

NDA 20-905/S-014

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1 Rev. November 2004

2 **ARAVA® Tablets**

3 **(leflunomide)**

4 **10 mg, 20 mg, 100 mg**

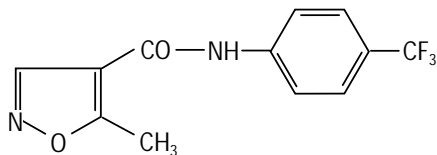
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6 **Rx only**

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8 **CONTRAINDICATIONS AND WARNINGS**

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10 **PREGNANCY MUST BE EXCLUDED BEFORE THE START OF TREATMENT WITH**  
11 **ARAVA. ARAVA IS CONTRAINDICATED IN PREGNANT WOMEN, OR WOMEN**  
12 **OF CHILDBEARING POTENTIAL WHO ARE NOT USING RELIABLE**  
13 **CONTRACEPTION. (SEE CONTRAINDICATIONS AND WARNINGS.) PREGNANCY**  
14 **MUST BE AVOIDED DURING ARAVA TREATMENT OR PRIOR TO THE**  
15 **COMPLETION OF THE DRUG ELIMINATION PROCEDURE AFTER ARAVA**  
16 **TREATMENT.**

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18 **DESCRIPTION**

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20 ARAVA® (leflunomide) is a pyrimidine synthesis inhibitor. The chemical name for leflunomide  
21 is N-(4'-trifluoromethylphenyl)-5-methylisoxazole-4-carboxamide. It has an empirical formula  
22 C<sub>12</sub>H<sub>9</sub>F<sub>3</sub>N<sub>2</sub>O<sub>2</sub>, a molecular weight of 270.2 and the following structural formula:



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29 ARAVA is available for oral administration as tablets containing 10, 20, or 100 mg of active  
30 drug. Combined with leflunomide are the following inactive ingredients: colloidal silicon  
31 dioxide, crospovidone, hypromellose, lactose monohydrate, magnesium stearate, polyethylene  
32 glycol, povidone, starch, talc, titanium dioxide, and yellow ferric oxide (20 mg tablet only).

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34 **CLINICAL PHARMACOLOGY**

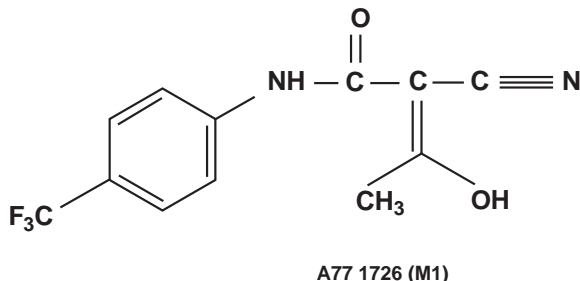
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36 **Mechanism of Action**

37 Leflunomide is an isoxazole immunomodulatory agent which inhibits dihydroorotate  
38 dehydrogenase (an enzyme involved in de novo pyrimidine synthesis) and has antiproliferative  
39 activity. Several *in vivo* and *in vitro* experimental models have demonstrated an anti-  
40 inflammatory effect.

41 **Pharmacokinetics**

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42 Following oral administration, leflunomide is metabolized to an active metabolite A77 1726  
43 (hereafter referred to as M1) which is responsible for essentially all of its activity *in vivo*.  
44 Plasma levels of leflunomide are occasionally seen, at very low levels. Studies of the  
45 pharmacokinetics of leflunomide have primarily examined the plasma concentrations of this  
46 active metabolite.  
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### Absorption

Following oral administration, peak levels of the active metabolite, M1, occurred between 6 - 12 hours after dosing. Due to the very long half-life of M1 (~2 weeks), a loading dose of 100 mg for 3 days was used in clinical studies to facilitate the rapid attainment of steady-state levels of M1. Without a loading dose, it is estimated that attainment of steady-state plasma concentrations would require nearly two months of dosing. The resulting plasma concentrations following both loading doses and continued clinical dosing indicate that M1 plasma levels are dose proportional.

**Table 1. Pharmacokinetic Parameters for M1 after Administration of Leflunomide at Doses of 5, 10, and 25 mg/day for 24 Weeks to Patients (n=54) with Rheumatoid Arthritis (Mean ± SD) (Study YU204)**

Maintenance (Loading) Dose			
Parameter	5 mg (50 mg)	10 mg (100 mg)	25 mg (100 mg)
C <sub>24</sub> (Day 1) (µg/mL) <sup>1</sup>	4.0 ± 0.6	8.4 ± 2.1	8.5 ± 2.2
C <sub>24</sub> (ss) (µg/mL) <sup>2</sup>	8.8 ± 2.9	18 ± 9.6	63 ± 36
T <sub>1/2</sub> (DAYS)	15 ± 3	14 ± 5	18 ± 9

<sup>1</sup> Concentration at 24 hours after loading dose  
<sup>2</sup> Concentration at 24 hours after maintenance doses at steady state

58 Relative to an oral solution, ARAVA tablets are 80% bioavailable. Co-administration of  
59 leflunomide tablets with a high fat meal did not have a significant impact on M1 plasma levels.

### Distribution

60 M1 has a low volume of distribution (V<sub>ss</sub> = 0.13 L/kg) and is extensively bound (>99.3%) to  
61 albumin in healthy subjects. Protein binding has been shown to be linear at therapeutic  
62 concentrations. The free fraction of M1 is slightly higher in patients with rheumatoid arthritis  
63 and approximately doubled in patients with chronic renal failure; the mechanism and  
64 significance of these increases are unknown.  
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### Metabolism

66 Leflunomide is metabolized to one primary (M1) and many minor metabolites. Of these minor  
67 metabolites, only 4-trifluoromethylaniline (TFMA) is quantifiable, occurring at low levels in the  
68 plasma of some patients. The parent compound is rarely detectable in plasma. At the present time  
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70 the specific site of leflunomide metabolism is unknown. *In vivo* and *in vitro* studies suggest a  
71 role for both the GI wall and the liver in drug metabolism. No specific enzyme has been  
72 identified as the primary route of metabolism for leflunomide; however, hepatic cytosolic and  
73 microsomal cellular fractions have been identified as sites of drug metabolism.

#### 74 **Elimination**

75 The active metabolite M1 is eliminated by further metabolism and subsequent renal excretion as  
76 well as by direct biliary excretion. In a 28 day study of drug elimination (n=3) using a single  
77 dose of radiolabeled compound, approximately 43% of the total radioactivity was eliminated in  
78 the urine and 48% was eliminated in the feces. Subsequent analysis of the samples revealed the  
79 primary urinary metabolites to be leflunomide glucuronides and an oxanilic acid derivative of  
80 M1. The primary fecal metabolite was M1. Of these two routes of elimination, renal elimination  
81 is more significant over the first 96 hours after which fecal elimination begins to predominate. In  
82 a study involving the intravenous administration of M1, the clearance was estimated to be  
83 31 mL/hr.

84 In small studies using activated charcoal (n=1) or cholestyramine (n=3) to facilitate drug  
85 elimination, the *in vivo* plasma half-life of M1 was reduced from >1 week to approximately 1  
86 day (see **PRECAUTIONS - General - Need for Drug Elimination**). Similar reductions in  
87 plasma half-life were observed for a series of volunteers (n=96) enrolled in pharmacokinetic  
88 trials who were given cholestyramine. This suggests that biliary recycling is a major contributor  
89 to the long elimination half-life of M1. Studies with both hemodialysis and CAPD (chronic  
90 ambulatory peritoneal dialysis) indicate that M1 is not dialyzable.

#### 91 **Special Populations**

92 **Gender.** Gender has not been shown to cause a consistent change in the *in vivo* pharmacokinetics  
93 of M1.

94 **Age.** Age has been shown to cause a change in the *in vivo* pharmacokinetics of M1 (see  
95 **CLINICAL PHARMACOLOGY – Special Populations - Pediatrics**).

96 **Smoking.** A population based pharmacokinetic analysis of the phase III data indicates that  
97 smokers have a 38% increase in clearance over non-smokers; however, no difference in clinical  
98 efficacy was seen between smokers and nonsmokers.

99 **Chronic Renal Insufficiency.** In single dose studies in patients (n=6) with chronic renal  
100 insufficiency requiring either chronic ambulatory peritoneal dialysis (CAPD) or hemodialysis,  
101 neither had a significant impact on circulating levels of M1. The free fraction of M1 was almost  
102 doubled, but the mechanism of this increase is not known. In light of the fact that the kidney  
103 plays a role in drug elimination and without adequate studies of leflunomide use in subjects with  
104 renal insufficiency, caution should be used when ARAVA is administered to these patients.

