

CENTER FOR DRUG EVALUATION AND RESEARCH

APPLICATION NUMBER: NDA 21174

FINAL PRINTED LABELING

1 **3.1 Proposed Text of Labeling for the Drug - Annotated**
2 **Mylotarg™ (gemtuzumab ozogamicin for Injection)**

3 **FOR INTRAVENOUS USE ONLY**

4 **WARNINGS**

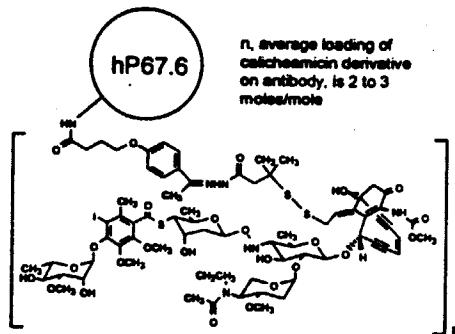
5 Mylotarg should be administered under the supervision of a physician who is experienced in
6 the use of cancer chemotherapeutic agents.

7 Severe myelosuppression occurs when Mylotarg is used at recommended doses.

8 **DESCRIPTION**

9 Mylotarg™ (gemtuzumab ozogamicin for Injection) is a chemotherapy agent composed of a
10 recombinant humanized IgG₄, kappa antibody conjugated with a cytotoxic antitumor
11 antibiotic, calicheamicin, isolated from fermentation of a bacterium, *Micromonospora*
12 *echinospora* sp. *calichensis*. The antibody portion of Mylotarg binds specifically to the
13 CD33 antigen, a sialic acid-dependent adhesion protein found on the surface of leukemic
14 myeloblasts and immature normal cells of myelomonocytic lineage, but not on normal
15 hematopoietic stem cells.

16 The anti-CD33 hP67.6 antibody is produced by mammalian cell suspension culture using a
17 myeloma NS0 cell line and is purified under conditions which remove or inactivate viruses.
18 Three separate and independent steps in the hP67.6 antibody purification process achieve
19 retrovirus inactivation and removal. These include low pH treatment, DEAE-Sepharose
20 chromatography, and viral filtration. Mylotarg contains amino acid sequences of which
21 approximately 98.3% are of human origin. The constant region and framework regions
22 contain human sequences while the complementarity-determining regions are derived from a
23 murine antibody (p67.6) that binds CD33. This antibody is linked to N-acetyl-gamma
24 calicheamicin via a bifunctional linker. Gemtuzumab ozogamicin has approximately 50%
25 of the antibody loaded with 4-6 moles calicheamicin per mole of antibody. The remaining
26 50% of the antibody is not linked to the calicheamicin derivative. Gemtuzumab ozogamicin
27 has a molecular weight of 151 to 153 kDa.



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29 Mylotarg is a sterile, white, preservative-free lyophilized powder containing 5 mg of drug
 30 conjugate (protein equivalent) in a 20-mL amber vial. The drug product is light sensitive
 31 and must be protected from direct and indirect sunlight and unshielded fluorescent light
 32 during the preparation and administration of the infusion. The inactive ingredients are:
 33 dextran 40; sucrose; sodium chloride; monobasic and dibasic sodium phosphate.

34 CLINICAL PHARMACOLOGY

35 General

36 Gemtuzumab ozogamicin binds to the CD33 antigen. This antigen is expressed on the
 37 surface of leukemic blasts in more than 80% of patients with acute myeloid leukemia
 38 (AML). CD33 is also expressed on normal and leukemic myeloid colony-forming cells,
 39 including leukemic clonogenic precursors, but it is not expressed on pluripotent
 40 hematopoietic stem cells or on nonhematopoietic cells.

41 **Mechanism of Action:** Mylotarg is directed against the CD33 antigen expressed by
 42 hematopoietic cells. Binding of the anti-CD33 antibody portion of Mylotarg with the CD33
 43 antigen results in the formation of a complex that is internalized. Upon internalization, the
 44 calicheamicin derivative is released inside the lysosomes of the myeloid cell. The released
 45 calicheamicin derivative binds to DNA in the minor groove resulting in DNA double strand
 46 breaks and cell death.

47 Gemtuzumab ozogamicin is cytotoxic to the CD33 positive HL-60 human leukemia cell
 48 line. Gemtuzumab ozogamicin produces significant inhibition of colony formation in
 49 cultures of adult leukemic bone marrow cells. The cytotoxic effect on normal myeloid
 50 precursors leads to substantial myelosuppression, but this is reversible because pluripotent
 51 hematopoietic stem cells are spared. In preclinical animal studies, gemtuzumab ozogamicin
 52 demonstrates antitumor effects in the HL-60 human promyelocytic leukemia xenograft
 53 tumor in athymic mice.

