells (median dose: 445 x 10⁶ CAR-positive T cells) [see *Clinical Studies (14)*]. Patients with a history of CNS disease or requiring ongoing treatment with chronic immunosuppression were excluded. The

median age of the safety population was 63 years (range: 30 to 81 years); 43% were 65 years or older, and 63% were men. The Eastern Cooperative Oncology Group (ECOG) performance status at baseline was 0 in 47%, 1 in 51%, 2 in 1.4% and 3 in 0.5% of patients. Four (1.8%) patients treated with ABECMA had creatinine clearance <45 mL/min. For details about the study population, see *Clinical Studies (14)*.

The most common (greater than or equal to 10%) Grade 3 or 4 nonlaboratory adverse reactions was febrile neutropenia (51%) and any infections (16%).

The most common nonlaboratory adverse reactions (incidence greater than or equal to 20%) included CRS, pyrexia, any infection, febrile neutropenia, hypogammaglobulinemia, musculoskeletal pain, hypotension, infections – pathogen unspecified, fatigue, tachycardia, diarrhea, nausea, headache, encephalopathy, dyspnea and edema.

Serious adverse reactions occurred in 43% of patients. The most common nonlaboratory (greater than or equal to 5%) serious adverse reactions included infections – pathogen unspecified (10%), pneumonia (9%), viral infections (8%), encephalopathy (6%), pyrexia (6%) and sepsis (5%). Fatal adverse reactions occurred in 9%.

Table 3 summarizes the adverse reactions that occurred in at least 10% of patients treated with ABECMA. Table 4 describes the most common Grade 3 or 4 laboratory abnormalities.

Table 3: Adverse Reactions Observed in at Least 10% of Patients Treated in the KarMMa-3 Study

	ABECMA (N=222)		Standard Regimens (N=126)	
	Any Grade (%)	Grade 3 or 4 (%)	Any Grade (%)	Grade 3 or 4 (%)
Blood and lymphatic system disorders				
Febrile neutropenia	51	51	28	28
Coagulopathy ^a	14	2.7	4.8	0.8
Cardiac disorders				
Tachycardia ^b	32	0	21	0
Gastrointestinal disorders				
Diarrhea ^c	31	2.3	35	3.2
Nausea	27	0.9	48	0
Constipation	17	0	15	0
Vomiting ^d	14	0	17	0
Abdominal pain ^e	10	0.5	14	0
General disorders and administration site conditions				
Pyrexia	91	9	53	6
Fatigue ^f	33	1.4	48	4
Edema ^g	20	0.5	28	2.4
Chills	19	0.5	13	0
Immune system disorders				

	ABECMA (N=222)		Standard Regimens (N=126)	
	Any Grade (%)	Grade 3 or 4 (%)	Any Grade (%)	Grade 3 or 4 (%)
Cytokine release syndrome	91	4.1	40	0.8
Hypogammaglobulinemia	48	0.9	25	0
Infections and infestations				
Any infection	56	16	64	18
Infections – Pathogen unspecified ^h	35	9	40	11
Upper respiratory tract infection ⁱ	19	1.8	17	0.8
Infections – Viral ^h	18	5	28	6
Infections – Bacterial ^h	15	4.5	19	8
Pneumonia ^j	13	8	13	11
Metabolism and nutrition disorders				
Decreased appetite	17	1.8	21	0
Musculoskeletal and connective tissue disorders				
Musculoskeletal pain ^k	36	1.8	49	8
Nervous system disorders				
Headache ^l	24	0	29	1.6
Encephalopathy ^m	22	3.6	21	4.8
Dizziness ⁿ	14	1.8	18	3.2
Neuropathy ^o	10	0	21	0.8
Psychiatric disorders				
Sleep disorder ^p	11	0	22	2.4
Renal and urinary disorders				
Renal failure ^q	13	5	15	4
Respiratory, thoracic, and mediastinal disorders				
Dyspnea ^r	21	1.8	31	2.4
Cough ^s	14	0	21	0
Hypoxia ^t	18	6	8	1.6
Vascular disorders				
Hypotension ^u	36	2.3	19	1.6
Hypertension	14	7	21	11

	ABECMA (N=222)		Standard Regimens (N=126)	
	Any Grade (%)	Grade 3 or 4 (%)	Any Grade (%)	Grade 3 or 4 (%)
Skin disorders				
Rash ^v	10	0	19	0.8

CAR=chimeric antigen receptor.

- ^a Coagulopathy includes activated partial thromboplastin time prolonged, blood fibrinogen decreased, coagulopathy, disseminated intravascular coagulation, hypofibrinogenemia, international normalized ratio increased, prothrombin time prolonged.
- ^b Tachycardia includes heart rate increased, sinus tachycardia, tachycardia.
- ^c Diarrhea includes colitis, colitis microscopic, diarrhea, enterocolitis.
- ^d Vomiting includes retching, vomiting.
- ^e Abdominal pain includes abdominal discomfort, abdominal pain, abdominal pain lower, abdominal pain upper, dyspepsia.
- ^f Fatigue includes asthenia, fatigue, malaise, muscle fatigue.
- ^g Edema includes edema, edema peripheral, generalized edema, peripheral swelling, swelling, eyelid edema, face edema, fluid retention, hypervolemia, localized edema, mouth swelling, periorbital edema, periorbital swelling, swelling face.
- ^h Infections and infestations System Organ Class Adverse Events are grouped by high level grouped term (HLGT) pathogen type.
- ⁱ Upper respiratory tract infection includes acute sinusitis, epiglottitis, HCoV-OC43 infection, nasopharyngitis, pharyngeal inflammation, pharyngitis, pharyngitis streptococcal, respiratory tract infection, respiratory tract infection bacterial, rhinitis, rhinovirus infection, sinusitis, upper respiratory tract infection, viral upper respiratory tract infection.
- ^j Pneumonia includes bronchopulmonary aspergillosis, coronavirus pneumonia, COVID-19 pneumonia, organizing pneumonia, pneumonia, pneumonia acinetobacter, pneumonia adenoviral, pneumonia aspiration, pneumonia bacterial, pneumonia fungal, pneumonia influenzas, pneumonia legionella, pneumonia parainfluenza viral, pneumonia pseudomonal, pneumonia streptococcal, pneumonia viral, pulmonary nocardiosis.
- ^k Musculoskeletal pain includes arthralgia, back pain, bone pain, joint stiffness, muscle strain, musculoskeletal chest pain, musculoskeletal discomfort, musculoskeletal pain, musculoskeletal stiffness, myalgia, neck pain, non-cardiac chest pain.
- ^l Headache includes headache, head discomfort.
- ^m Encephalopathy includes amnesia, cognitive disorder, confusional state, depressed level of consciousness, disturbance in attention, dysgraphia, encephalopathy, Immune effector cell-associated neurotoxicity syndrome incoherent, lethargy, memory impairment, mental status changes, metabolic encephalopathy, somnolence, stupor, toxic encephalopathy.
- ⁿ Dizziness includes dizziness, presyncope, syncope, vertigo, vertigo positional, vestibular disorder.
- ^o Neuropathy includes carpal tunnel syndrome, dysesthesia, hyperesthesia, hypoesthesia, hypoesthesia oral, mononeuropathy, neuralgia, neuritis, neuropathy peripheral, paresthesia, paresthesia oral, peripheral motor neuropathy, peripheral sensorimotor neuropathy, peripheral sensory neuropathy, peroneal nerve palsy, radicular pain, radiculopathy, sacral radiculopathy, sciatica, sensory loss, toxic neuropathy.
- ^p Sleep disorder includes hypersomnia, insomnia, sleep disorder.
- ^q Renal failure includes acute kidney injury, blood creatinine increased, chronic kidney disease, creatinine renal clearance decreased, glomerular filtration rate decreased, nephropathy toxic, oliguria, renal failure, renal impairment, urine output decreased.
- ^r Dyspnea includes dyspnea, dyspnea exertional, dyspnea paroxysmal nocturnal, tachypnea.
- ^s Cough includes cough, productive cough, upper-airway cough syndrome.
- ^t Hypoxia includes hypoxia, oxygen saturation decreased.
- ^u Hypotension includes hemodynamic instability, hypotension, orthostatic hypotension.