105 **Hepatic Insufficiency.** Studies of the effect of hepatic insufficiency on M1 pharmacokinetics  
106 have not been done. Given the need to metabolize leflunomide into the active species, the role of  
107 the liver in drug elimination/recycling, and the possible risk of increased hepatic toxicity, the use  
108 of leflunomide in patients with hepatic insufficiency is not recommended.

#### 109 **Pediatrics**

110 The pharmacokinetics of M1 following oral administration of leflunomide have been  
111 investigated in 73 pediatric patients with polyarticular course Juvenile Rheumatoid Arthritis  
112 (JRA) who ranged in age from 3 to 17 years. The results of a population pharmacokinetic  
113 analysis of these trials have demonstrated that pediatric patients with body weights  $\leq 40$  kg have  
114 a reduced clearance of M1 (see Table 2) relative to adult rheumatoid arthritis patients.

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<b>Mean <math>\pm</math>SD [Range]</b>		
<b>N</b>	<b>Body Weight (kg)</b>	<b>CL (mL/h)</b>
10	<20	18 $\pm$ 9.8 [6.8-37]
30	20-40	18 $\pm$ 9.5 [4.2-43]
33	>40	26 $\pm$ 16 [9.7-93.6]

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### ***Drug Interactions***

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*In vivo* drug interaction studies have demonstrated a lack of a significant drug interaction between leflunomide and tri-phasic oral contraceptives, and cimetidine.

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*In vitro* studies of protein binding indicated that warfarin did not affect M1 protein binding. At the same time M1 was shown to cause increases ranging from 13 - 50% in the free fraction of diclofenac, ibuprofen and tolbutamide at concentrations in the clinical range. *In vitro* studies of drug metabolism indicate that M1 inhibits CYP 450 2C9, which is responsible for the metabolism of phenytoin, tolbutamide, warfarin and many NSAIDs. M1 has been shown to inhibit the formation of 4'-hydroxydiclofenac from diclofenac *in vitro*. The clinical significance of these findings with regard to phenytoin and tolbutamide is unknown; however, there was extensive concomitant use of NSAIDs in the clinical studies and no differential effect was observed. (see **PRECAUTIONS – Drug Interactions**).

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**Methotrexate.** Coadministration, in 30 patients, of ARAVA (100 mg/day x 2 days followed by 10 - 20 mg/day) with methotrexate (10 - 25 mg/week, with folate) demonstrated no pharmacokinetic interaction between the two drugs. However, co-administration increased risk of hepatotoxicity (see **PRECAUTIONS - Drug Interactions–Hepatotoxic Drugs**).

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**Rifampin.** Following concomitant administration of a single dose of ARAVA to subjects receiving multiple doses of rifampin, M1 peak levels were increased (~40%) over those seen when ARAVA was given alone. Because of the potential for ARAVA levels to continue to increase with multiple dosing, caution should be used if patients are to receive both ARAVA and rifampin.

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## **CLINICAL STUDIES**

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### **A. ADULTS**

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The efficacy of ARAVA in the treatment of rheumatoid arthritis (RA) was demonstrated in three controlled trials showing reduction in signs and symptoms, and inhibition of structural damage. In two placebo controlled trials, efficacy was demonstrated for improvement in physical function.

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#### **1. Reduction of signs and symptoms**

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Relief of signs and symptoms was assessed using the American College of Rheumatology (ACR)20 Responder Index, a composite of clinical, laboratory, and functional measures in rheumatoid arthritis. An “ACR20 Responder” is a patient who had  $\geq 20\%$  improvement in both tender and swollen joint counts and in 3 of the following 5 criteria: physician global assessment, patient global assessment, functional ability measure [Modified Health Assessment Questionnaire (MHAQ)], visual analog pain scale, and erythrocyte sedimentation rate or C-reactive protein. An “ACR20 Responder at Endpoint” is a patient who completed the study and was an ACR20 Responder at the completion of the study.

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157 **2. Inhibition of structural damage**

158 Inhibition of structural damage compared to control was assessed using the Sharp Score (Sharp,  
159 JT. Scoring Radiographic Abnormalities in Rheumatoid Arthritis, Radiologic Clinics of North  
160 America, 1996; vol. 34, pp. 233-241), a composite score of X-ray erosions and joint space  
161 narrowing in hands/wrists and forefeet.

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163 **3. Improvement in physical function**

164 Improvement in physical function was assessed using the Health Assessment Questionnaire  
165 (HAQ) and the Medical Outcomes Survey Short Form (SF-36).

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167 In all Arava monotherapy studies, an initial loading dose of 100 mg per day for three days only  
168 was used followed by 20 mg per day thereafter.

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170 **US301 Clinical Trial in Adults**

171 Study US301, a 2 year study, randomized 482 patients with active RA of at least 6 months  
172 duration to leflunomide 20 mg/day (n=182), methotrexate 7.5 mg/week increasing to  
173 15 mg/week (n=182), or placebo (n=118). All patients received folate 1 mg BID. Primary  
174 analysis was at 52 weeks with blinded treatment to 104 weeks.

175 Overall, 235 of the 508 randomized treated patients (482 in primary data analysis and an  
176 additional 26 patients), continued into a second 12 months of double-blind treatment  
177 (98 leflunomide, 101 methotrexate, 36 placebo). Leflunomide dose continued at 20 mg/day and  
178 the methotrexate dose could be increased to a maximum of 20 mg/week. In total, 190 patients  
179 (83 leflunomide, 80 methotrexate, 27 placebo) completed 2 years of double-blind treatment.

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181 The rate and reason for withdrawal is summarized in Table 3.

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**Table 3: Withdrawals in US301**

	n(%) patients					
	Leflunomide 190		Placebo 128		Methotrexate 190	
Withdrawals in Year-1						
Lack of efficacy	33	(17.4)	7		5	
			0	(54.7)	0	(26.3)
Safety	44	(23.2)	1		2	
			2	(9.4)	2	(11.6)
Other <sup>1</sup>	15	(7.9)	1		1	
			0	(7.8)	7	(9.0)
Total	92	(48.4)	9		8	
			2	(71.9)	9	(46.8)
Patients entering Year 2						
		98		36		101
Withdrawals in Year-2						
Lack of efficacy	4	(4.1)	1	(2.8)	4	(4.0)
Safety	8	(8.2)	0	(0.0)	10	(9.9)
Other <sup>1</sup>	3	(3.1)	8	(22.2)	7	(6.9)
Total	15	5 (15.3)	9	(25.0)	21	(20.8)

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186 **MN301/303/305 Clinical Trial in Adults**  
187 Study MN301 randomized 358 patients with active RA to leflunomide 20 mg/day (n=133),  
188 sulfasalazine 2.0 g/day (n=133), or placebo (n=92). Treatment duration was 24 weeks. An  
189 extension of the study was an optional 6-month blinded continuation of MN301 without the  
190 placebo arm, resulting in a 12-month comparison of leflunomide and sulfasalazine (study  
191 MN303).  
192 Of the 168 patients who completed 12 months of treatment in MN301 and MN303, 146 patients  
193 (87%) entered a 1-year extension study of double blind active treatment (MN305;  
194 60 leflunomide, 60 sulfasalazine, 26 placebo/ sulfasalazine). Patients continued on the same  
195 daily dosage of leflunomide or sulfasalazine that they had been taking at the completion of  
196 MN301/303. A total of 121 patients (53 leflunomide, 47 sulfasalazine, 21 placebo/sulfasalazine)  
197 completed the 2 years of double-blind treatment.  
198 Patient withdrawal data in MN301/303/305 is summarized in Table 4.  
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**Table 4: Withdrawals in study MN301/303/305**

	n(%) patients					
	Leflunomide 133		Placebo 92		Sulfasalazine 133	
Withdrawals in MN301 (Mo 0-6)						
	1					
Lack of efficacy	0	(7.5)	29	(31.5)	14	(10.5)
	1					
Safety	9	(14.3)	6	(6.5)	25	(18.8)
Other <sup>1</sup>	8	(6.0)	6	(6.5)	11	(8.3)
	3					
Total	7	(27.8)	41	(44.6)	50	(37.6)
Patients entering MN303						
		80				76
Withdrawals in MN303 (Mo 7-12)						
Lack of efficacy	4	(5.0)			2	(2.6)
Safety	2	(2.5)			5	(6.6)
Other <sup>1</sup>	3	(3.8)			1	(1.3)
Total	9	(11.3)			8	(10.5)
Patients entering MN305						
		60				60
Withdrawals in MN305 (Mo 13-24)						
Lack of efficacy	0	(0.0)			3	(5.0)
Safety	6	(10.0)			8	(13.3)
Other <sup>1</sup>	1	(1.7)			2	(3.3)
Total	7	(11.7)			13	(21.7)

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202 <sup>1</sup> Includes: lost to follow up, protocol violation, noncompliance, voluntary withdrawal, investigator discretion.