54 **Human Pharmacokinetics**

55 After administration of the first recommended 9 mg/m² dose of gemtuzumab ozogamicin, given as a
56 2 hour infusion, the elimination half lives of total and unconjugated calicheamicin were about 45
57 and 100 hours, respectively. After the second 9 mg/m² dose, the half life of total calicheamicin was
58 increased to about 60 hours and the area under the concentration-time curve (AUC) was about twice
59 that in the first dose period. The pharmacokinetics of unconjugated calicheamicin did not appear to
60 change from period one to two. Metabolic studies indicate hydrolytic release of the calicheamicin
61 derivative from gemtuzumab ozogamicin. Many metabolites of this derivative were found after *in*
62 *vitro* incubation of gemtuzumab ozogamicin in human liver microsomes and cytosol, and in HL-60
63 promyelocytic leukemia cells. Metabolic studies characterizing the possible isozymes involved in
64 the metabolic pathway of Mylotarg have not been performed.

65 **CLINICAL STUDIES**

66 The efficacy and safety of Mylotarg as a single agent have been evaluated in 142 patients in
67 three single arm open-label studies in patients with CD33 positive AML in first relapse. The
68 studies included 65, 40, and 37 patients. In studies 1 and 2 patients were ≥ 18 years of age
69 with a first remission duration of at least 6 months. In study 3, only patients ≥ 60 were
70 enrolled and their first remission had to have lasted for at least 3 months. Patients with
71 secondary leukemia were excluded. The treatment course included two 9mg/m² doses
72 separated by 14 days and a 28-day follow-up after the last dose. Although smaller doses had
73 elicited responses in earlier studies, the 9 mg/m² was chosen because it would be expected
74 to saturate all CD33 sites regardless of leukemic burden. A total of 80 patients were 60
75 years of age and older. The primary endpoint of the three clinical studies was the rate of
76 complete remission (CR), which was defined as

- 77 a) leukemic blasts absent from the peripheral blood;
- 78 b) $\leq 5\%$ blasts in the bone marrow, as measured by morphology studies;
- 79 c) hemoglobin (Hgb) ≥ 9 g/dL, platelets $\geq 100,000/\mu\text{L}$, absolute neutrophil count
80 (ANC) $\geq 1500/\mu\text{L}$; and
- 81 d) red cell and platelet-transfusion independence (no red cell transfusions for 2 weeks;
82 no platelet transfusions for 1 week).

83 In addition to CR, a second response category, CRp, was defined as patients satisfying the
84 definition of CR, including platelet transfusion independence, with the exception of platelet
85 recovery $\geq 100,000/\mu\text{L}$. This category was added because Mylotarg appears to delay platelet

86 recovery in some patients. Most of these patients (18/19) achieved platelet counts of at least
87 25,000/ μ L and about two-thirds (13/19) achieved platelet counts of at least 50,000/ μ L,
88 before any additional therapy was administered. It is not yet clear whether CR and CRp
89 responses are clinically equivalent; but survival in the two groups appeared similar.

90 All patients were pre-medicated with acetaminophen 650-1000 mg and diphenhydramine 50
91 mg to decrease acute transfusion-related symptoms. Growth factors and cytokines were not
92 permitted. Use of prophylactic antibiotics was not specified.

93 Response Rate

94 The OR rate for the three pooled monotherapy studies was 30% (42/142) consisting of 16%
95 (23/142) of patients with CR and 13% (19/142) of patients with CRp. The median time to
96 remission was 60 days for both CR and CRp. Remission rates in the individual studies are
97 shown in Table 1.

