

1 Fludara[®]

2 (fludarabine phosphate)

3 **FOR INJECTION**

4 **FOR INTRAVENOUS USE ONLY**

5 **Rx Only**

6 **WARNING:** FLUDARA FOR INJECTION should be administered under the supervision of a
7 qualified physician experienced in the use of antineoplastic therapy. FLUDARA FOR
8 INJECTION can severely suppress bone marrow function. When used at high doses in dose-
9 ranging studies in patients with acute leukemia, FLUDARA FOR INJECTION was associated
10 with severe neurologic effects, including blindness, coma, and death. This severe central
11 nervous system toxicity occurred in 36% of patients treated with doses approximately four times
12 greater (96 mg/m²/day for 5-7 days) than the recommended dose. Similar severe central
13 nervous system toxicity, including coma, seizures, agitation and confusion, has been reported in
14 patients treated at doses in the range of the dose recommended for chronic lymphocytic
15 leukemia.

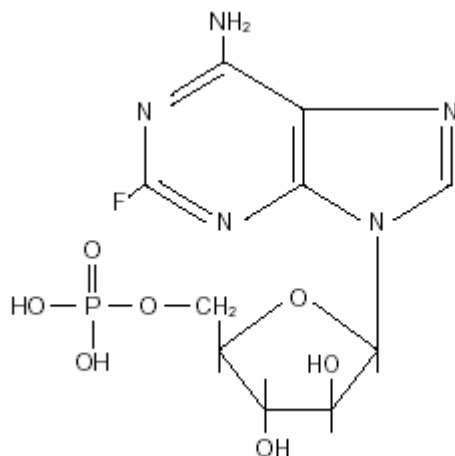
16 Instances of life-threatening and sometimes fatal autoimmune phenomena such as hemolytic
17 anemia, autoimmune thrombocytopenia/thrombocytopenic purpura (ITP), Evan's syndrome, and
18 acquired hemophilia have been reported to occur after one or more cycles of treatment with
19 FLUDARA FOR INJECTION. Patients undergoing treatment with FLUDARA FOR INJECTION
20 should be evaluated and closely monitored for hemolysis.

21 In a clinical investigation using FLUDARA FOR INJECTION in combination with pentostatin
22 (deoxycoformycin) for the treatment of refractory chronic lymphocytic leukemia (CLL), there was
23 an unacceptably high incidence of fatal pulmonary toxicity. Therefore, the use of FLUDARA
24 FOR INJECTION in combination with pentostatin is not recommended.

25 **DESCRIPTION**

26 FLUDARA FOR INJECTION contains fludarabine phosphate, a fluorinated nucleotide analog of
27 the antiviral agent vidarabine, 9-β-D-arabinofuranosyladenine (ara-A) that is relatively resistant
28 to deamination by adenosine deaminase. Each vial of sterile lyophilized solid cake contains 50
29 mg of the active ingredient fludarabine phosphate, 50 mg of mannitol, and sodium hydroxide to
30 adjust pH to 7.7. The pH range for the final product is 7.2-8.2. Reconstitution with 2 mL of
31 Sterile Water for Injection USP results in a solution containing 25 mg/mL of fludarabine
32 phosphate intended for intravenous administration.

33 The chemical name for fludarabine phosphate is 9H-Purin-6-amine, 2-fluoro-9-(5-0-phosphono-
34 β-D-arabino-furanosyl) (2-fluoro-ara-AMP). The molecular formula of fludarabine phosphate is
35 C₁₀H₁₃FN₅O₇P (MW 365.2) and the structure is:



36

37 **CLINICAL PHARMACOLOGY**

38 Fludarabine phosphate is rapidly dephosphorylated to 2-fluoro-ara-A and then phosphorylated
39 intracellularly by deoxycytidine kinase to the active triphosphate, 2-fluoro-ara-ATP. This
40 metabolite appears to act by inhibiting DNA polymerase alpha, ribonucleotide reductase and
41 DNA primase, thus inhibiting DNA synthesis. The mechanism of action of this antimetabolite is
42 not completely characterized and may be multi-faceted.