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203 **MN302/304 Clinical Trial in Adults**

204 Study MN302 randomized 999 patients with active RA to leflunomide 20 mg/day (n=501) or  
205 methotrexate at 7.5 mg/week increasing to 15 mg/week (n=498). Folate supplementation was  
206 used in 10% of patients. Treatment duration was 52 weeks.

207 Of the 736 patients who completed 52 weeks of treatment in study MN302, 612 (83%) entered  
208 the double-blind, 1-year extension study MN304 (292 leflunomide, 320 methotrexate). Patients  
209 continued on the same daily dosage of leflunomide or methotrexate that they had been taking at  
210 the completion of MN302. There were 533 patients (256 leflunomide, 277 methotrexate) who  
211 completed 2 years of double-blind treatment.

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Patient withdrawal data in MN302/304 is summarized in Table 5.

**Table 5: Withdrawals in MN302/304**

	n(%) patients	
	Leflunomide 501	Methotrexate 498
Withdrawals in MN302 (Year-1)		
Lack of efficacy	37 (7.4)	15 (3.0)
Safety	98 (19.6)	79 (15.9)
Other <sup>1</sup>	17 (3.4)	17 (3.4)
Total	152 (30.3)	111 (22.3)
Patients entering MN304	292	320
Withdrawals in MN304 (Year-2)		
Lack of efficacy	13 (4.5)	9 (2.8)
Safety	11 (3.8)	22 (6.9)
Other <sup>1</sup>	12 (4.1)	12 (3.8)
Total	36 (12.3)	43 (13.4)

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<sup>1</sup> Includes: lost to follow up, protocol violation, noncompliance, voluntary withdrawal, investigator discretion.

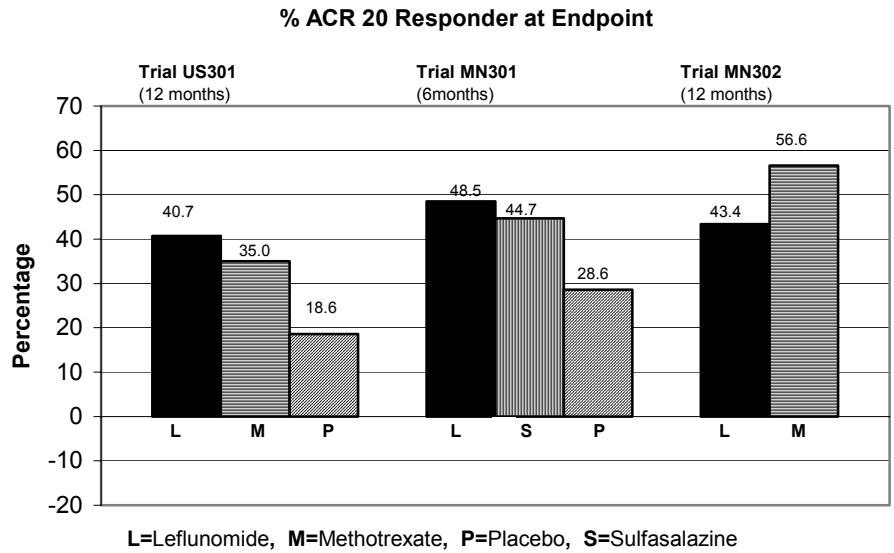
**Clinical Trial Data**

**1. Signs and symptoms Rheumatoid Arthritis**

The ACR20 Responder at Endpoint rates are shown in Figure 1. ARAVA was statistically significantly superior to placebo in reducing the signs and symptoms of RA by the primary efficacy analysis, ACR20 Responder at Endpoint, in study US301 (at the primary 12 months endpoint) and MN301 (at 6 month endpoint). ACR20 Responder at Endpoint rates with ARAVA treatment were consistent across the 6 and 12 month studies (41 - 49%). No consistent differences were demonstrated between leflunomide and methotrexate or between leflunomide and sulfasalazine. ARAVA treatment effect was evident by 1 month, stabilized by 3 - 6 months, and continued throughout the course of treatment as shown in Figure 2.

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229 **Figure 1**

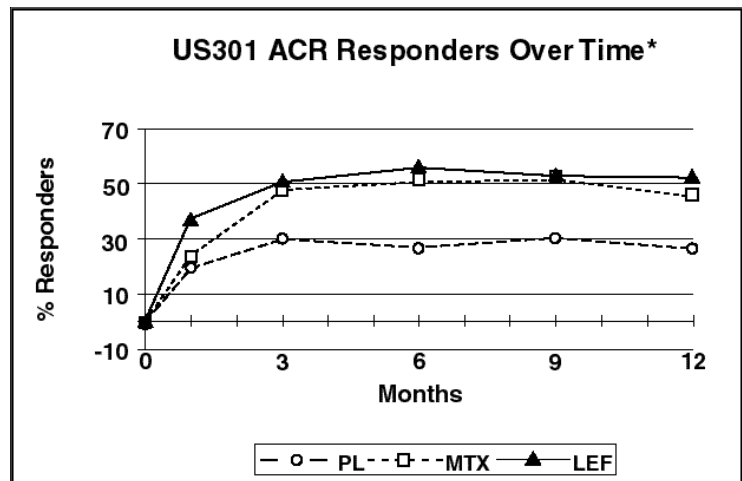


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Comparisons	95% Confidence Interval	p Value	
US301	Leflunomide vs. Placebo	(12, 32)	<0.0001
	Methotrexate vs. Placebo	(8, 30)	<0.0001
	Leflunomide vs. Methotrexate	(-4, 16)	NS
MN301	Leflunomide vs. Placebo	(7, 33)	0.0026
	Sulfasalazine vs. Placebo	(4, 29)	0.0121
	Leflunomide vs. Sulfasalazine	(-8, 16)	NS
MN302	Leflunomide vs. Methotrexate	(-19, -7)	<0.0001

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**Figure 2**



\*Last Observation Carried Forward.

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238 ACR50 and ACR70 Responders are defined in an analogous manner to the ACR 20 Responder,  
239 but use improvements of 50% or 70%, respectively (Table 6). Mean change for the individual  
240 components of the ACR Responder Index are shown in Table 7.  
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<b>Table 6. Summary of ACR Response Rates*</b>			
Study and Treatment Group	ACR20	ACR50	ACR70
Placebo-Controlled Studies			
US301 (12 months)			
Leflunomide (n=178) <sup>†</sup>	52.2 <sup>‡</sup>	34.3 <sup>‡</sup>	20.2 <sup>‡</sup>
Placebo (n=118) <sup>†</sup>	26.3	7.6	4.2
Methotrexate (n=180) <sup>†</sup>	45.6	22.8	9.4
MN301 (6 months)			
Leflunomide (n=130) <sup>†</sup>	54.6 <sup>‡</sup>	33.1 <sup>‡</sup>	10.0 <sup>§</sup>
Placebo (n=91) <sup>†</sup>	28.6	14.3	2.2
Sulfasalazine (n=132) <sup>†</sup>	56.8	30.3	7.6
Non-Placebo Active-Controlled Studies			
MN302 (12 months)			
Leflunomide (n=495) <sup>†</sup>	51.1	31.1	9.9
Methotrexate (n=489) <sup>†</sup>	65.2	43.8	16.4
* Intent to treat (ITT) analysis using last observation carried forward (LOCF) technique for patients who discontinued early.			
<sup>†</sup> N is the number of ITT patients for whom adequate data were available to calculate the indicated rates.			
<sup>‡</sup> p<0.001 leflunomide vs placebo			
<sup>§</sup> p<0.02 leflunomide vs placebo			

242  
243 Table 7 shows the results of the components of the ACR response criteria for US301, MN301,  
244 and MN302. ARAVA was significantly superior to placebo in all components of the ACR  
245 Response criteria in study US301 and MN301. In addition, Arava was significantly superior to  
246 placebo in improving morning stiffness, a measure of RA disease activity, not included in the  
247 ACR Response criteria. No consistent differences were demonstrated between ARAVA and the  
248 active comparators.