98 TABLE 1: PERCENTAGE OF PATIENTS BY REMISSION CATEGORY

	Study 1	Study 2	Study 3 ^a	All Studies
Type of Remission	n = 65	n = 40	n = 37	n = 142
CR (95% CI)	17 (9, 28)	20 (9, 36)	11 (3, 25)	16 (11, 23)
CRp (95% CI)	15 (8, 26)	13 (4, 27)	11 (3, 25)	13 (8, 20)
OR (CR + CRp) (95% CI)	32 (21, 45)	33 (19, 49)	22 (10, 38)	30 (22, 38)

a: Patients 60 years of age or greater

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100 Two of the most important determinants of response following relapse are age and duration
101 of first remission. Remission rates by prognostic category are outlined in Table 2; the
102 impact of age and duration of first remission in these patients was minimal:

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TABLE 2: PERCENTAGE OF PATIENTS BY REMISSION

104

CATEGORY AND PROGNOSTIC GROUP

	Age < 60 years	Age ≥ 60 years	First Remission ≥ 1 yr	First Remission < 1 yr
Type of Remission	n = 62	n = 80	n = 62	n = 80
CR (95% CI)	18 (9, 30)	15 (8, 25)	21 (12, 33)	13 (6, 22)
CRp (95% CI)	16 (8, 28)	11 (5, 20)	11 (5, 22)	15 (8, 25)
OR (CR + CRp) (95% CI)	34 (22, 47)	26 (17, 37)	32 (21, 45)	28 (18, 39)

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Among patients < 60 years of age the overall response rate was 34%; among patients ≥ 60 years of age the overall response rate was 26%. The overall response rates were similar for females and males: 31% of females and 29% of males achieved remission.

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The majority of patients (94%) in the Phase 2 clinical trials were white, only 6% were non-white. All 42 of the responding patients were white.

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Relapse-free Survival

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Relapse-free survival was calculated from the date of initial therapy (Table 3).

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TABLE 3: SUMMARY OF RELAPSE-FREE SURVIVAL^a FOR PATIENTS WITH CR AND CRp

Remission Group	n	No. Relapsed	Median months	Min-Max months ^b
CR	23	14	7.2	0.5 - 24.8
CRp	19	9	4.4	0.33 ^b - 21.5
OR ^c	42	23	6.8	0.33 ^b - 24.8

a: Number of months after achieving CR or CRp.

b: Data are limited by data cut-off date; First event occurred in 0.83 months for CRp and in 0.5 months for OR.

c: Six OR patients (1 CR and 5 CRp) had a relapse-free survival of >12 months.

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Overall Survival

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Median duration of overall survival for the 142 patients was 5.9 months, and 56/142 patients were alive as of the data cutoff date.

119 **Post-Remission Therapy**

120 Fifteen (15/42, 36%) OR patients (8 CRs and 7 CRps) received hematopoietic stem cell
121 transplantations. The survival of these 15 patients ranged from 3.5 to 26.9 months as of the
122 data cut-off date. Nine OR patients (4 CR and 5 CRp) had an overall survival of
123 >12 months as of the data cut-off date.

124 **Repeat Courses**

125 Five patients have received a second treatment course of Mylotarg in clinical trials. These
126 patients were initially treated with Mylotarg, achieved remission, then subsequently
127 relapsed. One of these patients (≥ 60 years of age) achieved a second CR after receiving the
128 second course of Mylotarg. Prolonged severe myelosuppression was observed in four
129 patients receiving a third dose.

130 **Overview of Clinical Data**

131 Available single arm trial data do not provide valid comparisons with various cytotoxic
132 regimens that have been used in relapsed acute myeloid leukemia. Response rates are in the
133 range of rates reported with such regimens only if the CRp responses are included.
134 Nevertheless, treatment with Mylotarg can provide responses, including some of reasonable
135 duration. The data support its use in patients for whom aggressive cytotoxic regimens
136 would be considered unsuitable, such as many patients 60 years of age or older.

137 **INDICATIONS AND USAGE**

138 Mylotarg is indicated for the treatment of patients with CD33 positive acute myeloid
139 leukemia in first relapse who are 60 years of age or older and who are not considered
140 candidates for cytotoxic chemotherapy. The safety and efficacy of Mylotarg in patients with
141 poor performance status and organ dysfunction has not been established.

142 The effectiveness of Mylotarg is based on OR rates (see CLINICAL STUDIES). There are
143 no controlled trials demonstrating a clinical benefit, such as improvement in disease-related
144 symptoms or increased survival, compared to any other treatment.

145 **CONTRAINDICATIONS**

146 Mylotarg is contraindicated in patients with a known hypersensitivity to gemtuzumab
147 ozogamicin or any of its components: anti-CD33 antibody (hP67.6), calicheamicin
148 derivatives, or inactive ingredients.

149 **WARNINGS**

150 **Mylotarg is intended for administration under the supervision of a physician who is**
151 **experienced in the use of cancer chemotherapeutic agents.**

152 **Myelosuppression:** Severe myelosuppression will occur in all patients given the
153 recommended dose of this agent. Careful hematologic monitoring is required. Systemic
154 infections should be treated.