43 Phase I studies in humans have demonstrated that fludarabine phosphate is rapidly converted
44 to the active metabolite, 2-fluoro-ara-A, within minutes after intravenous infusion.
45 Consequently, clinical pharmacology studies have focused on 2-fluoro-ara-A pharmacokinetics.
46 After the five daily doses of 25 mg 2-fluoro-ara-AMP/m² to cancer patients infused over 30
47 minutes, 2-fluoro-ara-A concentrations show a moderate accumulation. During a 5-day
48 treatment schedule, 2-fluoro-ara-A plasma trough levels increased by a factor of about 2. The
49 terminal half-life of 2-fluoro-ara-A was estimated as approximately 20 hours. *In vitro*, plasma
50 protein binding of fludarabine ranged between 19% and 29%.

51 A correlation was noted between the degree of absolute granulocyte count nadir and increased
52 area under the concentration x time curve (AUC).

53 **Special Populations**

54 *Pediatric Patients*

55 Limited pharmacokinetic data for FLUDARA FOR INJECTION are available from a published
56 study of children (ages 1-21 years) with refractory acute leukemias or solid tumors (Children's
57 Cancer Group Study 097¹). When FLUDARA FOR INJECTION was administered as a loading
58 dose over 10 minutes immediately followed by a 5-day continuous infusion, steady-state
59 conditions were reached early.

60 *Patients with Renal Impairment*

61 The total body clearance of the principal metabolite 2-fluoro-ara-A correlated with the creatinine
62 clearance, indicating the importance of the renal excretion pathway for the elimination of the
63 drug. Renal clearance represents approximately 40% of the total body clearance. Patients with
64 moderate renal impairment (17 - 41 mL/min/m²) receiving 20% reduced Fludara dose had a

65 similar exposure (AUC; 21 versus 20 nM • h/mL) compared to patients with normal renal
66 function receiving the recommended dose. The mean total body clearance was 172 mL/min for
67 normal and 124 mL/min for patients with moderately impaired renal function.

68 **CLINICAL STUDIES**

69 Two single-arm open-label studies of FLUDARA FOR INJECTION have been conducted in
70 adult patients with CLL refractory to at least one prior standard alkylating-agent containing
71 regimen. In a study conducted by M.D. Anderson Cancer Center (MDAH), 48 patients were
72 treated with a dose of 22-40 mg/m² daily for 5 days every 28 days. Another study conducted by
73 the Southwest Oncology Group (SWOG) involved 31 patients treated with a dose of 15-25
74 mg/m² daily for 5 days every 28 days. The overall objective response rates were 48% and 32%
75 in the MDAH and SWOG studies, respectively. The complete response rate in both studies was
76 13%; the partial response rate was 35% in the MDAH study and 19% in the SWOG study.
77 These response rates were obtained using standardized response criteria developed by the
78 National Cancer Institute CLL Working Group³ and were achieved in heavily pre-treated patients.
79 The ability of FLUDARA FOR INJECTION to induce a significant rate of response in refractory
80 patients suggests minimal cross-resistance with commonly used anti-CLL agents.

81 The median time to response in the MDAH and SWOG studies was 7 weeks (range of 1 to 68
82 weeks) and 21 weeks (range of 1 to 53 weeks) respectively. The median duration of disease
83 control was 91 weeks (MDAH) and 65 weeks (SWOG). The median survival of all refractory CLL
84 patients treated with FLUDARA FOR INJECTION was 43 weeks and 52 weeks in the MDAH
85 and SWOG studies, respectively.

86 Rai stage improved to Stage II or better in 7 of 12 MDAH responders (58%) and in 5 of 7 SWOG
87 responders (71%) who were Stage III or IV at baseline. In the combined studies, mean
88 hemoglobin concentration improved from 9.0 g/dL at baseline to 11.8 g/dL at the time of
89 response in a subgroup of anemic patients. Similarly, average platelet count improved from
90 63,500/mm³ to 103,300/mm³ at the time of response in a subgroup of patients who were
91 thrombocytopenic at baseline.

92 **INDICATIONS AND USAGE**

93 FLUDARA FOR INJECTION is indicated for the treatment of adult patients with B-cell chronic
94 lymphocytic leukemia (CLL) who have not responded to or whose disease has progressed
95 during treatment with at least one standard alkylating-agent containing regimen. The safety and
96 effectiveness of FLUDARA FOR INJECTION in previously untreated or non-refractory patients
97 with CLL have not been established.