^v Rash includes acne, catheter site dermatitis, catheter site rash, dermatitis, dermatitis contact, drug eruption, eczema, erythema, papulopustular rosacea, photosensitivity reaction, rash, rash follicular, rash macular, rash maculo-papular, rash papular, rash pruritic, skin irritation, skin lesion, urticaria.

Other clinically important adverse reactions that occurred in less than 10% of patients treated with ABECMA include the following:

- *Cardiac disorders*: cardiac arrhythmia (7%)
- *Gastrointestinal disorders*: gastrointestinal hemorrhage (0.5%)
- *Immune system disorders*: hemophagocytic lymphohistiocytosis (2.3%)
- *Infections and infestations*: infections - fungal (5%), sepsis^a (6%)
- *Musculoskeletal and connective tissue disorders*: motor dysfunction^b (9%)
- *Nervous system disorders*: tremor^c (4.1%), aphasia^d (3.2%), ataxia^e (2.3%), seizure (0.5%)
- *Psychiatric disorders*: anxiety (4.1%), delirium^f (7%)
- *Respiratory, thoracic, and mediastinal disorders*: pulmonary edema^g (1.4%)
- *Vascular disorders*: thrombosis^h (3.2%)

^a Sepsis includes bacteremia, bacterial sepsis, candida sepsis, citrobacter bacteremia, clostridial sepsis, device related bacteremia, enterococcal sepsis, klebsiella bacteremia, klebsiella sepsis, multiple organ dysfunction syndrome, neutropenic sepsis, pulmonary sepsis, sepsis, septic shock, staphylococcal bacteremia, streptococcal bacteremia, streptococcal sepsis.

^b Motor dysfunction includes akathisia, dyskinesia, dysphonia, hypertonia, muscle spasms, muscle twitching, muscular weakness, restless legs syndrome.

^c Tremor includes head titubation, intention tremor, resting tremor, tremor.

^d Aphasia includes aphasia, dysarthria, slow speech, speech disorder.

^e Ataxia includes ataxia, balance disorder, dysmetria, gait disturbance.

^f Delirium includes agitation, delirium, disorientation, hallucination, hallucination auditory, hallucination visual, restlessness.

^g Pulmonary edema includes pulmonary congestion and pulmonary edema.

^h Thrombosis includes deep vein thrombosis, device related thrombosis, embolism, pulmonary embolism, thrombosis, thrombosis in device.

Laboratory Abnormalities

Table 4 presents the most common Grade 3 or 4 laboratory abnormalities, based on laboratory data, occurring in at least 10% of patients.

Table 4: Grade 3 or 4^a Laboratory Abnormalities Worsening from Baseline in at Least 10% of Patients Treated in the KarMMA-3 Study

Laboratory Abnormality	ABECMA N=222 (%)	Standard Regimens N=126 (%)
	Grade 3 or 4 (%)	Grade 3 or 4 (%)
Lymphocyte decreased	98	78
Leukocyte decreased	96	64
Neutrophil decreased	96	72
Platelet decreased	59	46

Hemoglobin decreased	52	45
Phosphate decreased	45	30
Triglyceride increased	21	10
Alanine aminotransferase increased	13	8
Sodium decreased	11	7
Gamma-glutamyltransferase increased	10	6

CAR=chimeric antigen receptor; CTCAE=Common Terminology Criteria for Adverse Events; NCI=National Cancer Institute.

^a Laboratory tests were graded according to NCI CTCAE Version 4.03.

Other clinically important Grade 3 or 4 laboratory abnormalities (based on laboratory data) that occurred in less than 10% of patients treated with ABECMA include the following: aspartate aminotransferase increased, potassium decreased, albumin decreased, alkaline phosphatase increased, calcium decreased, glucose increased, activated partial thromboplastin time increased (seconds), fibrinogen decreased, bilirubin increased and hypomagnesemia.

KarMMA Study

The safety data described in this section reflect the exposure to ABECMA in the KarMMA study, in which 127 patients with relapsed/refractory multiple myeloma received ABECMA across a dose range of 150 to 518 x 10⁶ CAR-positive T cells [see *Clinical Studies (14)*]. Patients with a history of CNS disease (such as seizure or cerebrovascular ischemia) or requiring ongoing treatment with chronic immunosuppression were excluded. The median duration of follow-up was 11.4 months. The median age of the study population was 61 years (range: 33 to 78 years); 35% were 65 years or older, and 60% were men. The Eastern Cooperative Oncology Group (ECOG) performance status at baseline was 0 in 45%, 1 in 53%, and 2 in 2% of patients. Seven percent of the patients treated with ABECMA had creatinine clearance <45 mL/min. For details about the study population, see *Clinical Studies (14)*.

The most common (greater than or equal to 10%) Grade 3 or 4 nonlaboratory adverse reactions were febrile neutropenia (16%) and infections – pathogen unspecified (15%).

The most common nonlaboratory adverse reactions (incidence greater than or equal to 20%) included CRS, infections – pathogen unspecified, fatigue, musculoskeletal pain, hypogammaglobulinemia, diarrhea, upper respiratory tract infection, nausea, viral infections, encephalopathy, edema, pyrexia, cough, headache, and decreased appetite.

Serious adverse reactions occurred in 67% of patients. The most common nonlaboratory (greater than or equal to 5%) serious adverse reactions included CRS (18%), general physical health deterioration (10%), pneumonia (12%), infections-pathogen unspecified (19%), viral infections (9%), sepsis (7%), and febrile neutropenia (6%). Fatal adverse reactions occurred in 6%.

Table 5 summarizes the adverse reactions that occurred in at least 10% of patients treated with ABECMA. Table 6 describes the most common Grade 3 or 4 laboratory abnormalities.

Table 5: Adverse Reactions Observed in at Least 10% of Patients Treated with ABECMA in the KarMMa Study

System Organ Class Preferred Term	Target Dose of ABECMA (CAR-Positive T Cells)	
	Any Grade	Grade 3 or Higher
	[150 to 450 x 10 ⁶] (N=127) %	[150 to 450 x 10 ⁶] (N=127) %
Blood and lymphatic system disorders		
Febrile neutropenia	16	16
Cardiac disorders		
Tachycardia ^a	19	0
Gastrointestinal disorders		
Diarrhea	35	1.6
Nausea	29	0
Constipation	16	0
Vomiting	15	0
Oral pain ^b	12	0
General disorders and administration site conditions		
Fatigue ^c	45	3.1
Pyrexia	25	1.6
General physical health deterioration	11	10
Edema ^d	25	0
Chills	11	0
Immune system disorders		
Cytokine release syndrome	85	9
Hypogammaglobulinemia ^e	41	0.8
Infections and infestations^f		
Infections – Pathogen unspecified	51	15
Viral infections	27	9
Bacterial infections	15	3.9

Table 5: Adverse Reactions Observed in at Least 10% of Patients Treated with ABECMA in the KarMMa Study

System Organ Class Preferred Term	Target Dose of ABECMA (CAR-Positive T Cells)	
	Any Grade	Grade 3 or Higher
	[150 to 450 x 10 ⁶] (N=127) %	[150 to 450 x 10 ⁶] (N=127) %
Pneumonia ^g	17	9
Upper respiratory tract infection ^h	34	1.6
Investigations		
Weight decreased	13	1.6
Metabolism and nutrition disorders		
Decreased appetite ⁱ	22	0.8
Musculoskeletal and connective tissue disorders		
Musculoskeletal pain ^j	45	3.1
Motor dysfunction ^k	11	0
Nervous system disorders		
Encephalopathy ^l	26	6
Headache ^m	23	0
Dizziness ⁿ	17	0.8
Neuropathy peripheral ^o	17	0.8
Tremor ^p	10	0
Psychiatric disorders		
Insomnia ^q	13	0
Anxiety ^r	12	0.8
Renal and urinary disorders		
Renal failure ^s	10	2.4
Respiratory, thoracic, and mediastinal disorders		
Cough ^t	23	0
Dyspnea ^u	13	2.4

Table 5: Adverse Reactions Observed in at Least 10% of Patients Treated with ABECMA in the KarMMa Study

System Organ Class Preferred Term	Target Dose of ABECMA (CAR-Positive T Cells)	
	Any Grade	Grade 3 or Higher
	[150 to 450 x 10 ⁶] (N=127) %	[150 to 450 x 10 ⁶] (N=127) %
Skin and subcutaneous tissue disorder		
Rash ^v	14	0.8
Xerosis ^w	11	0
Vascular disorders		
Hypotension ^x	17	0
Hypertension	11	3.1

CAR=chimeric antigen receptor.

