

## AMGEVITA™

### NAME OF THE MEDICINE

AMGEVITA™ is the Amgen Inc. trademark for adalimumab (rch).

### DESCRIPTION

AMGEVITA™ (adalimumab) is a biosimilar medicine to the reference product Humira® (adalimumab). The comparability of AMGEVITA with Humira has been demonstrated with regard to physicochemical characteristics and efficacy and safety outcomes (see PHARMACOLOGY, CLINICAL TRIALS and ADVERSE EFFECTS). The evidence for comparability supports the use of AMGEVITA for the listed indications.

AMGEVITA (adalimumab) is a fully human anti-TNF $\alpha$  monoclonal antibody expressed in a Chinese hamster ovary (CHO) cell line. AMGEVITA consists of 2 heavy chains (HC) of the IgG1 subclass and 2 light chains (LC) of the human kappa subclass, which are covalently linked through disulfide bonds. AMGEVITA is produced by recombinant DNA technology in a mammalian cell expression system. It consists of 1330 amino acids and has a molecular weight of approximately 148 kilodaltons. The amino acid sequence of AMGEVITA is identical to that of Humira.

AMGEVITA is supplied as a sterile, preservative free solution of adalimumab for subcutaneous administration. The solution of AMGEVITA is clear with a pH of 5.2.

AMGEVITA is supplied as either a single use pre-filled glass syringe or as a single use pre-filled SureClick pen. Enclosed within the pre-filled pen is a single use, pre-filled glass syringe.

The pre-filled syringe contains a 0.4 mL or 0.8 mL deliverable volume of 50 mg/mL of adalimumab in 10 mM acetate, 9.0% (w/v) sucrose, 0.10% (w/v) polysorbate 80, at pH 5.2.

### PHARMACOLOGY

#### General

Adalimumab binds to TNF and neutralises the biological function of TNF by blocking its interaction with the p55 and p75 cell surface TNF receptors. TNF is a naturally occurring cytokine that is involved in normal inflammatory and immune responses. Elevated levels of TNF are found in the synovial fluid of rheumatoid arthritis (RA), including juvenile

idiopathic arthritis (JIA), psoriatic arthritis (PsA) and ankylosing spondylitis (AS) patients and play an important role in both the pathologic inflammation and the joint destruction that are hallmarks of these diseases. Increased levels of TNF are also found in psoriasis (Ps) plaques, which contribute to the inflammatory response, to the proliferation and decreased maturation of keratinocytes and to the associated vascular damages that are characteristic of the disease.

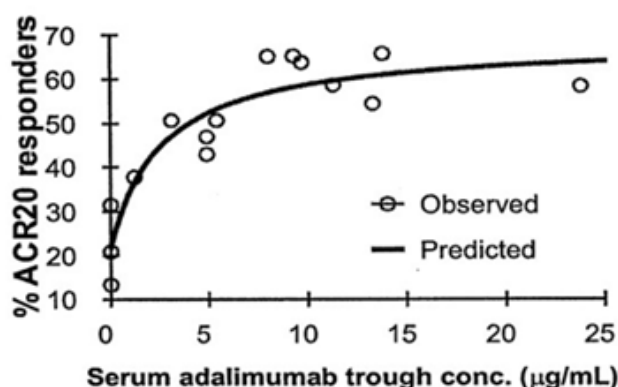
Adalimumab also modulates biological responses that are induced or regulated by TNF, including changes in the levels of adhesion molecules responsible for leukocyte migration (ELAM-1, VCAM-1, and ICAM-1 with an  $IC^{50}$  of  $1-2 \times 10^{-10}$  M).