98 **CONTRAINDICATIONS**

99 FLUDARA FOR INJECTION is contraindicated in those patients who are hypersensitive to this
100 drug or its components.

101 **WARNINGS**

102 (See **BOXED WARNINGS**)

103 There are clear dose dependent toxic effects seen with FLUDARA FOR INJECTION. Dose
104 levels approximately 4 times greater (96 mg/m²/day for 5 to 7 days) than that recommended for
105 CLL (25 mg/m²/day for 5 days) were associated with a syndrome characterized by delayed
106 blindness, coma and death. Symptoms appeared from 21 to 60 days following the last dose.
107 Thirteen of 36 patients (36%) who received FLUDARA FOR INJECTION at high doses (96
108 mg/m²/day for 5 to 7 days) developed this severe neurotoxicity. Similar severe central nervous

109 system toxicity, including coma, seizures, agitation and confusion, has been reported in patients
110 treated at doses in the range of the dose recommended for chronic lymphocytic leukemia.

111 The effect of chronic administration of FLUDARA FOR INJECTION on the central nervous
112 system is unknown, however, patients have received the recommended dose for up to 15
113 courses of therapy.

114 Severe bone marrow suppression, notably anemia, thrombocytopenia and neutropenia, has
115 been reported in patients treated with FLUDARA FOR INJECTION. In a Phase I study in adult
116 solid tumor patients, the median time to nadir counts was 13 days (range, 3-25 days) for
117 granulocytes and 16 days (range, 2-32) for platelets. Most patients had hematologic impairment
118 at baseline either as a result of disease or as a result of prior myelosuppressive therapy.
119 Cumulative myelosuppression may be seen. While chemotherapy-induced myelosuppression is
120 often reversible, administration of FLUDARA FOR INJECTION requires careful hematologic
121 monitoring.

122 Several instances of trilineage bone marrow hypoplasia or aplasia resulting in pancytopenia,
123 sometimes resulting in death, have been reported in adult patients. The duration of clinically
124 significant cytopenia in the reported cases has ranged from approximately 2 months to
125 approximately 1 year. These episodes have occurred both in previously treated or untreated
126 patients.

127 Instances of life-threatening and sometimes fatal autoimmune phenomena such as hemolytic
128 anemia, autoimmune thrombocytopenia/thrombocytopenic purpura (ITP), Evan's syndrome, and
129 acquired hemophilia have been reported to occur after one or more cycles of treatment with
130 FLUDARA FOR INJECTION in patients with or without a previous history of autoimmune
131 hemolytic anemia or a positive Coombs' test and who may or may not be in remission from their
132 disease. Steroids may or may not be effective in controlling these hemolytic episodes. The
133 majority of patients rechallenged with FLUDARA FOR INJECTION developed a recurrence in
134 the hemolytic process. The mechanism(s) which predispose patients to the development of this
135 complication has not been identified. Patients undergoing treatment with FLUDARA FOR
136 INJECTION should be evaluated and closely monitored for hemolysis. Discontinuation of
137 therapy with Fludara is recommended in case of hemolysis.

138 Transfusion-associated graft-versus-host disease has been observed after transfusion of non-
139 irradiated blood in FLUDARA FOR INJECTION treated patients. Fatal outcome as a
140 consequence of this disease has been reported. Therefore, to minimize the risk of transfusion-
141 associated graft-versus-host disease, patients who require blood transfusion and who are
142 undergoing, or who have received, treatment with FLUDARA FOR INJECTION should receive
143 irradiated blood only.

144 In a clinical investigation using FLUDARA FOR INJECTION in combination with pentostatin
145 (deoxycoformycin) for the treatment of refractory chronic lymphocytic leukemia (CLL) in adults,
146 there was an unacceptably high incidence of fatal pulmonary toxicity. Therefore, the use of
147 FLUDARA FOR INJECTION in combination with pentostatin is not recommended.

148 Of the 133 adult CLL patients in the two trials, there were 29 fatalities during study.
149 Approximately 50% of the fatalities were due to infection and 25% due to progressive disease.