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<b>Table 7. Mean Change in the Components of the ACR Responder Index*</b>								
Components	Placebo-Controlled Studies						Non-placebo Controlled Study	
	US301 (12 months)			MN301 Non-US (6 months)			MN302 Non-US (12 months)	
	Leflu-nomide	Metho-trexate	Placebo	Leflu-nomide	Sulfa-salazine	Placebo	Leflu-nomide	Metho-trexate
Tender joint count <sup>1</sup>	-7.7	-6.6	-3.0	-9.7	-8.1	-4.3	-8.3	-9.7
Swollen joint count <sup>1</sup>	-5.7	-5.4	-2.9	-7.2	-6.2	-3.4	-6.8	-9.0
Patient global assessment <sup>2</sup>	-2.1	-1.5	0.1	-2.8	-2.6	-0.9	-2.3	-3.0
Physician global assessment <sup>2</sup>	-2.8	-2.4	-1.0	-2.7	-2.5	-0.8	-2.3	-3.1
Physical function/disability (MHAQ/HAQ)	-0.29	-0.15	0.07	-0.50	-0.29	-0.04	-0.37	-0.44
Pain intensity <sup>2</sup>	-2.2	-1.7	-0.5	-2.7	-2.0	-0.9	-2.1	-2.9
Erythrocyte Sedimentation rate	-6.26	-6.48	2.56	-7.48	-16.56	3.44	-10.12	-22.18
C-reactive protein	-0.62	-0.50	0.47	-2.26	-1.19	0.16	-1.86	-2.45
<b>Not included in the ACR Responder Index</b>								
Morning Stiffness (min)	-101.4	-88.7	14.7	-93.0	-42.4	-6.8	-63.7	-86.6
* Last Observation Carried Forward; Negative Change Indicates Improvement								
1 Based on 28 joint count								
2 Visual Analog Scale - 0=Best; 10=Worst								

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**Maintenance of effect**

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After completing 12 months of treatment, patients continuing on study treatment were evaluated for an additional 12 months of double-blind treatment (total treatment period of 2 years) in studies US301, MN305, and MN304. ACR Responder rates at 12 months were maintained over 2 years in most patients continuing a second year of treatment.

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Improvement from baseline in the individual components of the ACR responder criteria was also sustained in most patients during the second year of Arava treatment in all three trials.

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**2. Inhibition of structural damage**

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The change from baseline to endpoint in progression of structural disease, as measured by the Sharp X-ray score, is displayed in Figure 3. ARAVA was statistically significantly superior to placebo in inhibiting the progression of disease by the Sharp Score. No consistent differences were demonstrated between leflunomide and methotrexate or between leflunomide and sulfasalazine.

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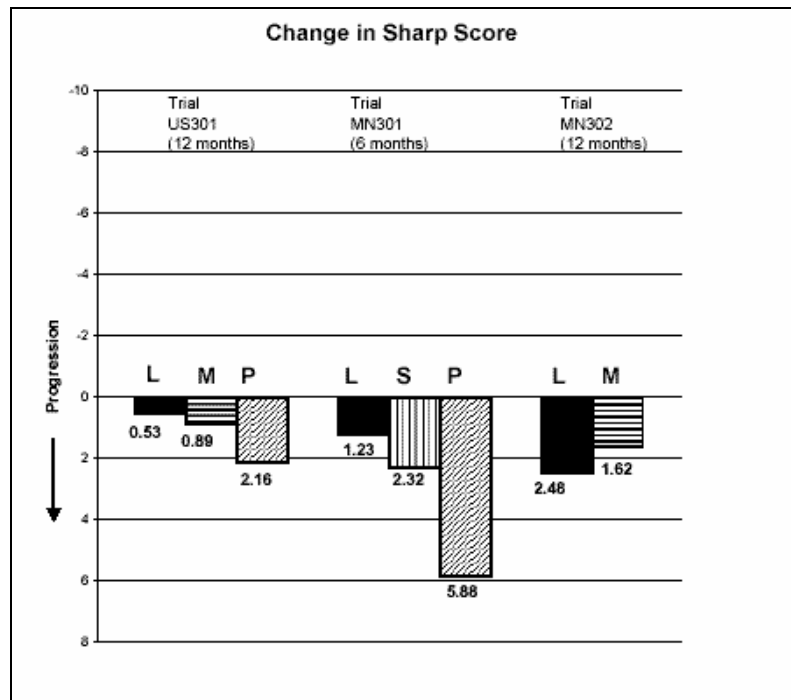
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267 **Figure 3**



L= Leflunomide; M=methotrexate; S=sulfasalazine; P=placebo

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	Comparisons	95% Confidence Interval	p Value
US301	Leflunomide vs. Placebo	(-4.0, -1.1)	0.0007
	Methotrexate vs. Placebo	(-2.6, -0.2)	0.0196
	Leflunomide vs. Methotrexate	(-2.3, 0.0)	0.0499
MN301	Leflunomide vs. Placebo	(-6.2, -1.8)	0.0004
	Sulfasalazine vs. Placebo	(-6.9, 0.0)	0.0484
	Leflunomide vs. Sulfasalazine	(-3.3, 1.2)	NS
MN302	Leflunomide vs. Methotrexate	(-2.2, 7.4)	NS

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**3. Improvement in physical function**

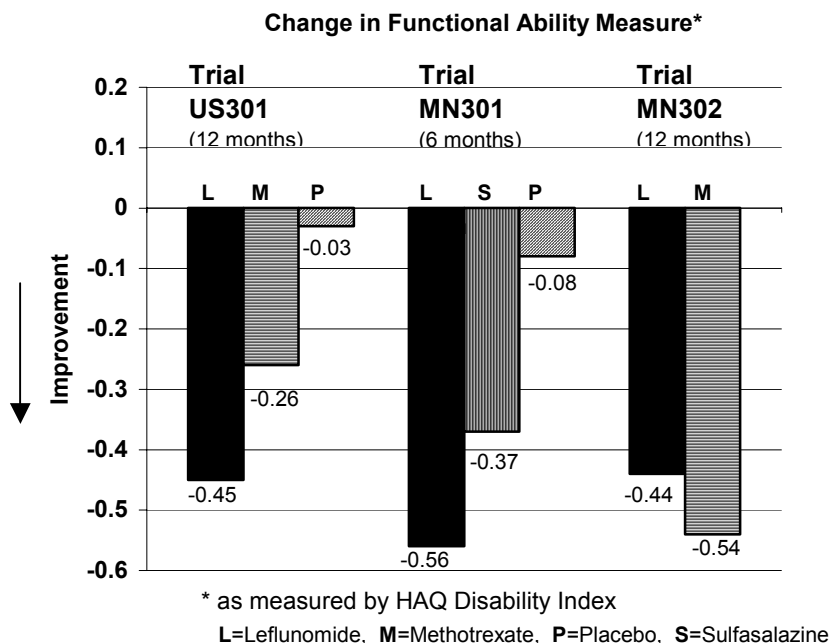
The Health Assessment Questionnaire (HAQ) assesses a patient’s physical function and degree of disability. The mean change from baseline in functional ability as measured by the HAQ Disability Index (HAQ DI) in the 6 and 12 month placebo and active controlled trials is shown in Figure 4. ARAVA was statistically significantly superior to placebo in improving physical function. Superiority to placebo was demonstrated consistently across all eight HAQ DI subscales (dressing, arising, eating, walking, hygiene, reach, grip and activities) in both placebo controlled studies.

The Medical Outcomes Survey Short Form 36 (SF-36), a generic health-related quality of life questionnaire, further addresses physical function. In US301, at 12 months, ARAVA provided statistically significant improvements compared to placebo in the Physical Component Summary (PCS) Score.

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**Figure 4**



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	Comparison	95% Confidence Interval	p Value
US301	Leflunomide vs. Placebo	(-0.58, -0.29)	0.0001
	Leflunomide vs. Methotrexate	(-0.34, -0.07)	0.0026
MN301	Leflunomide vs. Placebo	(-0.67, -0.36)	<0.0001
	Leflunomide vs. Sulfasalazine	(-0.33, -0.03)	0.0163
MN302	Leflunomide vs. Methotrexate	(0.01, 0.16)	0.0221

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292 **Maintenance of effect**

293 The improvement in physical function demonstrated at 6 and 12 months was maintained over  
294 two years. In those patients continuing therapy for a second year, this improvement in physical  
295 function as measured by HAQ and SF-36 (PCS) was maintained.

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297 **B. PEDIATRICS**

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299 **Clinical Trials in Pediatrics**

300 ARAVA was studied in a single multicenter, double-blind, active-controlled trial in 94 patients  
301 (1:1 randomization) with polyarticular course juvenile rheumatoid arthritis (JRA) as defined by  
302 the American College of Rheumatology (ACR). Approximately 68% of pediatric patients  
303 receiving ARAVA, versus 89% of pediatric patients receiving the active comparator, improved  
304 by Week 16 (end-of-study) employing the JRA Definition of Improvement (DOI)  $\geq$  30 %  
305 responder endpoint. In this trial, the loading dose and maintenance dose of ARAVA was based  
306 on three weight categories: <20 kg, 20-40kg, and >40 kg. The response rate to ARAVA in  
307 pediatric patients  $\leq$ 40 kg was less robust than in pediatric patients >40 kg suggesting suboptimal  
308 dosing in smaller weight pediatric patients, as studied, resulting in less than efficacious plasma  
309 concentrations, despite reduced clearance of M1. (See **Pharmacokinetics**).