### **Pharmacodynamics**

After treatment with adalimumab, a rapid decrease in levels of acute phase reactants of inflammation (C-reactive protein (CRP) and Erythrocyte Sedimentation Rate (ESR)) and serum cytokines (IL-6) was observed compared to baseline in patients with RA. In patients with Crohn's disease (CD), a decrease in CRP levels was observed by week 1. After 12 weeks of treatment with adalimumab, subjects with CD had lower levels of expression of TNF-alpha and the inflammatory markers, human leucocyte antigen (HLA-DR) and myeloperoxidase (MPO) in the colon but not in the ileum, compared with subjects with CD given placebo. Serum levels of matrix metalloproteinases (MMP-1 and MMP-3) that produce tissue remodelling responsible for cartilage destruction were also decreased after adalimumab administration. Patients treated with adalimumab usually experienced improvement in haematological signs of chronic inflammation. A rapid decrease in CRP levels was also observed in patients with polyarticular juvenile idiopathic arthritis, Crohn's disease, ulcerative colitis and hidradenitis suppurativa.

The serum adalimumab concentration-efficacy relationship as measured by the American College of Rheumatology response criteria (ACR20) appears to follow the Hill  $E_{max}$  equation as shown below:

**Figure 1. Concentration-Efficacy Relationship**



EC50 estimates ranging from 0.8 to 1.4 micrograms/mL were obtained through pharmacokinetic/ pharmacodynamic modelling of swollen joint count, tender joint count and ACR20 response from patients participating in Phase II and III trials.

### **Pharmacokinetics**

#### **Absorption**

Following a single 40 mg subcutaneous (SC) administration of adalimumab to 59 healthy adult subjects, absorption of adalimumab was slow, with mean peak serum concentration being reached about five days after administration. The average absolute bioavailability of adalimumab estimated from three studies following a single 40 mg subcutaneous dose was 64%. The pharmacokinetics of adalimumab was linear over the dose range of 0.5 to 10 mg/kg following a single intravenous dose.

#### **Distribution and Elimination**

The single dose pharmacokinetics of adalimumab in rheumatoid arthritis (RA) patients were determined in several studies with intravenous doses ranging from 0.25 to 10 mg/kg. The distribution volume ( $V_{ss}$ ) ranged from 4.7 to 6.0 L. Adalimumab is slowly eliminated, with clearances typically under 12 mL/h. The mean terminal phase half-life was approximately two weeks, ranging from 10 to 20 days across studies. Adalimumab concentrations in the synovial fluid from several RA patients ranged from 31 to 96% of those in serum.

#### **Steady-State**

Accumulation of adalimumab was predictable based on the half-life following SC administration of 40 mg of adalimumab fortnightly to patients with RA, with mean steady-

state trough concentrations of approximately 5 micrograms/mL (without concomitant methotrexate (MTX)) and 8 to 9 micrograms/mL (with concomitant MTX), respectively. These trough concentration levels are well above the EC50 estimates of 0.8 to 1.4 micrograms/mL and consistent with those at which ACR20 responses appear to reach a maximum (Figure 2). The serum adalimumab trough levels at steady state increased approximately proportionally with dose following 20, 40 and 80 mg fortnightly and every week SC dosing. In long-term studies with dosing for more than two years, there was no evidence of changes in clearance over time.

In patients with psoriasis, the mean steady-state trough concentration was 5 micrograms/mL during adalimumab 40 mg fortnightly without concomitant methotrexate treatment (after an initial loading dose of 80 mg sc).

In patients with hidradenitis suppurativa, a dose of 160 mg adalimumab on Week 0, followed by 80 mg on Week 2, achieved serum adalimumab trough concentrations of approximately 7 to 8 micrograms/mL at Week 2 and Week 4. The mean steady-state trough concentrations at Week 12 through Week 36 were approximately 8 to 10 micrograms/mL during adalimumab 40 mg every week treatment.

In patients with Crohn's disease, the loading dose of 160 mg adalimumab on Week 0 followed by 80 mg adalimumab on Week 2 achieves serum adalimumab trough concentrations of approximately 12 micrograms/mL at Weeks 2 and 4. The mean steady state trough concentration at Weeks 24 and 56 were 6.6 micrograms/mL and 7.2 micrograms/mL respectively. The range of trough concentrations in patients who received a maintenance dose of 40 mg adalimumab every fortnight was 0 – 21.7 micrograms/mL.