150 **Pregnancy Category D**

151 Based on its mechanism of action, fludarabine phosphate can cause fetal harm when
152 administered to a pregnant woman. There are no adequate and well-controlled studies of
153 Fludara in pregnant women. Fludarabine phosphate was embryo-lethal and teratogenic in both
154 rats and rabbits. If FLUDARA FOR INJECTION is used during pregnancy, or if the patient

155 becomes pregnant while taking this drug, the patient should be apprised of the potential hazard
156 to the fetus. Women of childbearing potential should be advised to avoid becoming pregnant.
157 Women of childbearing potential and fertile males must take contraceptive measures during and
158 at least for six months after cessation of treatment with FLUDARA FOR INJECTION. . .

159
160 Fludarabine phosphate was embryolethal and teratogenic in rats and rabbits.
161 Fludarabine phosphate was administered at doses of 0, 1, 10 or 30 mg/kg/day (0.24, 2.4 times
162 and 7.2 times the recommended human dose on a mg/m² basis, respectively) to pregnant rats
163 on days 6 to 15 of gestation. At 10 and 30 mg/kg/day administered during organogenesis, there
164 was a dose-related increase in various skeletal variations and a decrease in mean fetal body
165 weights. Maternal toxicity was not apparent at 10 mg/kg/day, and was limited to slight body
166 weight decreases at 30 mg/kg/day. In a dose finding study malformations, such as limb and tail
167 defects, were induced at 40 mg/kg/day (9.6 times the recommended human dose on a mg/m²
168 basis). In a reproduction toxicity study on rabbits Fludarabine phosphate was administered
169 intravenously at doses of 0, 1, 5 or 8 mg/kg/day (approximately 0.5, 2.4, and 3.8 times the
170 recommended human dose on a mg/m² basis) on days 6 to 18 of gestation. A dose of 8
171 mg/kg/day administered during organogenesis increased embryo and fetal lethality as indicated
172 by a higher number of resorptions and a decrease in live fetuses. Compound-related
173 teratogenic effects manifested by external deformities and skeletal malformations were
174 observed at 8 mg/kg/day. The most frequent external malformations observed in rabbits were
175 cleft palate, adactyly, brachydactyly and syndactyly along with skeletal malformations such as
176 fused metatarsals, phalanges, sternebrae and limb bones and some soft tissue malformations
177 (diaphragmatic herniae). Fetal body weights were decreased in rabbits given 8 mg/kg/day."

178 **PRECAUTIONS**

179 **General**

180 FLUDARA FOR INJECTION is a potent antineoplastic agent with potentially significant toxic
181 side effects. Patients undergoing therapy should be closely observed for signs of hematologic
182 and nonhematologic toxicity. Periodic assessment of peripheral blood counts is recommended
183 to detect the development of anemia, neutropenia and thrombocytopenia.

184 Tumor lysis syndrome associated with FLUDARA FOR INJECTION treatment has been
185 reported in CLL patients with large tumor burdens. Since FLUDARA FOR INJECTION can
186 induce a response as early as the first week of treatment, precautions should be taken in those
187 patients at risk of developing this complication.

188 In patients with impaired state of health, FLUDARA FOR INJECTION should be given with
189 caution and after careful risk/benefit consideration. This applies especially for patients with
190 severe impairment of bone marrow function (thrombocytopenia, anemia, and/or
191 granulocytopenia), immunodeficiency or with a history of opportunistic infection. Prophylactic
192 treatment should be considered in patients at increased risk of developing opportunistic
193 infections.

194 There are inadequate data on dosing of patients with renal insufficiency. FLUDARA FOR
195 INJECTION must be administered cautiously in patients with renal insufficiency. The total body
196 clearance of 2-fluoro-ara-A has been shown to be directly correlated with creatinine clearance.
197 Patients with moderate impairment of renal function (creatinine clearance 30-70 mL/min/1.73
198 m²) should have their Fludara dose reduced by 20% and be monitored closely. FLUDARA FOR
199 INJECTION is not recommended for patients with severely impaired renal function (creatinine
200 clearance less than 30 mL/min/1.73 m²).

201 Fludara may reduce the ability to drive or use machines, since fatigue, weakness, visual
202 disturbances, confusion, agitation and seizures have been observed.

203 **Laboratory Tests**

204 During treatment, the patient's hematologic profile (particularly neutrophils and platelets) should
205 be monitored regularly to determine the degree of hematopoietic suppression.