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## INDICATIONS AND USAGE

ARAVA is indicated in adults for the treatment of active rheumatoid arthritis (RA):

1. to reduce signs and symptoms
  2. to inhibit structural damage as evidenced by X-ray erosions and joint space narrowing
  3. to improve physical function.
- (see **CLINICAL STUDIES**)

Aspirin, nonsteroidal anti-inflammatory agents and/or low dose corticosteroids may be continued during treatment with ARAVA (see **PRECAUTIONS – Drug Interactions – NSAIDs**). The combined use of ARAVA with antimalarials, intramuscular or oral gold, D penicillamine, azathioprine, or methotrexate has not been adequately studied (see **WARNINGS - Immunosuppression Potential/Bone Marrow Suppression**).

## CONTRAINDICATIONS

ARAVA is contraindicated in patients with known hypersensitivity to leflunomide or any of the other components of ARAVA.

ARAVA can cause fetal harm when administered to a pregnant woman. Leflunomide, when administered orally to rats during organogenesis at a dose of 15 mg/kg, was teratogenic (most notably anophthalmia or microphthalmia and internal hydrocephalus). The systemic exposure of rats at this dose was approximately 1/10 the human exposure level based on AUC. Under these exposure conditions, leflunomide also caused a decrease in the maternal body weight and an increase in embryoletality with a decrease in fetal body weight for surviving fetuses. In rabbits, oral treatment with 10 mg/kg of leflunomide during organogenesis resulted in fused, dysplastic sternebrae. The exposure level at this dose was essentially equivalent to the maximum human exposure level based on AUC. At a 1 mg/kg dose, leflunomide was not teratogenic in rats and rabbits.

When female rats were treated with 1.25 mg/kg of leflunomide beginning 14 days before mating and continuing until the end of lactation, the offspring exhibited marked (greater than 90%) decreases in postnatal survival. The systemic exposure level at 1.25 mg/kg was approximately 1/100 the human exposure level based on AUC.

ARAVA is contraindicated in women who are or may become pregnant. If this drug is used during pregnancy, or if the patient becomes pregnant while taking this drug, the patient should be apprised of the potential hazard to the fetus.

## WARNINGS

### **Immunosuppression Potential/Bone Marrow Suppression**

ARAVA is not recommended for patients with severe immunodeficiency, bone marrow dysplasia, or severe, uncontrolled infections. In the event that a serious infection occurs, it may be necessary to interrupt therapy with ARAVA and administer cholestyramine or charcoal (see **PRECAUTIONS – General – Need for Drug Elimination**). Medications like leflunomide that have immunosuppression potential may cause patients to be more susceptible to infections, including opportunistic infections. Rarely, severe infections including sepsis, which may be fatal, have been reported in patients receiving ARAVA. Most of the reports were confounded by

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357 concomitant immunosuppressant therapy and/or comorbid illness which, in addition to  
358 rheumatoid disease, may predispose patients to infection.  
359 There have been rare reports of pancytopenia, agranulocytosis and thrombocytopenia in patients  
360 receiving ARAVA alone. These events have been reported most frequently in patients who  
361 received concomitant treatment with methotrexate or other immunosuppressive agents, or who  
362 had recently discontinued these therapies; in some cases, patients had a prior history of a  
363 significant hematologic abnormality.  
364 Patients taking ARAVA should have platelet, white blood cell count and hemoglobin or  
365 hematocrit monitored at baseline and monthly for six months following initiation of therapy and  
366 every 6- to 8 weeks thereafter. If used with concomitant methotrexate and/or other potential  
367 immunosuppressive agents, chronic monitoring should be monthly. If evidence of bone marrow  
368 suppression occurs in a patient taking ARAVA, treatment with ARAVA should be stopped, and  
369 cholestyramine or charcoal should be used to reduce the plasma concentration of leflunomide  
370 active metabolite (see **PRECAUTIONS – General – Need for Drug Elimination**).  
371 In any situation in which the decision is made to switch from ARAVA to another anti-rheumatic  
372 agent with a known potential for hematologic suppression, it would be prudent to monitor for  
373 hematologic toxicity, because there will be overlap of systemic exposure to both compounds.  
374 ARAVA washout with cholestyramine or charcoal may decrease this risk, but also may induce  
375 disease worsening if the patient had been responding to ARAVA treatment.

376 **Hepatotoxicity**  
377 **RARE CASES OF SEVERE LIVER INJURY, INCLUDING CASES WITH FATAL**  
378 **OUTCOME, HAVE BEEN REPORTED DURING TREATMENT WITH**  
379 **LEFLUNOMIDE. MOST CASES OF SEVERE LIVER INJURY OCCUR WITHIN 6**  
380 **MONTHS OF THERAPY AND IN A SETTING OF MULTIPLE RISK FACTORS FOR**  
381 **HEPATOTOXICITY (liver disease, other hepatotoxins). (See PRECAUTIONS).**  
382 At minimum, ALT (SGPT) must be performed at baseline and monitored initially at monthly  
383 intervals during the first six months then, if stable, every 6 to 8 weeks thereafter. In addition, if  
384 ARAVA and methotrexate are given concomitantly, ACR guidelines for monitoring  
385 methotrexate liver toxicity must be followed with ALT, AST, and serum albumin testing  
386 monthly.  
387 Guidelines for dose adjustment or discontinuation based on the severity and persistence of ALT  
388 elevation are recommended as follows: For confirmed ALT elevations between 2- and 3-fold  
389 ULN, dose reduction to 10 mg/day may allow continued administration of ARAVA under close  
390 monitoring. If elevations between 2- and 3-fold ULN persist despite dose reduction or if ALT  
391 elevations of >3-fold ULN are present, ARAVA should be discontinued and cholestyramine or  
392 charcoal should be administered (see **PRECAUTIONS - General - Need for Drug**  
393 **Elimination**) with close monitoring, including retreatment with cholestyramine or charcoal as  
394 indicated.  
395 In clinical trials, ARAVA treatment as monotherapy or in combination with methotrexate was  
396 associated with elevations of liver enzymes, primarily ALT and AST, in a significant number of  
397 patients; these effects were generally reversible. Most transaminase elevations were mild ( $\leq 2$ -  
398 fold ULN) and usually resolved while continuing treatment. Marked elevations (>3-fold ULN)  
399 occurred infrequently and reversed with dose reduction or discontinuation of treatment. Table 8  
400 shows liver enzyme elevations seen with monthly monitoring in clinical trials US301 and  
401 MN301. It was notable that the absence of folate use in MN302 was associated with a  
402 considerably greater incidence of liver enzyme elevation on methotrexate.

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	US301			MN301			MN302*	
	LEF	PL	MTX	LEF	PL	SSZ	LEF	MTX
ALT (SGPT) >3-fold ULN (n %)	8 (4.4)	3 (2.5)	5 (2.7)	2 (1.5)	1 (1.1)	2 (1.5)	13 (2.6)	83 (16.7)
Reversed to ≤ 2-fold ULN:	8	3	5	2	1	2	12	82
Timing of Elevation								
0-3 Months	6	1	1	2	1	2	7	27
4-6 Months	1	1	3	-	-	-	1	34
7-9 Months	1	1	1	-	-	-	-	16
10-12 Months	-	-	-	-	-	-	5	6

\*Only 10% of patients in MN302 received folate. All patients in US301 received folate.

In a 6 month study of 263 patients with persistent active rheumatoid arthritis despite methotrexate therapy, and with normal LFTs, leflunomide was added to a group of 133 patients starting at 10 mg per day and increased to 20 mg as needed. An increase in ALT greater than or equal to three times the ULN was observed in 3.8% of patients compared to 0.8% in 130 patients continued on methotrexate with placebo added.

**Pre-existing Hepatic Disease**

Given the possible risk of increased hepatotoxicity, and the role of the liver in drug activation, elimination and recycling, the use of ARAVA is not recommended in patients with significant hepatic impairment or evidence of infection with hepatitis B or C viruses. (See **WARNINGS – Hepatotoxicity**).

**Skin Reactions**

Rare cases of Stevens-Johnson syndrome and toxic epidermal necrolysis have been reported in patients receiving ARAVA. If a patient taking ARAVA develops any of these conditions, ARAVA therapy should be stopped, and a drug elimination procedure is recommended (see **PRECAUTIONS - General - Need for Drug Elimination**).

**Malignancy**

The risk of malignancy, particularly lymphoproliferative disorders, is increased with the use of some immunosuppression medications. There is a potential for immunosuppression with ARAVA. No apparent increase in the incidence of malignancies and lymphoproliferative disorders was reported in the clinical trials of ARAVA, but larger and longer-term studies would be needed to determine whether there is an increased risk of malignancy or lymphoproliferative disorders with ARAVA.