^a Tachycardia includes sinus tachycardia, tachycardia.

^b Oral pain includes oral pain, oropharyngeal pain, toothache.

^c Fatigue includes asthenia, fatigue, malaise.

^d Edema includes edema, face edema, fluid overload, fluid retention, generalized edema, peripheral edema, peripheral swelling, scrotal swelling, swelling.

^e Hypogammaglobulinemia includes patients with adverse events (21%) of blood immunoglobulin G decreased, hypogammaglobulinemia, hypoglobulinemia; and/or patients with laboratory IgG levels below 500 mg/dL following ABECMA infusion (25%).

^f Infections and infestations System Organ Class Adverse Events are grouped by pathogen type and selected clinical syndromes.

^g Pneumonia includes bronchopulmonary aspergillosis, lung infection, pneumonia, pneumonia aspiration, pneumonia cytomegaloviral, pneumonia pneumococcal, pneumonia pseudomonal. Pneumonias may also be included under pathogen categories.

^h Upper respiratory tract infection includes laryngitis, nasopharyngitis, pharyngeal erythema, pharyngitis, respiratory tract congestion, respiratory tract infection, rhinitis, rhinovirus infection, sinusitis, upper respiratory tract infection, upper respiratory tract infection bacterial. Upper respiratory tract infections may also be included under pathogen categories.

ⁱ Decreased appetite includes decreased appetite, hypophagia.

^j Musculoskeletal pain includes arthralgia, back pain, bone pain, musculoskeletal chest pain, musculoskeletal discomfort, musculoskeletal pain, musculoskeletal stiffness, myalgia, neck pain, spinal pain.

^k Motor dysfunction includes dysphonia, eyelid ptosis, hypotonia, motor dysfunction, muscle spasms, muscular weakness, restless legs syndrome.

^l Encephalopathy includes amnesia, bradyphrenia, cognitive disorder, confusional state, depressed level of consciousness, disturbance in attention, dyscalculia, dysgraphia, encephalopathy, lethargy, memory impairment, mental status changes, metabolic encephalopathy, somnolence, toxic encephalopathy.

^m Headache includes headache, head discomfort, sinus headache.

ⁿ Dizziness includes dizziness, presyncope, syncope, vertigo.

^o Neuropathy peripheral includes carpal tunnel syndrome, hypoesthesia, hypoesthesia oral, neuralgia, neuropathy peripheral, paresthesia, peripheral sensorimotor neuropathy, peripheral sensory neuropathy, sciatica.

^p Tremor includes asterixis, tremor.

^q Insomnia includes insomnia, sleep deficit, sleep disorder.

- ^r Anxiety includes anxiety, feeling jittery, nervousness.
- ^s Renal failure includes acute kidney injury, blood creatinine increased, chronic kidney disease, renal failure, renal impairment.
- ^t Cough includes cough, productive cough, upper-airway cough syndrome.
- ^u Dyspnea includes acute respiratory failure, dyspnea, dyspnea exertional, respiratory failure.
- ^v Rash includes acne, dermatitis, dermatitis bullous, erythema, rash, rash macular, rash papular, urticaria.
- ^w Xerosis includes dry eye, dry mouth, dry skin, lip dry, xerosis.
- ^x Hypotension includes hypotension, orthostatic hypotension.

Other clinically important adverse reactions that occurred in less than 10% of patients treated with ABECMA include the following:

- *Blood and lymphatic system disorders*: coagulopathy^a (9%)
- *Cardiac disorders*: atrial fibrillation (4.7%), cardiomyopathy^b (1.6%)
- *Gastrointestinal disorders*: gastrointestinal hemorrhage^c (3.1%)
- *Immune system disorders*: hemophagocytic lymphohistiocytosis (3.1%)
- *Infections and infestations*: fungal infections (8%), sepsis^d (9%)
- *Nervous system disorders*: aphasia^e (7%), ataxia^f (3.1%), paresis^g (2.4%), seizure (1.6%)
- *Psychiatric disorders*: delirium^h (6%)
- *Respiratory, thoracic, and mediastinal disorders*: hypoxia (2.4%), pulmonary edema (2.4%)
- *Vascular disorders*: thrombosisⁱ (3.1%)

^a Coagulopathy includes activated partial thromboplastin time prolonged, anticoagulation drug level above therapeutic, disseminated intravascular coagulation, international normalized ratio increased.

^b Cardiomyopathy includes stress cardiomyopathy, ventricular hypertrophy.

^c Gastrointestinal hemorrhage includes gastrointestinal hemorrhage, hemorrhoidal hemorrhage, melena.

^d Sepsis includes bacteremia, enterococcal bacteremia, Escherichia bacteremia, sepsis, septic shock, Serratia bacteremia, streptococcal bacteremia.

^e Aphasia includes aphasia, dysarthria.

^f Ataxia includes ataxia, gait disturbance, Romberg test positive.

^g Paresis includes cranial nerve disorder, hemiparesis.

^h Delirium includes delirium, disorientation, hallucination.

ⁱ Thrombosis includes deep vein thrombosis, jugular vein thrombosis, portal vein thrombosis, pulmonary embolism.

Laboratory Abnormalities

Table 6 presents the most common Grade 3 or 4 laboratory abnormalities, based on laboratory data, occurring in at least 10% of patients.

Table 6: Grade 3 or 4^a Laboratory Abnormalities Worsening from Baseline in at Least 10% of Patients Treated with ABECMA in the KarMMa Study

Laboratory Abnormality	Dose=[150 to 450 x 10 ⁶ CAR-Positive T cells] (N=127) %
	Grade 3 or 4 (%)
Neutrophil decreased	96
Leukocyte decreased	96
Lymphocyte decreased	92
Platelet decreased	63
Hemoglobin decreased	63
Phosphate decreased	45
Sodium decreased	10
aPTT increased (seconds)	10

^a NCI CTCAE=Common Terminology Criteria for Adverse Events version 4.03.

aPTT=activated partial thromboplastin time; CAR=chimeric antigen receptor; CTCAE=Common Terminology Criteria for Adverse Events; NCI=National Cancer Institute.

Laboratory tests were graded according to NCI CTCAE Version 4.03. Laboratory abnormalities are sorted by decreasing frequency in the 150 to 450 × 10⁶ column.

Other clinically important Grade 3 or 4 laboratory abnormalities (based on laboratory data) that occurred in less than 10% of patients treated with ABECMA include the following: alanine aminotransferase increased, aspartate aminotransferase increased, albumin decreased, alkaline phosphatase increased, glucose increased, potassium decreased, bilirubin increased, fibrinogen decreased, and calcium decreased.

6.2 Immunogenicity

ABECMA has the potential to induce anti-product antibodies. In clinical studies, humoral immunogenicity of ABECMA was measured by determination of anti-CAR antibody in serum pre- and post-administration. In the clinical studies, 2.6% of patients (9/349) tested positive for pre-infusion anti-CAR antibodies and treatment-induced anti-CAR antibodies were detected in 53% (186/349) of the patients. There is no identified clinically significant impact of pre-existing or post-infusion anti-CAR antibodies on the cellular expansion, safety, or effectiveness of ABECMA.