155 **Use in Patients With Hepatic Impairment:** Mylotarg has not been studied in patients with
156 bilirubin > 2 mg/dL. Caution should be exercised when administering Mylotarg in patients
157 with hepatic impairment [see ADVERSE REACTIONS section.]

158 **Allergic Reactions:** Mylotarg can produce a post-infusion symptom complex of fever and
159 chills, and less commonly hypotension and dyspnea that may occur during the first 24 hours
160 after administration. Grade 3 or 4 non-hematologic infusion-related adverse events included
161 chills, fever, hypotension, hypertension, hyperglycemia, hypoxia, and dyspnea. Most
162 patients received the following prophylactic medications before administration:
163 diphenhydramine 50 mg po and acetaminophen 650-1000 mg po; thereafter, two additional
164 doses of acetaminophen 650-1000 mg po, one every 4 hours as needed. Vital signs should
165 be monitored during infusion and for the four hours following infusion.

166 **Pregnancy:** Mylotarg may cause fetal harm when administered to a pregnant woman. Daily
167 treatment of pregnant rats with gemtuzumab ozogamicin during organogenesis caused dose
168 related decreases in fetal weight in association with dose-related decreases in fetal skeletal
169 ossification beginning at 0.025 mg/kg/day. Doses of 0.060 mg/kg/day (approximately 0.04
170 times the recommended human single dose on a mg/m² basis) produced increased embryo-
171 fetal mortality (increased numbers of resorptions and decreased numbers of live fetuses per
172 litter). Gross external, visceral, and skeletal alterations at the 0.060 mg/kg/day dose level
173 included digital malformations (ectrodactyly, brachydactyly) in one or both hind feet,
174 absence of the aortic arch, wavy ribs, anomalies of the long bones in the forelimb(s)
175 (short/thick humerus, misshapen radius and ulna, and short/thick ulna), misshapen scapula,
176 absence of vertebral centrum, and fused sternbrae. This dose was also associated with
177 maternal toxicity (decreased weight gain, decreased food consumption). There are no

178 adequate and well-controlled studies in pregnant women. If Mylotarg is used in pregnancy,
179 or if the patient becomes pregnant while taking it, the patient should be apprised of the
180 potential hazard to the fetus. Women of childbearing potential should be advised to avoid
181 becoming pregnant while receiving treatment with Mylotarg.

182 PRECAUTIONS

183 DO NOT ADMINISTER AS AN INTRAVENOUS PUSH OR BOLUS

184 General

185 **Treatment by experienced physicians:** Treatment should be initiated by and remain under
186 the supervision of a physician who is experienced in the use of cancer chemotherapeutic
187 agents.

188 **Tumor lysis syndrome:** Tumor lysis syndrome may be a consequence of leukemia
189 treatment. Appropriate measures, (e.g. hydration and allopurinol), must be taken to prevent
190 hyperuricemia.

191 **Laboratory Monitoring:** Electrolytes, tests of hepatic function, complete blood counts
192 (CBCs) and platelet counts should be monitored during Mylotarg therapy.

193 **Drug Interactions:** There have been no formal drug interaction studies performed with
194 Mylotarg.

195 **Laboratory Test Interactions:** Mylotarg is not known to interfere with any routine
196 diagnostic tests.

197 **Carcinogenesis, Mutagenesis, Impairment of Fertility:** No long-term studies in animals
198 have been performed to evaluate the carcinogenic potential of Mylotarg. Gemtuzumab
199 ozogamicin was clastogenic in the mouse *in vivo* micronucleus test. This positive result is
200 consistent with the known ability of calicheamicin to cause double-stranded breaks in DNA.
201 Formal fertility studies were not conducted in animals. When given weekly for 6 doses to
202 rats, gemtuzumab ozogamicin caused atrophy of the seminiferous tubules, oligospermia,
203 desquamated cells in the epididymis, and hyperplasia of the interstitial cells at the dose of
204 1.2 mg/kg/week (approximately 0.9 times the human dose on a mg/m² basis). These
205 findings did not resolve following a 5-week recovery period.

206
207 **Pregnancy Category D:** See "WARNINGS" section.

208 **Nursing Mothers:** It is not known if Mylotarg is excreted in human milk. Because many
209 drugs, including immunoglobulins, are excreted in human milk, and because of the potential
210 for serious adverse reactions in nursing infants from Mylotarg, a decision should be made
211 whether to discontinue nursing or to discontinue the drug, taking into account the
212 importance of the drug to the mother.