206 **Drug Interactions**

207 The use of FLUDARA FOR INJECTION in combination with pentostatin is not recommended
208 due to the risk of severe pulmonary toxicity (see WARNINGS section).

209 **Carcinogenesis**

210 No animal carcinogenicity studies with FLUDARA FOR INJECTION have been conducted.

211 **Mutagenesis**

212 Fludarabine phosphate was not mutagenic to bacteria (Ames test) or mammalian cells (HGRPT
213 assay in Chinese hamster ovary cells) either in the presence or absence of metabolic activation.
214 Fludarabine phosphate was clastogenic *in vitro* to Chinese hamster ovary cells (chromosome
215 aberrations in the presence of metabolic activation) and induced sister chromatid exchanges
216 both with and without metabolic activation. In addition, fludarabine phosphate was clastogenic
217 *in vivo* (mouse micronucleus assay) but was not mutagenic to germ cells (dominant lethal test in
218 male mice).

219 **Impairment of Fertility**

220 Studies in mice, rats and dogs have demonstrated dose-related adverse effects on the male
221 reproductive system. Observations consisted of a decrease in mean testicular weights in mice
222 and rats with a trend toward decreased testicular weights in dogs and degeneration and
223 necrosis of spermatogenic epithelium of the testes in mice, rats and dogs. The possible adverse
224 effects on fertility in humans have not been adequately evaluated.

225 **Pregnancy**

226 Pregnancy Category D: (see WARNINGS section).

227

228 **Nursing Mothers**

229 It is not known whether fludarabine phosphate is excreted in human milk. Because many drugs
230 are excreted in human milk and because of the potential for serious adverse reactions including
231 tumorigenicity in nursing infants, a decision should be made to discontinue nursing or
232 discontinue the drug, taking into account the importance of the drug to the mother.
233

234 **Pediatric Use**

235 Data submitted to the FDA was insufficient to establish efficacy in any childhood malignancy.
236 Fludarabine was evaluated in 62 pediatric patients (median age 10, range 1-21) with refractory
237 acute leukemia (45 patients) or solid tumors (17 patients). The fludarabine regimen tested for
238 pediatric acute lymphocytic leukemia (ALL) patients was a loading bolus of 10.5 mg/m²/day
239 followed by a continuous infusion of 30.5 mg/m²/day for 5 days. In 12 pediatric patients with
240 solid tumors, dose-limiting myelosuppression was observed with a loading dose of 8 mg/m²/day
241 followed by a continuous infusion of 23.5 mg/m²/day for 5 days. The maximum tolerated dose
242 was a loading dose of 7 mg/m²/day followed by a continuous infusion of 20 mg/m²/day for 5
243 days. Treatment toxicity included bone marrow suppression. Platelet counts appeared to be
244 more sensitive to the effects of fludarabine than hemoglobin and white blood cell counts. Other
245 adverse events included fever, chills, asthenia, rash, nausea, vomiting, diarrhea, and infection.

246 There were no reported occurrences of peripheral neuropathy or pulmonary hypersensitivity
247 reaction.

248 **Vaccination**

249 During and after treatment with FLUDARA FOR INJECTION, vaccination with live vaccines
250 should be avoided.

251 **Disease Progression**

252 Disease progression and transformation (e.g. Richter's syndrome) have been reported in CLL
253 patients.

254 **ADVERSE REACTIONS**

255 The most common adverse events include myelosuppression (neutropenia, thrombocytopenia
256 and anemia), fever and chills, infection, and nausea and vomiting. Other commonly reported
257 events include malaise, fatigue, anorexia, and weakness. Serious opportunistic infections have
258 occurred in CLL patients treated with FLUDARA FOR INJECTION. Adverse events, and those
259 reactions which are more clearly related to the drug are arranged below according to body
260 system.

261 **Hematopoietic Systems** Hematologic events (neutropenia, thrombocytopenia, and/or anemia)
262 were reported in the majority of CLL patients treated with FLUDARA FOR INJECTION. During
263 FLUDARA FOR INJECTION treatment of 133 patients with CLL, the absolute neutrophil count
264 decreased to less than 500/mm³ in 59% of patients, hemoglobin decreased from pretreatment
265 values by at least 2 grams percent in 60%, and platelet count decreased from pretreatment
266 values by at least 50% in 55%. Myelosuppression may be severe, cumulative, and may affect
267 multiple cell lines. Bone marrow fibrosis occurred in one CLL patient treated with FLUDARA
268 FOR INJECTION.