**Use in Women of Childbearing Potential**

There are no adequate and well-controlled studies evaluating ARAVA in pregnant women. However, based on animal studies, leflunomide may increase the risk of fetal death or teratogenic effects when administered to a pregnant woman (see **CONTRAINDICATIONS**). Women of childbearing potential must not be started on ARAVA until pregnancy is excluded and it has been confirmed that they are using reliable contraception. Before starting treatment with ARAVA, patients must be fully counseled on the potential for serious risk to the fetus. The patient must be advised that if there is any delay in onset of menses or any other reason to suspect pregnancy, they must notify the physician immediately for pregnancy testing and, if positive, the physician and patient must discuss the risk to the pregnancy. It is possible that rapidly lowering the blood level of the active metabolite by instituting the drug elimination procedure described below at the first delay of menses may decrease the risk to the fetus from ARAVA. Upon discontinuing ARAVA, it is recommended that all women of childbearing potential undergo the drug elimination procedure described below. Women receiving ARAVA treatment

443 who wish to become pregnant must discontinue ARAVA and undergo the drug elimination  
444 procedure described below which includes verification of M1 metabolite plasma levels less than  
445 0.02 mg/L (0.02 µg/mL). Human plasma levels of the active metabolite (M1) less than  
446 0.02 mg/L (0.02 µg/mL) are expected to have minimal risk based on available animal data.

#### 447 **Drug Elimination Procedure**

448 The following drug elimination procedure is recommended to achieve non-detectable plasma  
449 levels (less than 0.02 mg/L or 0.02 µg/mL) after stopping treatment with ARAVA:

- 450 1. Administer cholestyramine 8 grams 3 times daily for 11 days. (The 11 days do not  
451 need to be consecutive unless there is a need to lower the plasma level rapidly.)
- 452 2. Verify plasma levels less than 0.02 mg/L (0.02 µg/mL) by two separate tests at least  
453 14 days apart. If plasma levels are higher than 0.02 mg/L, additional cholestyramine  
454 treatment should be considered.

455 Without the drug elimination procedure, it may take up to 2 years to reach plasma M1 metabolite  
456 levels less than 0.02 mg/L due to individual variation in drug clearance.

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## 458 **PRECAUTIONS**

459

### 460 **General**

#### 461 **Need for Drug Elimination**

462 The active metabolite of leflunomide is eliminated slowly from the plasma. In instances of any  
463 serious toxicity from ARAVA, including hypersensitivity, use of a drug elimination procedure as  
464 described in this section is highly recommended to reduce the drug concentration more rapidly  
465 after stopping ARAVA therapy. If hypersensitivity is the suspected clinical mechanism, more  
466 prolonged cholestyramine or charcoal administration may be necessary to achieve rapid and  
467 sufficient clearance. The duration may be modified based on the clinical status of the patient.  
468 Cholestyramine given orally at a dose of 8 g three times a day for 24 hours to three healthy  
469 volunteers decreased plasma levels of M1 by approximately 40% in 24 hours and by 49 to 65%  
470 in 48 hours.

471 Administration of activated charcoal (powder made into a suspension) orally or via nasogastric  
472 tube (50 g every 6 hours for 24 hours) has been shown to reduce plasma concentrations of the  
473 active metabolite, M1, by 37% in 24 hours and by 48% in 48 hours.

474 These drug elimination procedures may be repeated if clinically necessary.

#### 475 **Respiratory**

476 Interstitial lung disease has been reported during treatment with leflunomide and has been  
477 associated with fatal outcomes (see **ADVERSE REACTIONS**). Interstitial lung disease is a  
478 potentially fatal disorder, which may occur acutely at any time during therapy and has a variable  
479 clinical presentation. New onset or worsening pulmonary symptoms, such as cough and  
480 dyspnea, with or without associated fever, may be a reason for discontinuation of the therapy and  
481 for further investigation, as appropriate. If discontinuation of the drug is necessary, initiation of  
482 wash-out procedures should be considered. (see **WARNINGS – Drug Elimination Procedure**).

#### 483 **Renal Insufficiency**

484 Single dose studies in dialysis patients show a doubling of the free fraction of M1 in plasma.  
485 There is no clinical experience in the use of ARAVA in patients with renal impairment. Caution  
486 should be used when administering this drug in this population.

#### 487 **Vaccinations**

488 No clinical data are available on the efficacy and safety of vaccinations during ARAVA  
489 treatment. Vaccination with live vaccines is, however, not recommended. The long half-life of

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490 ARAVA should be considered when contemplating administration of a live vaccine after  
491 stopping ARAVA.

492 **Information for Patients**

- 493 • The potential for increased risk of birth defects should be discussed with female patients  
494 of childbearing potential. It is recommended that physicians advise women that they may  
495 be at increased risk of having a child with birth defects if they are pregnant when taking  
496 ARAVA, become pregnant while taking ARAVA, or do not wait to become pregnant until  
497 they have stopped taking ARAVA and followed the drug elimination procedure (as  
498 described in **WARNINGS – Use In Women of Childbearing Potential – Drug**  
499 **Elimination Procedure**).
- 500 • Patients should be advised of the possibility of rare, serious skin reactions. Patients should  
501 be instructed to inform their physicians promptly if they develop a skin rash or mucous  
502 membrane lesions.
- 503 • Patients should be advised of the potential hepatotoxic effects of ARAVA and of the need  
504 for monitoring liver enzymes. Patients should be instructed to notify their physicians if  
505 they develop symptoms such as unusual tiredness, abdominal pain or jaundice.
- 506 • Patients should be advised that they may develop a lowering of their blood counts and  
507 should have frequent hematologic monitoring. This is particularly important for patients  
508 who are receiving other immunosuppressive therapy concurrently with ARAVA, who  
509 have recently discontinued such therapy before starting treatment with ARAVA, or who  
510 have had a history of a significant hematologic abnormality. Patients should be instructed  
511 to notify their physicians promptly if they notice symptoms of pancytopenia (such as easy  
512 bruising or bleeding, recurrent infections, fever, paleness or unusual tiredness).
- 513 • Patients should be informed about the early warning signs of interstitial lung disease and  
514 asked to contact their physician as soon as possible if these symptoms appear or worsen  
515 during therapy.

516 **Laboratory Tests**

517 ***Hematologic Monitoring***

518 At minimum, patients taking ARAVA should have platelet, white blood cell count and  
519 hemoglobin or hematocrit monitored at baseline and monthly for six months following initiation  
520 of therapy and every 6 to 8 weeks thereafter.

521 ***Bone Marrow Suppression Monitoring***

522 If used concomitantly with immunosuppressants such as methotrexate, chronic monitoring  
523 should be monthly. (see **WARNINGS - Immunosuppression Potential/Bone Marrow**  
524 **Suppression**).

525 ***Liver Enzyme Monitoring***

526 ALT (SGPT) must be performed at baseline and monitored at monthly intervals during the first  
527 six months then, if stable, every 6 to 8 weeks thereafter. In addition, if ARAVA and  
528 methotrexate are given concomitantly, ACR guidelines for monitoring methotrexate liver  
529 toxicity must be followed with ALT, AST, and serum albumin testing every month. (See  
530 **WARNINGS – Hepatotoxicity**.)

531 Due to a specific effect on the brush border of the renal proximal tubule, ARAVA has a  
532 uricosuric effect. A separate effect of hypophosphaturia is seen in some patients. These effects  
533 have not been seen together, nor have there been alterations in renal function.

534 **Drug Interactions**

535 ***Cholestyramine and Charcoal***

536 Administration of cholestyramine or activated charcoal in patients (n=13) and volunteers (n=96)  
537 resulted in a rapid and significant decrease in plasma M1 (the active metabolite of leflunomide)  
538 concentration (see **PRECAUTIONS – General – Need for Drug Elimination**).

539 ***Hepatotoxic Drugs***

540 Increased side effects may occur when leflunomide is given concomitantly with hepatotoxic  
541 substances. This is also to be considered when leflunomide treatment is followed by such drugs  
542 without a drug elimination procedure. In a small (n=30) combination study of ARAVA with  
543 methotrexate, a 2- to 3-fold elevation in liver enzymes was seen in 5 of 30 patients. All  
544 elevations resolved, 2 with continuation of both drugs and 3 after discontinuation of leflunomide.  
545 A >3-fold increase was seen in another 5 patients. All of these also resolved, 2 with continuation  
546 of both drugs and 3 after discontinuation of leflunomide. Three patients met “ACR criteria” for  
547 liver biopsy (1: Roegnik Grade I, 2: Roegnik Grade IIIa). No pharmacokinetic interaction was  
548 identified (see **CLINICAL PHARMACOLOGY**).

549 ***NSAIDs***

550 In *in vitro* studies, M1 was shown to cause increases ranging from 13 - 50% in the free fraction  
551 of diclofenac and ibuprofen at concentrations in the clinical range. The clinical significance of  
552 this finding is unknown; however, there was extensive concomitant use of NSAIDs in clinical  
553 studies and no differential effect was observed.