6.3 Postmarketing Experience

Because adverse events to marketed products are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to product exposure.

The following adverse event has been identified during postmarketing use of ABECMA:

Nervous system disorders: Immune effector cell-associated neurotoxicity syndrome (ICANS).

The following adverse event has been identified during postmarketing use of BCMA- or CD19-directed genetically modified autologous T cell immunotherapies:

Neoplasms: T cell malignancies.

7 DRUG INTERACTIONS

Drug/Laboratory Test Interactions

HIV and the lentivirus used to make ABECMA have limited, short spans of identical genetic material (RNA). Therefore, some commercial HIV nucleic acid tests may yield false-positive results in patients who have received ABECMA.

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Risk Summary

There are no available data with ABECMA use in pregnant women. No animal reproductive and developmental toxicity studies have been conducted with ABECMA to assess whether it can cause fetal harm when administered to a pregnant woman.

It is not known if ABECMA has the potential to be transferred to the fetus. Based on the mechanism of action, if the transduced cells cross the placenta, they may cause fetal toxicity, including plasma cell aplasia or hypogammaglobulinemia. Therefore, ABECMA is not recommended for women who are pregnant, and pregnancy after ABECMA infusion should be discussed with the treating physician. Assess immunoglobulin levels in newborns of mothers treated with ABECMA.

The estimated background risk of major birth defects and miscarriage for the indicated population is unknown. The estimated background risk in the U.S. general population of major birth defects is 2% to 4% and of miscarriage is 15% to 20% of clinically recognized pregnancies.

8.2 Lactation

Risk Summary

There is no information regarding the presence of ABECMA in human milk, the effect on the breastfed infant, and the effects on milk production. The developmental and health benefits of breastfeeding should be considered along with the mother's clinical need for ABECMA and any potential adverse effects on the breastfed infant from ABECMA or from the underlying maternal condition.

8.3 Females and Males of Reproductive Potential

Pregnancy Testing

Pregnancy status of sexually active females with reproductive potential should be verified via pregnancy testing prior to starting treatment with ABECMA.

Contraception

See the prescribing information for fludarabine and cyclophosphamide for information on the need for effective contraception in patients who receive the lymphodepleting chemotherapy.

There are insufficient exposure data to provide a recommendation concerning duration of contraception following treatment with ABECMA.

Infertility

There are no data on the effect of ABECMA on fertility.

8.4 Pediatric Use

The safety and efficacy of ABECMA in patients under 18 years of age have not been established.

8.5 Geriatric Use

In the clinical trials of ABECMA, 141 (40%) of the 349 patients were 65 years of age or older and 16/349 (4.6%) patients were 75 years of age or older. In KarMMA study, all five cases of Grade 3 neurotoxicity occurred in patients \geq 65 years of age (66 to 74 years). No clinically important differences in effectiveness of ABECMA were observed between these patients and patients younger than 65 years of age.

11 DESCRIPTION

ABECMA is a BCMA-directed genetically modified autologous T cell immunotherapy product consisting of a patient's own T cells that are harvested and genetically modified *ex vivo* through transduction with an anti-BCMA02 chimeric antigen receptor (CAR) lentiviral vector (LVV). Autologous T cells transduced with the anti-BCMA02 CAR LVV express the anti-BCMA CAR on the T cell surface. The CAR is comprised of a murine extracellular single-chain variable fragment (scFv) specific for recognizing B cell maturation antigen (BCMA) followed by a human CD8 α hinge and transmembrane domain fused to the T cell cytoplasmic signaling domains of CD137 (4-1BB) and CD3 ζ chain, in tandem. Binding of ABECMA to BCMA-expressing target cells leads to signaling initiated by CD3 ζ and 4-1BB domains, and subsequent CAR-positive T cell activation. Antigen-specific activation of ABECMA results in CAR-positive T cell proliferation, cytokine secretion, and subsequent cytolytic killing of BCMA-expressing cells.

ABECMA is prepared from the patient's peripheral blood mononuclear cells (PBMCs), which are obtained via a standard leukapheresis procedure. The mononuclear cells are enriched for T cells, through activation with anti-CD3 and anti-CD28 antibodies in the presence of IL-2, which are then transduced with the replication-incompetent lentiviral vector containing the anti-BCMA CAR transgene. The transduced T cells are expanded in cell culture, washed, formulated into a suspension, and cryopreserved. The product must pass a sterility test before release for shipping as a frozen suspension in one or more patient-specific infusion bag(s). The product is thawed prior to infusion back into the patient [*see Dosage and Administration (2.3) and How Supplied/Storage and Handling (16)*].

The ABECMA formulation contains 50% Plasma-Lyte A and 50% CryoStor[®] CS10, resulting in a final DMSO concentration of 5%.

12 CLINICAL PHARMACOLOGY

12.1 Mechanism of Action

ABECMA is a chimeric antigen receptor (CAR)-positive T cell therapy targeting B-cell maturation antigen (BCMA), which is expressed on the surface of normal and malignant plasma cells. The CAR construct includes an anti-BCMA scFv-targeting domain for antigen specificity, a transmembrane domain, a CD3-zeta T cell activation domain, and a 4-1BB costimulatory domain. Antigen-specific activation of ABECMA results in CAR-positive T cell proliferation, cytokine secretion, and subsequent cytolytic killing of BCMA-expressing cells.

12.2 Pharmacodynamics

Following ABECMA infusion, pharmacodynamic responses of CAR activation and anti-tumor efficacy were evaluated. Peak elevation of plasma cytokines, chemokines, and soluble immune mediators occurred within 14 days of ABECMA infusion and returned to baseline levels within one month.

Rapid decreases in tumor markers associated with clinical response, including serum levels of soluble BCMA, and bone marrow CD138+ cells, as well as minimal residual disease (MRD) negative responses, were observed within the first month following ABECMA infusion.

12.3 Pharmacokinetics

Following ABECMA infusion, the CAR-positive T cells proliferate and undergo rapid multi-log expansion followed by a bi-exponential decline. The median time of maximal expansion in peripheral blood (T_{max}) occurred 11 days after infusion.

ABECMA can persist in peripheral blood for up to 1 year post-infusion. A summary of T_{max} , $AUC_{0-28days}$, and C_{max} from KarMMa and KarMMa-3 is provided in Table 7.

Table 7: Pharmacokinetic Parameters of ABECMA in Patients with Relapsed/Refractory Multiple Myeloma

Pharmacokinetic Parameter	Summary Statistic	KarMMa Study Total [300 to 460 x 10 ⁶] CAR-Positive T Cells (Quantified by qPCR) ^a	KarMMa-3 Study Total [300 to 510 x 10 ⁶] CAR-Positive T Cells (Quantified by ddPCR) ^b
T_{max} (days)	Median (Range)	11 (7-28) N = 99	11 (4-31) N = 207
C_{max} (copies/mcg)	Geometric mean (geometric CV%)	256,333 (165) N = 99	117,557 (215) N = 207
$AUC_{0-28days}$ (days*copies/mcg)	Geometric mean (geometric CV%)	3,088,455 (190) N = 98	1,098,862 (228) N = 205

$AUC_{0-28days}$ = area under the curve of the transgene level from time of dose to 28 days post-infusion; C_{max} = the maximum transgene level; ddPCR = droplet digital polymerase chain reaction; qPCR = quantitative polymerase chain reaction; PK = pharmacokinetics; T_{max} = time of maximum observed transgene level.

^a The PK parameters of KarMMa study were determined by time course of transgene copies per microgram of DNA extracted from CD3+ sorted cells as quantified by quantitative polymerase chain reaction (qPCR).

^b The PK parameters of KarMMa-3 Study were determined by time course of transgene copies per microgram of DNA extracted from whole blood as quantified by droplet digital PCR (ddPCR).