269 Several instances of trilineage bone marrow hypoplasia or aplasia resulting in pancytopenia,
270 sometimes resulting in death, have been reported in postmarketing surveillance. The duration
271 of clinically significant cytopenia in the reported cases has ranged from approximately 2 months
272 to approximately 1 year. These episodes have occurred both in previously treated or untreated
273 patients.

274 Life-threatening and sometimes fatal autoimmune phenomena such as hemolytic anemia,
275 autoimmune thrombocytopenia/thrombocytopenic purpura (ITP), Evan's syndrome, and
276 acquired hemophilia have been reported to occur in patients receiving FLUDARA FOR
277 INJECTION (see WARNINGS section). The majority of patients rechallenged with FLUDARA
278 FOR INJECTION developed a recurrence in the hemolytic process.

279 In post-marketing experience, cases of myelodysplastic syndrome and acute myeloid leukemia,
280 mainly associated with prior, concomitant or subsequent treatment with alkylating agents,
281 topoisomerase inhibitors, or irradiation have been reported.

282 **Infections** Serious, and sometimes fatal infections, including opportunistic infections and
283 reactivations of latent viral infections such as VZV (Herpes zoster), Epstein-Barr virus and JC
284 virus (progressive multifocal leukoencephalopathy) have been reported in patients treated with
285 FLUDARA FOR INJECTION.

286 Rare cases of Epstein Barr Virus (EBV) associated lymphoproliferative disorders have been
287 reported in patients treated with FLUDARA FOR INJECTION.

288 **Metabolic** Tumor lysis syndrome has been reported in CLL patients treated with FLUDARA
289 FOR INJECTION. This complication may include hyperuricemia, hyperphosphatemia,
290 hypocalcemia, metabolic acidosis, hyperkalemia, hematuria, urate crystalluria, and renal failure.
291 The onset of this syndrome may be heralded by flank pain and hematuria.

292 **Nervous System** (See WARNINGS section) Objective weakness, agitation, confusion,
293 seizures, visual disturbances, optic neuritis, optic neuropathy, blindness and coma have
294 occurred in CLL patients treated with FLUDARA FOR INJECTION at the recommended dose.
295 Peripheral neuropathy has been observed in patients treated with FLUDARA FOR INJECTION
296 and one case of wrist-drop was reported.

297 In post-marketing experience, cases of progressive multifocal leukoencephalopathy have been
298 reported. Most cases had a fatal outcome. Many of these cases were confounded by prior
299 and/or concurrent chemotherapy. The time to onset has ranged from a few weeks to
300 approximately one year after initiating treatment.

301 **Pulmonary System** Pneumonia, a frequent manifestation of infection in CLL patients, occurred
302 in 16%, and 22% of those treated with FLUDARA FOR INJECTION in the MDAH and SWOG
303 studies, respectively. Pulmonary hypersensitivity reactions to FLUDARA FOR INJECTION
304 characterized by dyspnea, cough and interstitial pulmonary infiltrate have been observed.

305 In post-marketing experience, cases of severe pulmonary toxicity have been observed with
306 Fludara use which resulted in ARDS, respiratory distress, pulmonary hemorrhage, pulmonary
307 fibrosis, and respiratory failure. After an infectious origin has been excluded, some patients
308 experienced symptom improvement with corticosteroids.

309 **Gastrointestinal System** Gastrointestinal disturbances such as nausea and vomiting, anorexia,
310 diarrhea, stomatitis and gastrointestinal bleeding have been reported in patients treated with
311 FLUDARA FOR INJECTION.

312 **Cardiovascular** Edema has been frequently reported. One patient developed a pericardial
313 effusion possibly related to treatment with FLUDARA FOR INJECTION. No other severe
314 cardiovascular events were considered to be drug related.

315 **Genitourinary System** Rare cases of hemorrhagic cystitis have been reported in patients
316 treated with FLUDARA FOR INJECTION.

317 **Skin** Skin toxicity, consisting primarily of skin rashes, has been reported in patients treated with
318 FLUDARA FOR INJECTION.