554 ***Tolbutamide***

555 In *in vitro* studies, M1 was shown to cause increases ranging from 13 - 50% in the free fraction  
556 of tolbutamide at concentrations in the clinical range. The clinical significance of this finding is  
557 unknown.

558 ***Rifampin***

559 Following concomitant administration of a single dose of ARAVA to subjects receiving multiple  
560 doses of rifampin, M1 peak levels were increased (~40%) over those seen when ARAVA was  
561 given alone. Because of the potential for ARAVA levels to continue to increase with multiple  
562 dosing, caution should be used if patients are to be receiving both ARAVA and rifampin.

563 ***Warfarin***

564 Increased INR (International Normalized Ratio) when ARAVA and warfarin were co-  
565 administered has been rarely reported.

566 ***Carcinogenesis, Mutagenesis, and Impairment of Fertility***

567 No evidence of carcinogenicity was observed in a 2-year bioassay in rats at oral doses of  
568 leflunomide up to the maximally tolerated dose of 6 mg/kg (approximately 1/40 the maximum  
569 human M1 systemic exposure based on AUC). However, male mice in a 2-year bioassay  
570 exhibited an increased incidence in lymphoma at an oral dose of 15 mg/kg, the highest dose  
571 studied (1.7 times the human M1 exposure based on AUC). Female mice, in the same study,  
572 exhibited a dose-related increased incidence of bronchoalveolar adenomas and carcinomas  
573 combined beginning at 1.5 mg/kg (approximately 1/10 the human M1 exposure based on AUC).  
574 The significance of the findings in mice relative to the clinical use of ARAVA is not known.  
575 Leflunomide was not mutagenic in the Ames Assay, the Unscheduled DNA Synthesis Assay, or  
576 in the HGPRT Gene Mutation Assay. In addition, leflunomide was not clastogenic in the *in vivo*  
577 Mouse Micronucleus Assay nor in the *in vivo* Cytogenetic Test in Chinese Hamster Bone  
578 Marrow Cells. However, 4-trifluoromethylaniline (TFMA), a minor metabolite of leflunomide,  
579 was mutagenic in the Ames Assay and in the HGPRT Gene Mutation Assay, and was clastogenic  
580 in the *in vitro* Assay for Chromosome Aberrations in the Chinese Hamster Cells. TFMA was not  
581 clastogenic in the *in vivo* Mouse Micronucleus Assay nor in the *in vivo* Cytogenetic Test in  
582 Chinese Hamster Bone Marrow Cells. Leflunomide had no effect on fertility in either male or

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583 female rats at oral doses up to 4.0 mg/kg (approximately 1/30 the human M1 exposure based on  
584 AUC).

585 **Pregnancy**

586 ***Pregnancy Category X.*** (See **CONTRAINDICATIONS** section.) Pregnancy Registry: To  
587 monitor fetal outcomes of pregnant women exposed to leflunomide, health care providers are  
588 encouraged to register such patients by calling 1-877-311-8972.

589 **Nursing Mothers**

590 ARAVA should not be used by nursing mothers. It is not known whether ARAVA is excreted in  
591 human milk. Many drugs are excreted in human milk, and there is a potential for serious adverse  
592 reactions in nursing infants from ARAVA. Therefore, a decision should be made whether to  
593 proceed with nursing or to initiate treatment with ARAVA, taking into account the importance of  
594 the drug to the mother.

595 **Use in Males**

596 Available information does not suggest that ARAVA would be associated with an increased risk  
597 of male-mediated fetal toxicity. However, animal studies to evaluate this specific risk have not  
598 been conducted. To minimize any possible risk, men wishing to father a child should consider  
599 discontinuing use of ARAVA and taking cholestyramine 8 grams 3 times daily for 11 days.

600 **Pediatric Use**

601 The safety and effectiveness of ARAVA in pediatric patients with polyarticular course juvenile  
602 rheumatoid arthritis (JRA) have not been fully evaluated. (See **CLINICAL STUDIES** and  
603 **ADVERSE REACTIONS**).

604 **Geriatric Use**

605 Of the total number of subjects in controlled clinical (Phase III) studies of ARAVA, 234 subjects  
606 were 65 years and over. No overall differences in safety or effectiveness were observed between  
607 these subjects and younger subjects, and other reported clinical experience has not identified  
608 differences in responses between the elderly and younger patients, but greater sensitivity of some  
609 older individuals cannot be ruled out. No dosage adjustment is needed in patients over 65.

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**ADVERSE REACTIONS**

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613 Adverse reactions associated with the use of leflunomide in RA include diarrhea, elevated liver  
614 enzymes (ALT and AST), alopecia and rash. In the controlled studies at one year, the following  
615 adverse events were reported, regardless of causality. (See Table 9.)

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Table 9. Percentage Of Patients With Adverse Events ≥3% In Any Leflunomide Treated Group							
	All RA Studies	Placebo-Controlled Trials				Active-Controlled Trials	
		MN 301 and US 301				MN 302*	
	LEF (N=1339) <sup>1</sup>	LEF (N=315)	PBO (N=210)	SSZ (N=133)	MTX (N=182)	LEF (N=501)	MTX (N=498)
<b>BODY AS A WHOLE</b>							
Allergic Reaction	2%	5%	2%	0%	6%	1%	2%
Asthenia	3%	6%	4%	5%	6%	3%	3%
Flu Syndrome	2%	4%	2%	0%	7%	0%	0%
Infection, upper respiratory	4%	0%	0%	0%	0%	0%	0%
Injury Accident	5%	7%	5%	3%	11%	6%	7%
Pain	2%	4%	2%	2%	5%	1%	<1%
Abdominal Pain	6%	5%	4%	4%	8%	6%	4%
Back Pain	5%	6%	3%	4%	9%	8%	7%
<b>CARDIOVASCULAR</b>							
Hypertension <sup>2</sup>	10%	9%	4%	4%	3%	10%	4%
- New onset of hypertension		1%	<1%	0%	2%	2%	<1%
Chest Pain	2%	4%	2%	2%	4%	1%	2%
<b>GASTROINTESTINAL</b>							
Anorexia	3%	3%	2%	5%	2%	3%	3%
Diarrhea	17%	27%	12%	10%	20%	22%	10%
Dyspepsia	5%	10%	10%	9%	13%	6%	7%
Gastroenteritis	3%	1%	1%	0%	6%	3%	3%
Abnormal Liver Enzymes	5%	10%	2%	4%	10%	6%	17%
Nausea	9%	13%	11%	19%	18%	13%	18%
GI/Abdominal Pain	5%	6%	4%	7%	8%	8%	8%
Mouth Ulcer	3%	5%	4%	3%	10%	3%	6%
Vomiting	3%	5%	4%	4%	3%	3%	3%
<b>METABOLIC AND NUTRITIONAL</b>							
Hypokalemia	1%	3%	1%	1%	1%	1%	<1%
Weight Loss <sup>3</sup>	4%	2%	1%	2%	0%	2%	2%
<b>MUSCULO-SKELETAL SYSTEM</b>							
Arthralgia	1%	4%	3%	0%	9%	<1%	1%
Leg Cramps	1%	4%	2%	2%	6%	0%	0%
Joint Disorder	4%	2%	2%	2%	2%	8%	6%
Synovitis	2%	<1%	1%	0%	2%	4%	2%
Tenosynovitis	3%	2%	0%	1%	2%	5%	1%
<b>NERVOUS SYSTEM</b>							
Dizziness	4%	5%	3%	6%	5%	7%	6%
Headache	7%	13%	11%	12%	21%	10%	8%
Paresthesia	2%	3%	1%	1%	2%	4%	3%
<b>RESPIRATORY SYSTEM</b>							
Bronchitis	7%	5%	2%	4%	7%	8%	7%
Increased Cough	3%	4%	5%	3%	6%	5%	7%
Respiratory Infection	15%	21%	21%	20%	32%	27%	25%
Pharyngitis	3%	2%	1%	2%	1%	3%	3%
Pneumonia	2%	3%	0%	0%	1%	2%	2%
Rhinitis	2%	5%	2%	4%	3%	2%	2%
Sinusitis	2%	5%	5%	0%	10%	1%	1%

<b>SKIN AND APPENDAGES</b>							
Alopecia	10%	9%	1%	6%	6%	17%	10%
Eczema	2%	1%	1%	1%	1%	3%	2%
Pruritus	4%	5%	2%	3%	2%	6%	2%
Rash	10%	12%	7%	11%	9%	11%	10%
Dry Skin	2%	3%	2%	2%	0%	3%	1%
<b>UROGENITAL SYSTEM</b>							
Urinary Tract Infection	5%	5%	7%	4%	2%	5%	6%

- 617  
618 \* Only 10% of patients in MN302 received folate. All patients in US301 received folate; none in  
619 MN301 received folate.  
620 1 Includes all controlled and uncontrolled trials with leflunomide (duration up to 12 months).  
621 2 Hypertension as a preexisting condition was overrepresented in all leflunomide treatment  
622 groups in phase III trials  
623 3 In a meta-analysis of all phase II and III studies, during the first 6 months in patients receiving  
624 leflunomide, 10% lost 10-19 lbs (24 cases per 100 patient years) and 2% lost at least 20 lbs (4  
625 cases/100 patient years). Of patients receiving leflunomide, 4% lost 10% of their baseline weight  
626 during the first 6 months of treatment.