213 **Pediatric Use:** The safety and effectiveness of Mylotarg in pediatric patients have not been
214 studied.

215 **Use in Patients with Renal Impairment:** Patients with renal impairment were not studied.

216 ADVERSE REACTIONS

217 Mylotarg has been administered to 142 patients with relapsed AML at 9 mg/m². Mylotarg
218 was generally given as two intravenous infusions separated by 14 days.

219 **Acute Infusion-related events (Table 4)**

220 TABLE 4: PERCENTAGE OF PATIENTS REPORTED TO HAVE ACUTE INFUSION-
221 RELATED ADVERSE EVENTS

Adverse Event	(%) Any Severity	(%) Grade 3 or 4
Chills	62	11
Fever	61	7
Nausea	38	<1
Vomiting	32	<1
Headache	12	<1
Hypotension	11	4
Hypertension	6	3
Hypoxia	6	2
Dyspnea	4	1
Hyperglycemia	2	2

222

223 These symptoms generally occurred after the end of the 2-hour intravenous infusion and
224 resolved after 2 to 4 hours with a supportive therapy of acetaminophen, diphenhydramine,
225 and IV fluids. (see WARNINGS section) Fewer infusion-related events were observed after
226 the second dose.

227 **Antibody formation:** Antibodies to gemtuzumab ozogamicin were not detected in a total of
228 142 patients in the Phase 2 clinical studies. Two patients in a Phase 1 study developed
229 antibody titers against the calicheamicin/calicheamicin-linker portion of gemtuzumab
230 ozogamicin after three doses. One patient experienced transient fever, hypotension and

231 dyspnea; the other patient had no clinical symptoms. No patient developed antibody
232 responses to the hP67.6 antibody portion of Mylotarg.

233 **Myelosuppression:** Severe myelosuppression is the major toxicity associated with
234 Mylotarg. During the treatment phase, 137/140 (98%) patients experienced Grade 3 or
235 Grade 4 neutropenia. Responding patients recovered ANC's to 500/ μ L by a median of 40.5
236 days after the first dose of Mylotarg.

237 **Anemia, Thrombocytopenia:** During the treatment phase, 139/141 (99%) patients
238 experienced Grade 3 or Grade 4 thrombocytopenia. Responding patients recovered platelet
239 counts to 25,000/ μ L by a median of 39 days after the first dose of Mylotarg. 66/141 (47%)
240 patients experienced Grade 3 or Grade 4 anemia.

241 **Infection:** During the treatment phase, 40/142 (28%) patients experienced Grade 3 or Grade
242 4 infections, including opportunistic infections. The most frequent Grade 3 or Grade 4
243 infection-related treatment-emergent adverse events (TEAEs) were sepsis (16%) and
244 pneumonia (7%). Herpes simplex infection was reported in 22% of the patients.

245 **Bleeding:** During the treatment phase, 21/142 (15%) patients experienced Grade 3 or Grade
246 4 bleeding. The most frequent severe TEAE was epistaxis (3%). There were also reports of
247 cerebral hemorrhage (2%), disseminated intravascular coagulation (2%), intracranial
248 hemorrhage (2%), and hematuria (1%).

249 **Transfusions:** During the treatment phase, more transfusions were required in the NR and
250 CRp patients compared with the CRs (Table 5):

251 **TABLE 5: NUMBER OF TRANSFUSIONS BY RESPONSE GROUP**

Transfusions	All Patients n = 142	CR n = 23	CRp n = 19	NR n = 100
Platelet transfusions				
Mean (SD)	14 (23)	5.4 (6)	14.8 (12)	15.8 (27)
(95% CI)	(10.2, 17.8)	(3, 7.8)	(9.3, 20.4)	(10.6, 21.1)
RBC transfusions				
Mean	8.2 (26)	2.6 (2)	6.2 (5)	9.9 (31)
(95% CI)	(3.9, 12.6)	(1.7, 3.5)	(4, 8.4)	(3.7, 16)

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253 **Mucositis:** A total of 50/142 (35%) patients were reported to have a TEAE consistent with
254 oral mucositis or stomatitis. During the treatment phase, 5/142 (4%) patients experienced
255 Grade 3 or 4 stomatitis/mucositis after the first dose. The mucositis events for the remaining
256 45/142 (32%) patients were categorized as Grade 1 or 2.