Note: The PK parameters should not be directly compared between KarMMa and KarMMa-3 due to different primary PK assays used in these two studies.

ABECMA transgene levels were positively associated with objective tumor response (partial response or better). Among patients who received ABECMA in KarMMa, the median C_{max} levels in responders (N = 72) were approximately 4.6-fold higher than the corresponding levels in non-responders (N = 27). Median $AUC_{0-28days}$ in responders (N = 72) was approximately 5.6-fold higher than non-responders (N = 26). Among patients who received ABECMA in KarMMa-3, the median C_{max} levels in responders (N = 172) were approximately 6.5-fold higher compared to the corresponding levels in non-responders (N = 35). Median $AUC_{0-28days}$ in responders (N = 172) was approximately 6.1-fold higher than non-responders (N = 33).

Tocilizumab or Siltuximab and Corticosteroid Use

Some patients required tocilizumab or siltuximab and/or corticosteroid for the management of CRS. ABECMA can continue to expand and persist following tocilizumab or siltuximab or corticosteroid administration [see *Warnings and Precautions (5.2)*].

In KarMMa, patients with CRS treated with tocilizumab had higher ABECMA cellular expansion levels, as measured by 1.3-fold and 1.6-fold higher median C_{max} (N = 67) and $AUC_{0-28days}$ (N = 66), respectively, compared to patients who did not receive tocilizumab (N = 59 for C_{max} and N = 58 for $AUC_{0-28days}$).

Patients with CRS treated with corticosteroids had higher ABECMA cellular expansion levels, as measured by 1.7-fold and 2.2-fold higher median C_{max} (N = 18) and $AUC_{0-28days}$ (N = 18), respectively, compared to patients who did not receive corticosteroids (N = 108 for C_{max} and N = 106 for $AUC_{0-28days}$).

Similar trend was observed in KarMMa-3.

Specific Populations

Geriatric

Age (range: 30 to 81 years) had no significant impact on expansion parameters [see *Use in Special Populations (8.5)*].

Pediatric

The pharmacokinetics of ABECMA in patients less than 18 years of age have not been evaluated.

Patients with Hepatic/Renal Impairment

Hepatic and renal impairment studies of ABECMA were not conducted.

Patients with Other Intrinsic Factors

Gender, race, and ethnicity had no significant impact on ABECMA expansion parameters. Patients with lower body weight had higher expansion. Due to high variability in pharmacokinetic cellular expansion, the overall effect of weight on the pharmacokinetics of ABECMA is considered to be not clinically relevant.

13 NONCLINICAL TOXICOLOGY

13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

Genotoxicity assays and carcinogenicity studies in rodents were not performed for ABECMA.

In vitro expansion studies with CAR-positive T cells (ABECMA) from 5 patients and 2 healthy donor drug product lots showed no evidence for transformation and/or immortalization of T cells. A genomic insertion site analysis of the lentiviral vector was performed on ABECMA samples from twenty (20) individual patient donors. There was no evidence for preferential integration near genes of concern or preferential outgrowth of cells harboring integration sites of concern.

No studies on the effects of ABECMA on fertility have been conducted.

14 CLINICAL STUDIES

Relapsed/Refractory Multiple Myeloma After Two to Four Prior Lines of Therapy

Efficacy of ABECMA was evaluated in KarMMa-3 (NCT03651128), an open-label, multicenter, randomized, controlled study in adult patients with relapsed and refractory multiple myeloma who had received two to four prior antimyeloma therapies including an immunomodulatory agent, a proteasome inhibitor and daratumumab, and were refractory to the most recent prior antimyeloma regimen. The study included patients who achieved a response (minimal response or better) to at least 1 prior treatment regimen and had ECOG performance status of 0 or 1. The study excluded patients with serum creatinine clearance <45 mL/min, serum aspartate aminotransferase (AST) or alanine aminotransferase (ALT) >2.5 times upper limit of normal, and left ventricular ejection fraction (LVEF) <45%. Patients were also excluded if absolute neutrophil count <1000/ μ L and platelet count <75,000/ μ L in patients in whom <50% of bone marrow nucleated cells are plasma cells and platelet count <50,000/ μ L in patients in whom \geq 50% of bone marrow nucleated cells are plasma cells.

In total, 386 patients were randomized 2:1 to receive either ABECMA (N=254) or standard regimens (N=132). The standard regimens consisted of daratumumab, pomalidomide, dexamethasone [DPd], daratumumab, bortezomib, dexamethasone [DVd], ixazomib, lenalidomide, dexamethasone [IRd], carfilzomib, dexamethasone [Kd], or elotuzumab, pomalidomide, dexamethasone [EPd]), selected by Investigator prior to randomization contingent upon the patient's most recent antimyeloma treatment. Randomization was stratified by age, number of prior antimyeloma regimens, and presence of high-risk cytogenetics abnormalities.

Patients randomized to ABECMA were to receive lymphodepleting chemotherapy consisting of cyclophosphamide (300 mg/m² IV infusion daily for 3 days) and fludarabine (30 mg/m² IV infusion daily for 3 days) starting 5 days prior to the target infusion date of ABECMA. Up to 1 cycle of DPd, DVd, IRd, Kd or EPd bridging therapy, dependent on the patient's most recent antimyeloma treatment regimen, was permitted for disease control between apheresis and until 14 days before the start of lymphodepleting chemotherapy.

Of the 254 patients randomized to receive ABECMA, 249 (98%) patients underwent leukapheresis:

- Five (2%) patients did not receive leukapheresis due to patient withdrawal (n=2), adverse event (n=1) or failure to meet lymphodepleting chemotherapy treatment criteria (n=2).
- Twenty-four (10%) patients did not receive ABECMA either due to death (n=4), adverse event (n=4), physician decision (n=7), failure to meet lymphodepleting chemotherapy treatment criteria (n=6) or inability to manufacture product (n=3).
- Three (1.2%) patients received CAR-positive T cells that did not meet product release specifications for ABECMA (non-conforming product; n=3).

The overall manufacturing failure rate for patients who underwent leukapheresis was 2.4% (6 out of 249 patients). Of these 6 patients, 3 received CAR positive T cells that did not meet product release specifications for ABECMA, and in 3 patients there was an inability to manufacture ABECMA.

Most patients (85%) treated with ABECMA received bridging therapy for control of their multiple myeloma during the manufacturing process. The median time from leukapheresis to product availability was 35 days (range: 24 to 102 days).

In overall study population, the median age was 63 years (range: 30 to 83 years), 61% were male, 65% were white, 9.3% were black and 3.1% were Asian. Most patients (80%) were Revised International Staging System

(R-ISS) Stage I or II. High-risk cytogenetics [presence of t(4:14), (14:16), and 17p13 del] were present in 42% of patients. Twenty-four percent of patients had presence of extramedullary disease.

The median number of prior lines of therapy was 3 (range: 2 to 4). Thirty percent had received 2 prior lines, 37% had received 3 prior lines of therapy and 32% had received 4 prior lines of therapy. Ninety-five percent were refractory to an anti-CD38 monoclonal antibody. Sixty-six percent were triple class refractory (refractory to a PI, an IMiD and an anti-CD38 monoclonal antibody), and 5% were penta-drug-refractory (refractory to 2 PIs, 2 IMiD agents, and an anti-CD38 monoclonal antibody). Eighty-five percent of patients had received prior autologous stem cell transplantation.

The primary efficacy measure was progression free survival (PFS) as determined by Independent Review Committee (IRC) based on the International Myeloma Working Group (IMWG) Uniform Response Criteria² for Multiple Myeloma. Other efficacy measures included overall response rate (ORR) and overall survival (OS). Efficacy results are summarized in Table 8, and Kaplan-Meier curve for PFS is provided in Figure 2.

The estimated median duration of follow-up at the primary PFS analysis was 15.9 months (95% CI: 14.1, 18.0).