627  
628 Adverse events during a second year of treatment with leflunomide in clinical trials were  
629 consistent with those observed during the first year of treatment and occurred at a similar or  
630 lower incidence.

631  
632 In addition, the following adverse events have been reported in 1% to <3% of the RA patients in  
633 the leflunomide treatment group in controlled clinical trials.  
634 **Body as a Whole:** abscess, cyst, fever, hernia, malaise, pain, neck pain, pelvic pain;  
635 **Cardiovascular:** angina pectoris, migraine, palpitation, tachycardia, varicose vein, vasculitis,  
636 vasodilatation;  
637 **Gastrointestinal:** cholelithiasis, colitis, constipation, esophagitis, flatulence, gastritis, gingivitis,  
638 melena, oral moniliasis, pharyngitis, salivary gland enlarged, stomatitis (or aphthous stomatitis),  
639 tooth disorder;  
640 **Endocrine:** diabetes mellitus, hyperthyroidism;  
641 **Hemic and Lymphatic System:** anemia (including iron deficiency anemia), ecchymosis;  
642 **Metabolic and Nutritional:** creatine phosphokinase increased, hyperglycemia, hyperlipidemia,  
643 peripheral edema;  
644 **Musculo-Skeletal System:** arthrosis, bone necrosis, bone pain, bursitis, muscle cramps, myalgia,  
645 tendon rupture;  
646 **Nervous System:** anxiety, depression, dry mouth, insomnia, neuralgia, neuritis, sleep disorder,  
647 sweating increased, vertigo;  
648 **Respiratory System:** asthma, dyspnea, epistaxis, lung disorder;  
649 **Skin and Appendages:** acne, contact dermatitis, fungal dermatitis, hair discoloration,  
650 hematoma, herpes simplex, herpes zoster, maculopapular rash, nail disorder, skin discoloration,  
651 skin disorder, skin nodule, subcutaneous nodule, ulcer skin;  
652 **Special Senses:** blurred vision, cataract, conjunctivitis, eye disorder, taste perversion;  
653 **Urogenital System:** albuminuria, cystitis, dysuria, hematuria, menstrual disorder, prostate  
654 disorder, urinary frequency, vaginal moniliasis.  
655

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656 Other less common adverse events seen in clinical trials include: 1 case of anaphylactic reaction  
657 occurred in Phase 2 following rechallenge of drug after withdrawal due to rash (rare); urticaria;  
658 eosinophilia; transient thrombocytopenia (rare); and leukopenia  $<2000$  WBC/mm<sup>3</sup> (rare).  
659

660 Adverse events during a second year of treatment with leflunomide in clinical trials were  
661 consistent with those observed during the first year of treatment and occurred at a similar or  
662 lower incidence.  
663

664 In post-marketing experience, the following have been reported rarely:

665 **Body as a whole:** opportunistic infections, severe infections including sepsis that may be fatal;

666 **Gastrointestinal:** pancreatitis;

667 **Hematologic:** agranulocytosis, leukopenia, neutropenia, pancytopenia, thrombocytopenia;

668 **Hypersensitivity:** angioedema;

669 **Hepatic:** hepatitis, jaundice/cholestasis, severe liver injury such as hepatic failure and acute  
670 hepatic necrosis that may be fatal;

671 **Respiratory:** interstitial lung disease, including interstitial pneumonitis and pulmonary fibrosis,  
672 which may be fatal;

673 **Nervous system:** peripheral neuropathy;

674 **Skin and Appendages:** erythema multiforme, Stevens-Johnson syndrome, toxic epidermal  
675 necrolysis.  
676

#### 677 **Adverse Reactions (Pediatric Patients)**

678 The safety of ARAVA was studied in 74 patients with polyarticular course juvenile rheumatoid  
679 arthritis ranging in age from 3-17 years (47 patients from the active-controlled study and 27 from  
680 an open-label safety and pharmacokinetic study). The most common adverse events included  
681 abdominal pain, diarrhea, nausea, vomiting, oral ulcers, upper respiratory tract infections,  
682 alopecia, rash, headache, and dizziness. Less common adverse events included anemia,  
683 hypertension, and weight loss. Fourteen pediatric patients experienced ALT and/or AST  
684 elevations, nine between 1.2 and 3-fold the upper limit of normal, five between 3 and 8-fold the  
685 upper limit of normal.  
686

#### 687 **DRUG ABUSE AND DEPENDENCE**

688  
689 ARAVA has no known potential for abuse or dependence.  
690

#### 691 **OVERDOSAGE**

692  
693 In mouse and rat acute toxicology studies, the minimally toxic dose for oral leflunomide was  
694 200-- 500 mg/kg and 100 mg/kg, respectively (approximately  $>350$  times the maximum  
695 recommended human dose, respectively).  
696

697 There have been reports of chronic overdose in patients taking ARAVA at daily dose up to five  
698 times the recommended daily dose and reports of acute overdose in adults or children. There  
699 were no adverse events reported in the majority of case reports of overdose. Adverse events were  
700 consistent with the safety profile for ARAVA (see **ADVERSE REACTIONS**). The most  
701 frequent adverse events observed were diarrhea, abdominal pain, leukopenia, anemia and  
elevated liver function tests.

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702 In the event of a significant overdose or toxicity, cholestyramine or charcoal administration is  
703 recommended to accelerate elimination (see **PRECAUTIONS – General – Need for Drug**  
704 **Elimination**).  
705 Studies with both hemodialysis and CAPD (chronic ambulatory peritoneal dialysis) indicate that  
706 M1, the primary metabolite of leflunomide, is not dialyzable. (see **CLINICAL**  
707 **PHARMACOLOGY – Elimination**).

## 708 **DOSAGE AND ADMINISTRATION**

### 709 **Loading Dose**

710 Due to the long half-life in patients with RA and recommended dosing interval (24 hours), a  
711 loading dose is needed to provide steady-state concentrations more rapidly. It is recommended  
712 that ARAVA therapy be initiated with a loading dose of one 100 mg tablet per day for 3 days.  
713 Elimination of the loading dose regimen may decrease the risk of adverse events. This could be  
714 especially important for patients at increased risk of hematologic or hepatic toxicity, such as  
715 those receiving concomitant treatment with methotrexate or other immunosuppressive agents or  
716 on such medications in the recent past. (See **WARNINGS — Hepatotoxicity**).

### 717 **Maintenance Therapy**

718 Daily dosing of 20 mg is recommended for treatment of patients with RA. A small cohort of  
719 patients (n=104), treated with 25 mg/day, experienced a greater incidence of side effects;  
720 alopecia, weight loss, liver enzyme elevations. Doses higher than 20 mg/day are not  
721 recommended. If dosing at 20 mg/day is not well tolerated clinically, the dose may be  
722 decreased to 10 mg daily. Liver enzymes must be monitored and dose adjustments may be  
723 necessary (see **WARNINGS – Hepatotoxicity**). Due to the prolonged half-life of the active  
724 metabolite of leflunomide, patients should be carefully observed after dose reduction, since it  
725 may take several weeks for metabolite levels to decline.

## 726 **HOW SUPPLIED**

727 ARAVA Tablets in 10 and 20 mg strengths are packaged in bottles. ARAVA Tablets 100 mg  
728 strength are packaged in blister packs.

### 729 **ARAVA® (leflunomide) Tablets**

730 <b>Strength</b>	731 <b>Quantity</b>	732 <b>NDC Number</b>	733 <b>Description</b>
734 10 mg	30 count bottle	0088-2160-30	White, round film-coated tablet embossed with “ZBN” on one side.
20 mg	30 count bottle	0088-2161-30	Light yellow, triangular film-coated tablet embossed with “ZBO” on one side.
100 mg	3 count blister pack	0088-2162-03	White, round film-coated tablet embossed with “ZBP” on one side.

735 Store at 25°C (77°F); excursions permitted to 15-30°C (59-86°F) [see USP Controlled Room  
736 Temperature]. Protect from light.

737 Rx only.

738 Rev. November 2004

739

740

741

742

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743      Manufactured by  
744      Aventis Pharma Specialites, 60200 Compiègne, France  
745      for  
746      Aventis Pharmaceuticals Inc.  
747      Kansas City, MO 64137  
748  
749      Made in France  
750  
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