In patients with ulcerative colitis, a loading dose of 160 mg adalimumab on Week 0 followed by 80 mg adalimumab on Week 2 achieves serum adalimumab trough concentrations of approximately 12 micrograms/mL during the induction period. Mean steady-state trough levels of approximately 8 micrograms/mL were observed in ulcerative colitis patients who received a maintenance dose of 40 mg adalimumab fortnightly in a 52-week study.

In patients with uveitis, a loading dose of 80 mg adalimumab on Week 0 followed by 40 mg adalimumab fortnightly starting at Week 1, resulted in mean steady-state concentrations of approximately 8 to 10 micrograms/mL.

Population pharmacokinetic analyses with data from over 1200 RA patients revealed a trend toward higher apparent clearance of adalimumab with increasing body weight and in patients who developed the presence of anti-adalimumab antibodies.

Minor increases in apparent clearance were predicted in RA patients receiving doses lower than the recommended dose, and in RA patients with high rheumatoid factor or CRP concentrations. These factors are not likely to be clinically important. However, there is a significant difference in mean apparent clearance in patients with Crohn's disease studied short term (4 weeks – 13.1 mL/hr) vs. long term (56 weeks – 16.8 mL/hr).

### **Special Populations**

Pharmacokinetics in special populations were investigated using population pharmacokinetic analyses.

#### **Geriatrics**

Adalimumab's apparent clearance decreases slightly with increasing age. From the population analyses, the mean weight-adjusted clearances in patients 40 to 65 years (n=850) and ≥ 65 years (n=287) were 0.33 and 0.30 mL/h/kg, respectively.

#### **Paediatrics**

In pJIA Study I for patients with polyarticular juvenile idiopathic arthritis (4 to 17 years of age), the mean steady-state trough serum adalimumab concentrations for patients weighing <30 kg receiving 20 mg adalimumab subcutaneously fortnightly without concomitant methotrexate or with concomitant methotrexate were 6.8 micrograms/mL and 10.9 micrograms/mL, respectively. The mean steady-state trough serum adalimumab concentrations for patients weighing ≥30 kg receiving 40 mg adalimumab subcutaneously fortnightly without concomitant methotrexate, or with concomitant methotrexate, were 6.6 micrograms/mL and 8.1 micrograms/mL, respectively. In pJIA Study II for patients with polyarticular juvenile idiopathic arthritis who were 2 to <4 years old, or aged 4 years and above weighing <15 kg, the mean steady-state trough serum adalimumab concentrations for patients receiving adalimumab subcutaneously fortnightly

were  $6.0 \pm 6.1$  micrograms/mL (101% CV) for adalimumab without concomitant methotrexate, and  $7.9 \pm 5.6$  micrograms/mL (71.2% CV) with concomitant methotrexate.

**Table 1. Summary of Serum Adalimumab Trough Concentrations ( $\mu\text{g/mL}$ ) in Patients With Polyarticular JIA by Week 24 (N = 15) (pJIA Study II)**

Treatment Groups	Mean $\pm$ SD (CV%)		
	Min – Max, N <sub>nmiss</sub>		
	Week		
	0	12	24
Adalimumab 24 mg/m <sup>2</sup> BSA fortnightly (All patients n = 15)	0 $\pm$ 0 (0%) 0 – 0, 14	6.97 $\pm$ 5.69 (81.6%) 0 – 14.9, 15	7.78 $\pm$ 5.85 (75.2%) 0 – 14.7, 15
Adalimumab 24 mg/ m <sup>2</sup> BSA fortnightly, with Methotrexate (All patients n = 11)	0 $\pm$ 0 (0%) 0 – 0, 10	7.27 $\pm$ 5.71 (78.5%) 0 – 14.8, 11	8.45 $\pm$ 5.69 (67.3%) 0 – 14.7, 11
Adalimumab 24 mg/ m <sup>2</sup> BSA fortnightly, without Methotrexate (All patients n = 4)	0 $\pm$ 0 (0%) 0 – 0, 4	6.13 $\pm$ 6.41 (104.6%) 0 – 14.9, 4	5.95 $\pm$ 6.74 (113.3%) 0 – 12.7, 4