319 Erythema multiforme, Stevens-Johnson syndrome, toxic epidermal necrolysis, and pemphigus
320 have been reported, with fatal outcomes in some cases.

321 Worsening or flare up of pre-existing skin cancer lesions, as well as new onset of skin cancer,
322 has been reported in patients during or after treatment with FLUDARA FOR INJECTION.

323 Data in the following table are derived from the 133 patients with CLL who received FLUDARA
324 FOR INJECTION in the MDAH and SWOG studies.

325

PERCENT OF CLL PATIENTS REPORTING NON-HEMATOLOGIC ADVERSE EVENTS

<u>ADVERSE EVENTS</u>	<u>MDAH (N=101)</u>	<u>SWOG (N=32)</u>
ANY ADVERSE EVENT	88%	91%
BODY AS A WHOLE	72	84
FEVER	60	69
CHILLS	11	19
FATIGUE	10	38

**PERCENT OF CLL PATIENTS REPORTING
NON-HEMATOLOGIC ADVERSE EVENTS**

<u>ADVERSE EVENTS</u>	<u>MDAH (N=101)</u>	<u>SWOG (N=32)</u>
INFECTION	33	44
PAIN	20	22
MALAISE	8	6
DIAPHORESIS	1	13
ALOPECIA	0	3
ANAPHYLAXIS	1	0
HEMORRHAGE	1	0
HYPERGLYCEMIA	1	6
DEHYDRATION	1	0
NEUROLOGICAL	21	69
WEAKNESS	9	65
PARESTHESIA	4	12
HEADACHE	3	0
VISUAL DISTURBANCE	3	15
HEARING LOSS	2	6
SLEEP DISORDER	1	3
DEPRESSION	1	0
CEREBELLAR SYNDROME	1	0
IMPAIRED MENTATION	1	0
PULMONARY	35	69
COUGH	10	44
PNEUMONIA	16	22
DYSPNEA	9	22
SINUSITIS	5	0
PHARYNGITIS	0	9
UPPER RESPIRATORY INFECTION	2	16
ALLERGIC PNEUMONITIS	0	6
EPISTAXIS	1	0
HEMOPTYSIS	1	6
BRONCHITIS	1	0
HYPOXIA	1	0
GASTROINTESTINAL	46	63
NAUSEA/VOMITING	36	31
DIARRHEA	15	13
ANOREXIA	7	34
STOMATITIS	9	0
GI BLEEDING	3	13
ESOPHAGITIS	3	0
MUCOSITIS	2	0
LIVER FAILURE	1	0
ABNORMAL LIVER FUNCTION TEST	1	3
CHOLELITHIASIS	0	3
CONSTIPATION	1	3

**PERCENT OF CLL PATIENTS REPORTING
NON-HEMATOLOGIC ADVERSE EVENTS**

<u>ADVERSE EVENTS</u>	<u>MDAH (N=101)</u>	<u>SWOG (N=32)</u>
DYSPHAGIA	1	0
CUTANEOUS	17	18
RASH	15	15
PRURITUS	1	3
SEBORRHEA	1	0
GENITOURINARY	12	22
DYSURIA	4	3
URINARY INFECTION	2	15
HEMATURIA	2	3
RENAL FAILURE	1	0
ABNORMAL RENAL FUNCTION TEST	1	0
PROTEINURIA	1	0
HESITANCY	0	3
CARDIOVASCULAR	12	38
EDEMA	8	19
ANGINA	0	6
CONGESTIVE HEART FAILURE	0	3
ARRHYTHMIA	0	3
SUPRAVENTRICULAR TACHYCARDIA	0	3
MYOCARDIAL INFARCTION	0	3
DEEP VENOUS THROMBOSIS	1	3
PHLEBITIS	1	3
TRANSIENT ISCHEMIC ATTACK	1	0
ANEURYSM	1	0
CEREBROVASCULAR ACCIDENT	0	3
MUSCULOSKELETAL	7	16
MYALGIA	4	16
OSTEOPOROSIS	2	0
ARTHRALGIA	1	0
TUMOR LYSIS SYNDROME	1	0

326 More than 3000 adult patients received FLUDARA FOR INJECTION in studies of other
 327 leukemias, lymphomas, and other solid tumors. The spectrum of adverse effects reported in
 328 these studies was consistent with the data presented above.