257 **Hepatotoxicity:** Abnormalities of liver function were transient and generally reversible. In
258 clinical studies, 33/141 (23%) patients experienced Grade 3 or Grade 4 hyperbilirubinemia.
259 Nine percent (12/141) of patients experienced Grade 3 or Grade 4 abnormalities in levels of
260 ALT, and 24/141 (17%) patients experienced Grade 3 or Grade 4 abnormalities in levels of
261 AST. Thirteen patients had concurrent elevations of transaminases (grade 3 to 4) and
262 bilirubin. One patient died with liver failure in the setting of tumor lysis syndrome and
263 multisystem organ failure 22 days after treatment. Another patient died after an episode of
264 persistent jaundice and hepatosplenomegaly 156 days after treatment. Among 27 patients
265 who received hematopoietic stem cell transplantations following Mylotarg, four (3 NRs and
266 1 CR) died of hepatic veno-occlusive disease (VOD) 22 to 392 days following
267 transplantation.

268 **Skin:** No patients experienced alopecia. A nonspecific rash was reported in 22%.

269 **Retreatment Events:** Five (5) patients have received more than one course of Mylotarg, 4
270 of these patients at 9 mg/m². The adverse event profile for retreated patients was similar to
271 that following their initial treatment. One of the repeat dose patients was in a Phase 1 study
272 and received a first course of 3 doses at 1 mg/m² and 2 doses of a second course at 6 mg/m².
273 This patient was discontinued from further dose administration as a result of an immune
274 response to the calicheamicin/calicheamicin-linker portion of gemtuzumab ozogamicin. The
275 4 other retreated patients did not experience an immune response.

276 **Dose relationship for adverse events:** Dose-relationship data were generated from a small
277 dose-escalation study. The most common clinical adverse event observed in this study was
278 an infusion-related symptom complex of fever and chills. In general, the severity of fever,
279 but not chills, increased as the dose level increased. Only one dose level of Mylotarg was
280 studied in the Phase 2 clinical trials in relapsed AML.

281 **Treatment-emergent adverse events (TEAE):** TEAEs (Grades 1-4) that occurred in
282 ≥ 10% of the patients regardless of causality are listed in Table 6.

TABLE 6. NUMBER (%) OF PATIENTS REPORTING
TREATMENT-EMERGENT ADVERSE EVENTS^a -ALL GRADES
(INCIDENCE \geq 10%^b)

Adverse Event	Efficacy and Safety Studies	
	All Patients (n = 142)	Age \geq 60 (n = 80)
Body as a whole		
Abdomen enlarged	13 (9)	9 (11)
Abdominal pain	52 (37)	23 (29)
Asthenia	63 (44)	36 (45)
Back pain	22 (15)	14 (18)
Chills	104 (73)	53 (66)
Fever	121 (85)	64 (80)
Headache	50 (35)	21 (26)
Neutropenic fever	30 (21)	16 (20)
Pain	30 (21)	20 (25)
Sepsis	36 (25)	19 (24)
Cardiovascular system		
Hemorrhage	14 (10)	6 (8)
Hypertension	29 (20)	16 (20)
Hypotension	28 (20)	13 (16)
Tachycardia	15 (11)	8 (10)
Digestive system		
Anorexia	41 (29)	25 (31)
Constipation	36 (25)	22 (28)
Diarrhea	54 (38)	30 (38)
Dyspepsia	16 (11)	9 (11)
Nausea	100 (70)	51 (64)
Stomatitis	45 (32)	20 (25)
Vomiting	89 (63)	44 (55)
Hemic and lymphatic system		
Ecchymosis	18 (13)	12 (15)
Metabolic		
Hypokalemia	44 (31)	24 (30)
Hypomagnesemia	14 (10)	3 (4)
Lactic dehydrogenase increased	19 (13)	14 (18)
Musculoskeletal system		
Arthralgia	12 (8)	8 (10)
Nervous system		
Depression	13 (9)	8 (10)
Dizziness	22 (15)	9 (11)
Insomnia	22 (15)	14 (18)
Respiratory system		
Cough increased	28 (20)	15 (19)
Dyspnea	46 (32)	29 (36)
Epistaxis	44 (31)	23 (29)
Pharyngitis	20 (14)	11 (14)
Pneumonia	14 (10)	8 (10)
Pulmonary physical finding ^c	16 (11)	10 (13)
Rhinitis	14 (10)	8 (10)
Skin and appendages		
Herpes simplex	31 (22)	12 (15)
Rash	31 (22)	18 (23)
Local reaction	35 (25)	20 (25)
Peripheral edema	23 (16)	17 (21)
Petechiae	28 (20)	17 (21)
Urogenital system^c		
Hematuria	14 (10)	8 (10)