BSA = Body surface area

N<sub>nmiss</sub> = number of non-missing observations

Following the administration of 24 mg/m<sup>2</sup> (up to a maximum of 40 mg) subcutaneously fortnightly to patients with enthesitis-related arthritis, the mean trough steady-state (values measured at Week 24) serum adalimumab concentrations were  $8.8 \pm 6.6$  micrograms/mL for adalimumab without concomitant methotrexate and  $11.8 \pm 4.3$  micrograms/mL with concomitant methotrexate. Based on a population pharmacokinetic (PK) modelling approach, simulated steady-state adalimumab serum trough concentrations for a weight-based dosing regimen (20 mg adalimumab fortnightly for body weight < 30 kg and 40 mg adalimumab fortnightly for body weight  $\geq$  30 kg) were comparable to the simulated trough concentrations for the body surface area-based regimen.

In paediatric patients with moderately to severely active Crohn's disease, the open-label adalimumab induction dose was 160/80 mg or 80/40 mg at Weeks 0 and 2, respectively,

dependent on a body weight cut-off of 40 kg. At Week 4, patients were randomised 1:1 to either the Standard Dose (40/20 mg fortnightly) or Low Dose (20/10 mg fortnightly) maintenance treatment groups based on their body weight. The mean ( $\pm$ SD) serum adalimumab trough concentrations achieved at Week 4 were  $15.7 \pm 6.6$  micrograms/mL for patients  $\geq 40$  kg (160/80 mg) and  $10.6 \pm 6.1$  micrograms/mL for patients  $< 40$  kg (80/40 mg).

For patients who stayed on their randomised therapy, the mean ( $\pm$ SD) adalimumab trough concentrations at Week 52 were  $9.5 \pm 5.6$  micrograms/mL for the Standard Dose group and  $3.5 \pm 2.2$  micrograms/mL for the Low Dose group. The mean trough concentrations were maintained in patients who continued to receive adalimumab treatment fortnightly for 52 weeks. For patients who dose escalated from fortnightly to weekly regimen, the mean ( $\pm$ SD) serum concentrations of adalimumab at Week 52 were  $15.3 \pm 11.4$  micrograms/mL (40/20 mg, weekly) and  $6.7 \pm 3.5$  micrograms/mL (20/10 mg, weekly).

Following the administration of 0.8 mg/kg (up to a maximum of 40 mg) subcutaneously fortnightly to paediatric patients with chronic plaque psoriasis, the mean  $\pm$  SD steady-state adalimumab trough concentration (measured at Week 11) was approximately  $7.4 \pm 5.8$  micrograms/mL (79% CV). Serum adalimumab concentrations after 40mg fortnightly in adult psoriasis patients are comparable to those following 0.8mg/kg fortnightly in paediatric psoriasis patients in study M04-717 (range 7-11 micrograms/mL).

### **Gender**

No gender-related pharmacokinetic differences were observed after correction for a patient's body weight.

### **Race**

No differences in immunoglobulin clearance would be expected among races. From limited data in non-Caucasians, no important kinetic differences were observed for adalimumab.

### **Hepatic and Renal Insufficiency**

No pharmacokinetic data are available in patients with hepatic or renal impairment.

### **Disease States**

Healthy volunteers and patients with RA displayed similar adalimumab pharmacokinetics.

### **Drug Interactions, Methotrexate**

When adalimumab was administered to 21 RA patients on stable methotrexate therapy, there were no statistically significant changes in the serum methotrexate concentration profiles. In contrast, after single and multiple dosing, methotrexate reduced adalimumab's apparent clearances by 29% and 44% respectively (see PRECAUTIONS – Drug Interactions). This is consistent with the higher trough concentrations of adalimumab found in patients treated with concomitant methotrexate (see Pharmacokinetics - Steady State).