Table 8: Summary of Efficacy Results from KarMMA-3 (Intent-to-Treat Population)

	ABECMA Arm (N=254)	Standard Regimens Arm (N=132)
Progression Free Survival (PFS)		
Number of events, n (%)	149 (59)	93 (70)
Median, months [95% CI] ^a	13.3 [11.8, 16.1]	4.4 [3.4, 5.9]
Hazard Ratio [95% CI] ^b	0.49 [0.38, 0.64]	
One-sided p-value ^c	< 0.0001	
Overall Response Rate (ORR), n (%)		
n (%)	181 (71)	55 (42)
95% CI (%) ^d	(66, 77)	(33, 50)
One-sided p-value ^e	< 0.0001	
CR or better (sCR+CR)	98 (39)	7 (5)
sCR	90 (35)	6 (4.5)
CR	8 (3.1)	1 (0.8)
VGPR	55 (22)	13 (10)
PR	28 (11)	35 (27)

CI=confidence interval; CR=complete response; MRD=minimal residual disease; PR=partial response; sCR=stringent complete response; VGPR=very good partial response.

^a Kaplan-Meier estimate.

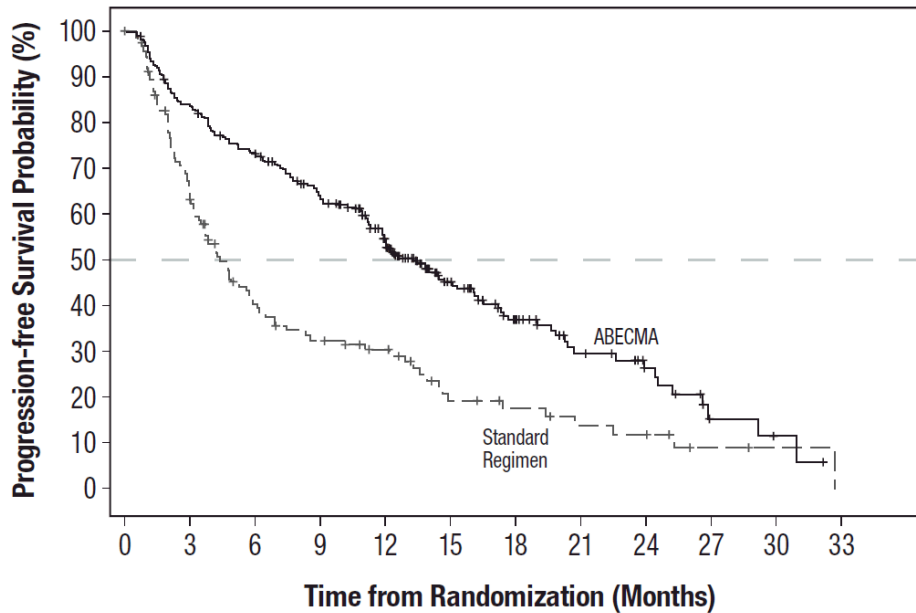
^b Based on stratified univariate Cox proportional hazards model.

^c One-sided p-value is based on stratified log-rank test.

^d Two-sided Wald confidence interval.

^e One-sided p-value from Cochran-Mantel-Haenszel (CMH) test stratified by stratification factors.

Figure 2: Kaplan-Meier Plot of IRC-Assessed Progression Free Survival (Intent-to-Treat Analysis)



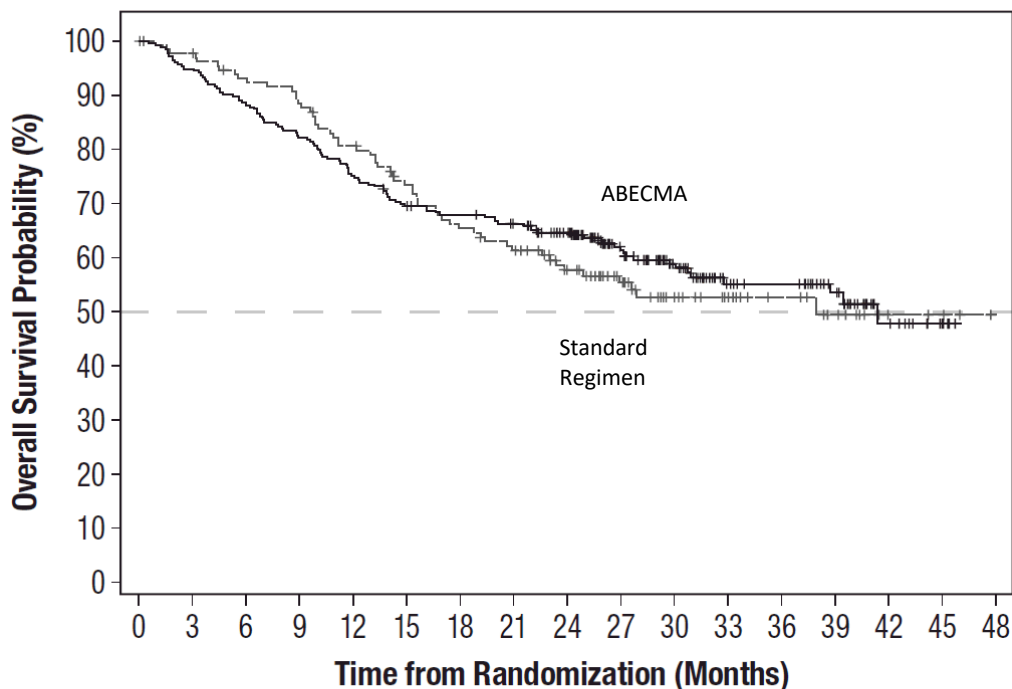
Number at Risk												
	0	3	6	9	12	15	18	21	24	27	30	33
ABECMA	254	206	178	149	110	62	40	22	14	4	2	0
Standard Regimen	132	75	42	32	25	13	10	7	6	2	1	0

Data cutoff date: April 18, 2022

In the ABECMA arm, the median duration of response (DOR) was 14.8 months (95% CI: 12.0, 18.6) in patients with partial response (PR) or better. In those patients with CR or better, the median DOR was 20 months (95% CI: 15.8, 24.3).

A higher proportion of patients in the ABECMA arm compared to the standard regimen’s arm died within the first 9 months of randomization as shown in Figure 3.

Figure 3: Kaplan-Meier Plot of Overall Survival (Intent-to-Treat Analysis) at Second Interim Analysis



Patients at Risk

ABECMA	254	240	223	208	190	175	169	161	143	103	75	48	44	30	13	4	0
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Standard Regimen	132	128	120	114	103	91	81	75	59	45	32	24	18	11	4	3	0
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Data cutoff date: April 28, 2023.

74% of the planned OS events have occurred. 74 patients (56%) crossed over from the standard regimens arm to the ABECMA arm. The OS curves cross at Month 15 of the study rendering the overall hazard ratio unreliable to estimate the treatment effect on OS.

Relapsed/Refractory Multiple Myeloma After Three or More Prior Lines of Therapy

Efficacy of ABECMA was evaluated in KarMMa (NCT03361748), an open-label, single-arm, multicenter study in adult patients with relapsed and refractory multiple myeloma who had received at least 3 prior lines of antimyeloma therapy including an immunomodulatory agent, a proteasome inhibitor, and an anti-CD38 monoclonal antibody. The study included patients with ECOG performance status of 0 or 1. The study excluded patients with a creatinine clearance of less than or equal to 45 mL/minute, alanine aminotransferase >2.5 times upper limit of normal, and left ventricular ejection fraction <45%. Patients were also excluded if absolute neutrophil count <1000 cells/mm³ and platelet count <50,000/mm³. Patients had measurable disease by IMWG 2016 criteria at enrollment. Bridging therapy with alkylating agents, corticosteroids, immunomodulatory agents, proteasome inhibitors, and/or anti-CD38 monoclonal antibodies to which patients were previously exposed was permitted for disease control between apheresis and until 14 days before the start of lymphodepleting chemotherapy.