TABLE 6. NUMBER (%) OF PATIENTS REPORTING TREATMENT-EMERGENT ADVERSE EVENTS^a -ALL GRADES (INCIDENCE ≥ 10%^b)

Adverse Event	Efficacy and Safety Studies	
	All Patients (n = 142)	Age ≥ 60 (n = 80)
Vaginal hemorrhage	7 (12)	2 (7)

a: Does not include changes in laboratory values reported as adverse events for events included in the NCI common toxicity scale.

b: ≥ 10% limit specifies the minimum percentage threshold from at least 1 column for an event to be displayed in the table.

c: Includes rales, rhonchi, and changes in breath sounds.

d: Percentages for sex-specific adverse events are based on the number of patients of the relevant sex.

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284

TEAE with a Grade 3 or 4 severity are listed in Table 7

TABLE 7. PERCENT (%) OF PATIENTS REPORTED TO HAVE SEVERE OR NCI GRADE 3 OR 4 TREATMENT-EMERGENT ADVERSE EVENTS^a (INCIDENCE ≥ 5%^b)

Body system Adverse event	Efficacy and safety studies Grades 3 - 4	
	All Patients (n = 142)	Age ≥ 60 (n = 80)
Any adverse event	129 (91)	70 (88)
Body as a whole		
Asthenia	10 (7)	8 (10)
Chills	18 (13)	12 (15)
Fever	21 (15)	11 (14)
Neutropenic fever	10 (7)	4 (5)
Sepsis	23 (16)	12 (16)
Cardiovascular system		
Hypertension	13 (9)	9 (11)
Hypotension	11 (8)	6 (8)
Digestive system		
Nausea	13 (9)	6 (8)
Metabolic		
Hypokalemia	4 (3)	4 (5)
Lactic dehydrogenase increased	6 (4)	6 (8)
Respiratory system		
Dyspnea	13 (9)	10 (13)
Pneumonia	10 (7)	5 (6)

a: Does not include changes in laboratory values reported as adverse events for events included in the NCI common toxicity scale.

b: ≥ 5% limit specifies the minimum percentage threshold from at least 1 column for an event to be displayed in the table.

285

286 Clinically important laboratory abnormalities with a Grade 3 or 4 severity are listed in
 287 Table 8.

TABLE 8. NUMBER (%) OF PATIENTS WITH LABORATORY TEST RESULTS OF GRADE 3 OR 4 SEVERITY^b

Test	Efficacy and safety studies Grades 3 - 4	
	All Patients (n = 142)	Age ≥ 60 (n = 80)
Hematologic		
Hemoglobin	66/141 (47)	36/80 (45)
WBC	136/141 (96)	75/80 (94)
Total neutrophils, absolute	137/140 (98)	78/79 (99)
Lymphocytes	130/140 (93)	70/79 (89)
Platelet count	139/141 (99)	79/80 (99)
Prothrombin time	2/ 47 (4)	1/23 (4)
Partial thromboplastin time	1/ 79 (1)	1/42 (2)
Non-hematologic		
Glucose	17/140 (12)	9/79 (11)
Creatinine	2/141 (1)	0/80
Total bilirubin	33/141 (23)	18/80 (23)
AST	24/141 (17)	12/80 (15)
ALT	12/141 (9)	7/80 (9)
Alkaline phosphatase	5/141 (4)	1/80 (1)
Calcium	17/141 (12)	5/80 (6)

a: Percentage is based on the number of patients receiving a particular laboratory test during the study as is indicated for each test.

b: Severity as defined by NCI common toxicity scale version 1.

288

289 There were considered to be no clinically important differences in TEAEs between patients
 290 < 60 years of age and those patients ≥ 60. Laboratory parameters associated with hepatic
 291 dysfunction (e.g., elevated levels of bilirubin, AST, and ALT) were more consistently
 292 observed in patients ≥ 60 years old than in those < 60 years old.

293 There were considered to be no clinically important differences in TEAEs between female
 294 and male patients.

295 OVERDOSAGE

296 No cases of overdose with Mylotarg were reported in clinical experience. Single doses
 297 higher than 9 mg/m² in adults were not tested. When a single dose of Mylotarg was
 298 administered to animals, mortality was observed in rats at the dose of 2 mg/kg
 299 (approximately 1.3-times the recommended human dose on a mg/m² basis), and in male
 300 monkeys at the dose of 4.5 mg/kg (approximately 6-times the recommended human dose on
 301 a mg/m² basis).