329 **OVERDOSAGE**

330 High doses of FLUDARA FOR INJECTION (see WARNINGS section) have been associated
 331 with an irreversible central nervous system toxicity characterized by delayed blindness, coma
 332 and death. High doses are also associated with severe thrombocytopenia and neutropenia due

333 to bone marrow suppression. There is no known specific antidote for FLUDARA FOR
334 INJECTION overdose. Treatment consists of drug discontinuation and supportive therapy.

335 **DOSAGE AND ADMINISTRATION**

336 **Usual Dose**

337 The recommended adult dose of FLUDARA FOR INJECTION is 25 mg/m² administered
338 intravenously over a period of approximately 30 minutes daily for five consecutive days. Each 5
339 day course of treatment should commence every 28 days. Dosage may be decreased or
340 delayed based on evidence of hematologic or nonhematologic toxicity. Physicians should
341 consider delaying or discontinuing the drug if neurotoxicity occurs.

342 A number of clinical settings may predispose to increased toxicity from FLUDARA FOR
343 INJECTION. These include advanced age, renal insufficiency, and bone marrow impairment.
344 Such patients should be monitored closely for excessive toxicity and the dose modified
345 accordingly.

346 The optimal duration of treatment has not been clearly established. It is recommended that
347 three additional cycles of FLUDARA FOR INJECTION be administered following the
348 achievement of a maximal response and then the drug should be discontinued.

349 **Renal Insufficiency**

350 Adult patients with moderate impairment of renal function (creatinine clearance 30-70
351 mL/min/1.73 m²) should have a 20% dose reduction of FLUDARA FOR INJECTION. FLUDARA
352 FOR INJECTION should not be administered to patients with severely impaired renal function
353 (creatinine clearance less than 30 mL/min/1.73 m²).

354 **Preparation of Solutions**

355 FLUDARA FOR INJECTION should be prepared for parenteral use by aseptically adding Sterile
356 Water for Injection USP. When reconstituted with 2mL of Sterile Water for Injection, USP, the
357 solid cake should fully dissolve in 15 seconds or less; each mL of the resulting solution will
358 contain 25 mg of fludarabine phosphate, 25 mg of mannitol, and sodium hydroxide to adjust the
359 pH to 7.7. The pH range for the final product is 7.2-8.2. In clinical studies, the product has been
360 diluted in 100 cc or 125 cc of 5% Dextrose Injection USP or 0.9% Sodium Chloride USP.

361 Reconstituted FLUDARA FOR INJECTION contains no antimicrobial preservative and thus
362 should be used within 8 hours of reconstitution. Care must be taken to assure the sterility of
363 prepared solutions. Parenteral drug products should be inspected visually for particulate matter
364 and discoloration prior to administration.

365 FLUDARA FOR INJECTION should not be mixed with other drugs.

366 **Handling and Disposal**

367 Procedures for proper handling and disposal should be considered. Consideration should be
368 given to handling and disposal according to guidelines issued for cytotoxic drugs. Several
369 guidelines on this subject have been published.¹⁻⁴

370 Caution should be exercised in the handling and preparation of FLUDARA FOR INJECTION
371 solution. The use of latex gloves and safety glasses is recommended to avoid exposure in case
372 of breakage of the vial or other accidental spillage. If the solution contacts the skin or mucous
373 membranes, wash thoroughly with soap and water; rinse eyes thoroughly with plain water.
374 Avoid exposure by inhalation or by direct contact of the skin or mucous membranes.

375 **HOW SUPPLIED**

376 FLUDARA FOR INJECTION is supplied as a white, lyophilized solid cake. Each vial contains 50
377 mg of fludarabine phosphate, 50 mg of mannitol, and sodium hydroxide to adjust pH to 7.7. The
378 pH range for the final product is 7.2-8.2. Store under refrigeration, between 2°-8°C (36°-46°F).

379 FLUDARA FOR INJECTION is supplied in a clear glass single dose vial (6mL capacity) and
380 packaged in a single dose vial carton in a shelf pack of five.

381 NDC 50419-511-06

382 Manufactured by: Ben Venue Laboratories, Bedford, OH 44146

383 Manufactured for: Bayer HealthCare Pharmaceuticals Inc., Wayne, NJ 07470

384 U.S. Patent Number: 4,357,324

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