Lymphodepleting chemotherapy consisted of cyclophosphamide (300 mg/m² IV infusion daily for 3 days) and fludarabine (30 mg/m² IV infusion daily for 3 days) starting 5 days prior to the target infusion date of ABECMA. Fludarabine was dose reduced for renal insufficiency. Patients were hospitalized for 14 days after ABECMA infusion to monitor for potential CRS, HLH/MAS, and neurotoxicity.

Of the 135 patients who underwent leukapheresis for 300×10^6 and 450×10^6 CAR-positive T cell dose cohorts:

- 11 (8%) did not receive the CAR-positive T cells either due to death (n=2), adverse event (n=1), disease progression (n=1), consent withdrawal (n=3), physician decision (n=3), or inability to manufacture product [manufacturing failure (n=1)]. Two patients died after receiving lymphodepletion and prior to receiving ABECMA. Deaths were from septic shock and general physical health deterioration.
- 24 (18%) either received ABECMA outside of the 300 to 460×10^6 CAR-positive T cells dose range (n=23) or received CAR-positive T cells that did not meet product release specifications for ABECMA (non-conforming product; n=1).
- The efficacy evaluable population consists of the 100 patients (74%) who received ABECMA in the dose range of 300 to 460×10^6 CAR-positive T cells.

The overall manufacturing failure rate for patients who underwent leukapheresis for the 300×10^6 and 450×10^6 CAR-positive T cell dose cohorts was 1.5% (2 out of 135 patients). Of these 2 patients, one received CAR-positive T cells that did not meet product release specifications for ABECMA, and in one patient there was an inability to manufacture ABECMA.

Of the 100 patients in the efficacy evaluable population, the median age was 62 years (range: 33 to 78 years), 60% were male, 78% were white, 6% were black, and 2% were Asian. Most patients (78%) were International Staging System (ISS) Stage I or II. High-risk cytogenetics (presence of t(4:14), t(14:16), and 17p13 del) were present in 37% of patients. Thirty-six percent of the patients had presence of extramedullary disease.

The median number of prior lines of therapy was 6 (range: 3 to 16), and 88% of the patients received 4 or more prior lines of therapy. Ninety-five percent of the patients were refractory to an anti-CD38 monoclonal antibody. Eighty-five percent were triple class refractory (refractory to a proteasome inhibitor [PI], an immunomodulatory drug [IMiD], and an anti-CD38 monoclonal antibody), and 26% were penta-refractory (refractory to 2 PIs, 2 IMiD agents, and an anti-CD38 monoclonal antibody). Ninety-two percent had received prior autologous stem cell transplantation.

Most patients (87%) treated with ABECMA received bridging therapy for control of their multiple myeloma during the manufacturing process. The median time from leukapheresis to product availability was 33 days (range: 26 to 49 days).

Efficacy was established on the basis of overall response rate (ORR), complete response (CR) rate, and duration of response (DOR), as assessed by the Independent Response committee (IRC) based on the International Myeloma Working Group (IMWG) Uniform Response Criteria for Multiple Myeloma.

Efficacy results for the dose range of 300 to 460×10^6 CAR-positive T cells are shown in Table 9 and Table 10, and the DOR results are shown in Table 11. The median time to first response was 30 days (range: 15 to 88 days).

Table 9: Summary of Efficacy Based on Independent Response Committee Review According to IMWG Criteria (KarMMa Study)

	ABECMA-Treated Population (300 to 460 x 10⁶ CAR-Positive T Cells) N=100
Overall Response Rate (sCR ^a +VGPR+PR), n (%)	72 (72)
95% CI ^b (%)	62, 81
sCR^a , n (%)	28 (28)
95% CI ^b (%)	19, 38
VGPR , n (%)	25 (25)
95% CI ^b (%)	17, 35
PR , n (%)	19 (19)
95% CI ^b (%)	12, 28

CAR=chimeric antigen receptor; CI=confidence interval; CR=complete response; MRD=Minimal Residual Disease; IMWG=International Myeloma Working Group; PR=partial response; sCR=stringent complete response; VGPR=very good partial response.

^a All complete responses were stringent CRs.

^b Clopper-Pearson exact CI.

Table 10: MRD Negativity Rate in the KarMMa Study

MRD ^c -negativity rate ^a in all treated patients (n=100)	21 (21)
95% CI ^b (%)	13, 30
MRD ^c -negativity rate ^a in patients achieving CR or sCR status (%) (n=28)	21 (75)
95% CI ^b	55, 89

^a MRD negativity was defined as the proportion of patients with CR or stringent CR who are MRD negative at any timepoint within 3 months prior to achieving CR or stringent CR until the time of progression or death.

^b Clopper-Pearson exact CI.

^c Based on a threshold of 10⁻⁵ using ClonoSEQ, a next-generation sequencing assay (NGS).

Table 11: Duration of Response in the KarMMa Study

	ABECMA-Treated Population (300 to 460 x 10⁶ CAR-Positive T Cells) N=100
Duration of Response ^{a,b} (PR or Better)	
n	72
Median (months)	11.0
95% CI	10.3, 11.4
Duration of Response ^b for sCR	
n	28
Median (months)	19.0
95% CI	11.4, NE
Median follow-up for duration of response (DOR)	10.7 months

CAR=chimeric antigen receptor; CI=confidence interval; CR=complete response; PR=partial response; sCR=stringent complete response; VGPR=very good partial response; NE=not estimable.

^a Response is defined as achieving sCR, CR, VGPR, or PR according to IMWG criteria.

^b Median and 95% CI are based on Kaplan-Meier estimation.

Response durations were longer in patients who achieved a stringent CR as compared to patients with a PR or VGPR (Table 11). Of the 28 patients who achieved a stringent CR, it is estimated that 65% (95% CI: 42%, 81%) had a remission lasting at least 12 months.

The median duration of response for VGPR patients (n=25) was 11.1 months (95% CI: 8.7, 11.3).

The median duration of response for PR patients (n=19) was 4.0 months (95% CI: 2.7, 7.2).

Within the recommended dose of 300 to 460 x 10⁶ CAR-positive T cells, a dose-response relationship was observed with higher ORR and sCR rate in patients who received 440 to 460 x 10⁶ compared to 300 to 340 x 10⁶ CAR-positive T cells. Overall response rate of 79% (95% CI: 65%, 90%) and sCR rate of 31% (95% CI: 19%, 46%) was observed with 440 to 460 x 10⁶ CAR-positive T cells. Overall response rate of 65% (95% CI: 51%, 78%) with sCR rate of 25% (95% CI: 14%, 39%) was observed in 300 to 340 x 10⁶ CAR-positive T cells.

One hundred and thirty-five patients underwent leukapheresis. Fifteen out of the 23 patients who received treatment outside of the recommended dose range of 300 to 460 x 10⁶ CAR-positive T cells experienced a response in addition to the responses noted in Table 9. The IRC assessed overall response in the leukapheresis population (n=135) was 64% (95% CI: 56%, 72%) with stringent CR rate of 24% (95% CI: 17%, 32%), VGPR rate of 21% (95% CI: 14%, 29%), and PR rate of 20% (95% CI: 14%, 28%).

15 REFERENCES

1. Lee DW, Gardner R, Porter DL, et al. Current concepts in the diagnosis and management of cytokine release syndrome. *Blood* 2014; 124(2): 188-95. Errata in *Blood*: 2015;126(8):1048. and 2016;128(11):1533.
2. Kumar S, Paiva B, Anderson KC, et al. International Myeloma Working Group consensus criteria for response and minimal residual disease assessment in multiple myeloma. *Lancet Oncol* 2016; 17(8): e328-46.

16 HOW SUPPLIED/STORAGE AND HANDLING

ABECMA is supplied in one or more infusion bag(s) (see below) containing a frozen suspension of genetically modified autologous T cells in 5% DMSO.

Each infusion bag of ABECMA is individually packed in a metal cassette. ABECMA is stored in the vapor phase of liquid nitrogen and supplied in a liquid nitrogen dry vapor shipper. An RFI Certificate is affixed inside the shipper.