302 **Signs and Symptoms:** Signs of overdose with Mylotarg are unknown.

303 **Recommended Treatment:** General supportive measures should be followed in case of
304 overdose. Blood pressure and blood counts should be carefully monitored. Gemtuzumab
305 ozogamicin is not dialyzable.

306 **DOSAGE AND ADMINISTRATION**

307 The recommended dose of Mylotarg is $9\text{mg}/\text{m}^2$, administered as a 2-hour intravenous
308 infusion. Patients should receive the following prophylactic medications one hour before
309 Mylotarg administration: diphenhydramine 50 mg po and acetaminophen 650-1000 mg po;
310 thereafter, two additional doses of acetaminophen 650-1000 mg po, one every 4 hours as
311 needed. Vital signs should be monitored during infusion and for four hours following
312 infusion. The recommended treatment course with Mylotarg is a total of 2 doses with 14
313 days between the doses. Full recovery from hematologic toxicities is not a requirement for
314 administration of the second dose. Mylotarg may be administered in an outpatient setting.

315 **Hepatic insufficiency:** Patients with hepatic impairment were not included in the clinical
316 studies. See WARNINGS section

317 **Renal insufficiency:** Patients with renal impairment were not included in the clinical
318 studies.

319 **Instructions for Reconstitution**

320 The drug product is light sensitive and must be protected from direct and indirect sunlight
321 and unshielded fluorescent light during the preparation and administration of the infusion.
322 **All preparation should take place in a biologic safety hood with the fluorescent light**
323 **off.** Prior to reconstitution, allow drug vials to come to room temperature. Reconstitute the
324 contents of each vial with 5 mL Sterile Water for Injection, USP, using sterile syringes.
325 Gently swirl each vial. Each vial should be inspected for complete solution and for
326 particulate. The final concentration of drug in the vial is 1 mg/mL. While in the vial, the
327 reconstituted drug may be stored refrigerated (2-8°C) and protected from light for up to 8
328 hours.

329 **Instructions for Dilution**

330 Withdraw the desired volume from each vial and inject into a 100 mL IV bag of 0.9%
331 Sodium Chloride Injection. Place the 100-mL IV bag into an UV protectant bag. The
332 resulting drug solution in the IV bag should be used immediately.

333 **Administration**

334 **DO NOT ADMINISTER AS AN INTRAVENOUS PUSH OR BOLUS**

335 Once the reconstituted Mylotarg is diluted into the IV bag containing normal saline, the
336 resulting solution should be infused over a 2-hour period. A separate IV line equipped with
337 a low protein-binding 1.2-micron terminal filter must be used for administration of the drug.
338 Mylotarg may be given peripherally or through a central line. Pre-medication, consisting of
339 acetaminophen and diphenhydramine, should be given before each infusion to reduce the
340 incidence of a post-infusion symptom complex (see ADVERSE REACTIONS, Acute
341 infusion-related events). **Stability and Storage:** Mylotarg should be stored refrigerated
342 (2 - 8° C, 36 - 46° F and protected from light).

343 **Instructions for use, handling and for disposal:** Mylotarg should be inspected visually for
344 particulate matter and discoloration, following reconstitution and prior to administration.
345 Protect from light and use an UV protective bag over the IV bag during infusion.
346 Procedures for handling and disposal of anticancer drugs should be considered. Several
347 guidelines on this subject have been published.^{1,2,3}

348 **HOW SUPPLIED**

349 Mylotarg is supplied as a single vial package with an amber glass vial containing 5mg of
350 Mylotarg lyophilized powder. Single unit 5mg package: each 20mL vial contains 5 mg of
351 Mylotarg. NDC 0008-4510-01

352 **REFERENCES**

¹ Recommendation for the Safe Handling of Parenteral Antineoplastic Drugs. NIH Publication No. 83-2621. For Sale by the Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

² AMA Council Report. Guidelines for Handling Parenteral Antineoplastics. JAMA 1985; 253 (11): 1590-1592.

³ National Study Commission on Cytotoxic Exposure—Recommendations for Handling Cytotoxic Agents. Available from Louis P. Jeffrey, ScD, Chairman, National Study Commission on Cytotoxic Exposure, Massachusetts College of Pharmacy and Allied Health Sciences, 179 Longwood Avenue, Boston, Massachusetts 02115.