- 50 mL infusion bag and metal cassette (NDC 59572-515-01)
- 250 mL infusion bag and metal cassette (NDC 59572-515-02)
- 500 mL infusion bag and metal cassette (NDC 59572-515-03)

Match the identity of the patient with the patient identifiers on the cassette(s) and infusion bag(s) upon receipt.

Store ABECMA frozen in the vapor phase of liquid nitrogen (less than or equal to minus 130°C).

Thaw ABECMA prior to infusion [*see Dosage and Administration (2.2)*].

17 PATIENT COUNSELING INFORMATION

Advise the patient to read the FDA-approved patient labeling (Medication Guide).

Advise patients that the risk of manufacturing failure is 2.1% [8/384 in the clinical studies]. In case of a manufacturing failure, a second manufacturing of ABECMA may be attempted. In addition, while the patient awaits the product, additional anticancer treatment (not the lymphodepletion) may be necessary and may increase the risk of adverse events during the pre-infusion period, which could delay or prevent the administration of ABECMA.

Inform patients of the risk of early death: In a clinical study, a higher proportion of patients experienced death within the first 9 months from randomization in the ABECMA arm compared to the standard regimens arm. This higher rate of early death was mainly observed before receiving ABECMA with the main reason being progression of multiple myeloma. There was also an increase in the rate of death from adverse events after ABECMA.

Advise patients to seek immediate attention for any of the following:

- **Cytokine Release Syndrome (CRS):** Signs or symptoms associated with CRS, including fever, hypotension, tachycardia, chills, hypoxia, headache, and fatigue [*see Dosage and Administration (2.3), Warnings and Precautions (5.2), and Adverse Reactions (6.1)*].
- **Neurologic Toxicities:** Signs or symptoms associated with neurologic events, including encephalopathy, confusion, seizures, tremor, aphasia, delirium, and somnolence [*see Dosage and Administration (2.3), Warnings and Precautions (5.3), and Adverse Reactions (6.1)*].

- **Infections:** Signs or symptoms associated with infection [*see Warnings and Precautions (5.7) and Adverse Reactions (6.1)*].
- **Prolonged Cytopenias:** Signs or symptoms associated with bone marrow suppression, including neutropenia, anemia, thrombocytopenia, or febrile neutropenia [*see Warnings and Precautions (5.8) and Adverse Reactions (6.1)*].
- **Secondary malignancies:** Secondary malignancies, including T cell malignancies, have occurred [*see Boxed Warning, Warnings and Precautions (5.10), Adverse Reactions (6.3)*].

Advise patients for the need to:

- Contact Bristol-Myers Squibb at 1-888-805-4555 if they are diagnosed with a secondary malignancy [*see Warnings and Precautions (5.10)*].
- Have periodic monitoring of blood counts before and after ABECMA infusion [*see Warnings and Precautions (5.8)*].
- Refrain from driving or operating heavy or potentially dangerous machines until at least 8 weeks after ABECMA administration [*see Warnings and Precautions (5.11)*].

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Pat. <https://www.bms.com/patient-and-caregivers/our-medicines.html>

ABEPI.003/MG.002

MEDICATION GUIDE
ABECMA® (uh-BEK-muh)
(idecabtagene vicleucel)

Read this Medication Guide before you start your ABECMA treatment. The more you know about your treatment, the more active you can be in your care. Talk with your healthcare provider if you have questions about your health condition or treatment. Reading this Medication Guide does not take the place of talking with your healthcare provider about your treatment.

What is the most important information I should know about ABECMA?

ABECMA may cause side effects that are life-threatening and can lead to death. Call your healthcare provider or get emergency help right away if you get any of the following:

- difficulty breathing
- fever (100.4°F/38°C or higher)
- chills/shivering
- confusion
- dizziness or lightheadedness
- shaking or twitching (tremor)
- fast or irregular heartbeat
- severe fatigue
- severe nausea, vomiting, diarrhea

It is important that you tell your healthcare providers that you have received ABECMA and to show them your ABECMA Patient Wallet Card. Your healthcare provider may give you other medicines to treat your side effects.

What is ABECMA?

ABECMA is for the treatment of multiple myeloma in patients who have received at least two kinds of treatment regimens that have not worked or have stopped working. ABECMA is a medicine made from your own white blood cells; the cells are genetically modified to recognize and attack your multiple myeloma cells.

How will I receive ABECMA?

ABECMA is made from your own white blood cells, so your blood will be collected by a process called "leukapheresis" (LOO-kuh-feh-REE-sis).

Your blood cells will be sent to a manufacturing center to make your ABECMA. Based on clinical trial experience, it takes about 4 weeks from the time your cells are received at the manufacturing site and are available to be shipped back to your healthcare provider, but the time may vary.

Before you get ABECMA, your healthcare provider will give you chemotherapy for 3 days to prepare your body.

When your ABECMA is ready, your healthcare provider will give ABECMA to you through a catheter (tube) placed into your vein (intravenous infusion). Your dose of ABECMA may be given in one or more infusion bags. The infusion usually takes up to 30 minutes for each infusion bag.

You will be monitored at the certified healthcare facility where you received your treatment daily for at least 7 days after the infusion.

You should plan to stay within 2 hours of this location for at least 4 weeks after getting ABECMA. Your healthcare provider will check to see that your treatment is working and help you with any side effects that may occur.

What should I avoid after receiving ABECMA?

- Do not drive, operate heavy machinery, or do other activities that could be dangerous if you are not mentally alert, for at least 8 weeks after you get ABECMA. This is because the treatment can cause temporary memory and coordination problems, sleepiness, confusion, dizziness, and seizures.
- Do not donate blood, organs, tissues, or cells for transplantation.

What are the possible or reasonably likely side effects of ABECMA?

The most common side effects of ABECMA are:

- fatigue
- fever (100.4°F/38°C or higher)
- chills/shivering
- severe nausea or diarrhea
- decreased appetite
- headache
- dizziness/lightheadedness
- confusion
- difficulty speaking or slurred speech
- cough
- difficulty breathing
- fast or irregular heartbeat

In a study comparing ABECMA to standard regimen, a higher proportion of patients experienced death within the first 9 months from randomization in the ABECMA arm compared to the standard regimens arm. This higher rate of early death was mainly observed before receiving ABECMA with the main reason being progression of multiple myeloma. There was also an increase in the rate of death from adverse events after ABECMA.

ABECMA can cause a very common side effect called cytokine release syndrome or CRS, which can be severe or fatal. Symptoms of CRS include fever, difficulty breathing, dizziness or light-headedness, nausea, headache, fast heartbeat, low blood pressure, or fatigue. Tell your healthcare provider right away if you develop fever or any of these other symptoms after receiving ABECMA.

ABECMA can increase the risk of life-threatening infections that may lead to death. Tell your healthcare provider right away if you develop fever, chills, or any signs or symptoms of an infection.

ABECMA can lower one or more types of your blood cells (red blood cells, white blood cells, or platelets), which may make you feel weak or tired or increase your risk of severe infection or bleeding. After treatment, your healthcare provider will test your blood to check for this. Tell your healthcare provider right away if you get a fever, are feeling tired, or have bruising or bleeding.

ABECMA may increase your risk of getting cancers including certain types of blood cancers. Your healthcare provider should monitor you for this.

Having ABECMA in your blood may cause a false-positive human immunodeficiency virus (HIV) test result by some commercial tests.

These are not all the possible side effects of ABECMA. Call your doctor for medical advice about side effects. You may report side effects to FDA at 1-800-FDA-1088.

General information about the safe and effective use of ABECMA

Medicines are sometimes prescribed for purposes other than those listed in a Medication Guide. If you would like more information about ABECMA, talk with your healthcare provider. You can ask your healthcare provider for information about ABECMA that is written for health professionals.

For more information, go to ABECMA.com or call 1-888-805-4555.

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This Medication Guide has been approved by the U.S. Food and Drug Administration.

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