### **Comparability of AMGEVITA with Humira**

AMGEVITA is pharmacokinetically similar to Humira.

Pharmacokinetic similarity was demonstrated between AMGEVITA and Humira following administration of a single 40 mg dose subcutaneously in 203 healthy adult subjects. Pharmacokinetic parameters such as maximum serum concentrations and area under the serum concentration time curves were compared. According to the bioequivalence testing, the 90% confidence intervals of the geometric mean test-to-reference ratios for these parameters fell within the protocol-specified criteria of 0.8 to 1.25 and concluded pharmacokinetic similarity between AMGEVITA and Humira.

## **CLINICAL TRIALS**

### **CLINICAL TRIALS WITH HUMIRA**

#### **CLINICAL TRIALS FOR RHEUMATOID ARTHRITIS**

Adalimumab was evaluated in over 3000 patients in all rheumatoid arthritis clinical trials. Some patients were treated for greater than 60 months duration. The efficacy and safety of adalimumab were assessed in five randomised, double-blind and well-controlled studies.

The primary efficacy endpoint in those studies was ACR20 response, equating to an at least 20% improvement from baseline in tender joint count, swollen joint count, and at least 3 of the 5 remaining ACR core set measures: Patient assessment of pain, patient global assessment of disease activity, physician global assessment of disease activity, patient self-assessed disability (HAQ), and erythrocyte sedimentation rate or CRP.



RA Study I (DE009) evaluated 271 patients with moderately to severely active RA who were  $\geq 18$  years old, had failed therapy with at least one but no more than four disease-modifying anti-rheumatic drugs (DMARDs) and had insufficient efficacy with methotrexate at doses of 12.5 to 25 mg (10 mg if methotrexate-intolerant) every week and whose methotrexate dose remained constant at 10 to 25 mg every week. Patients had  $\geq 6$  swollen joints and  $\geq 9$  tender joints and RA diagnosed according to ACR criteria. Doses of 20, 40 or 80 mg of adalimumab or placebo were given fortnightly for 24 weeks.

RA Study II (DE011) evaluated 544 patients with moderately to severely active RA who were  $\geq 18$  years old and had failed therapy with at least one DMARD. Patients, who were not permitted methotrexate or other DMARDs during the study, had  $\geq 10$  swollen joints and  $\geq 12$  tender joints and were also diagnosed according to ACR criteria. Doses of 20 or 40 mg of adalimumab were given by subcutaneous injection fortnightly with placebo on alternative weeks or every week for 26 weeks; placebo was given every week for the same duration.

RA Study III (DE019) evaluated 619 patients with moderately to severely active RA who were  $\geq 18$  years old, had insufficient efficacy to methotrexate at doses of 12.5 to 25 mg (10 mg if methotrexate-intolerant) every week and whose methotrexate dose remained constant at 12.5 to 25 mg every week. Patients had  $\geq 6$  swollen joints and  $\geq 9$  tender joints and RA diagnosed according to ACR criteria. There were three groups in this study. The first received placebo injections every week for 52 weeks. The second received 20 mg of adalimumab every week for 52 weeks. The third group received 40 mg of adalimumab fortnightly with placebo injections on alternate weeks. Upon completion of the first 52 weeks, 457 patients enrolled in an open-label extension phase in which 40 mg of adalimumab/MTX was administered fortnightly, for up to 5 years. The objectives of this open-label extension were to evaluate the long-term safety and maintenance of efficacy of adalimumab in subjects with RA receiving concurrent MTX. The maintenance of efficacy was assessed by evaluating the effect of adalimumab on the signs and symptoms of RA, physical function, structural damage, rates of clinical remission and patient-reported outcomes. Of the 457 patients who entered the open-label extension, 53/457 (11.6%) subjects discontinued the study due to adverse events, and 16/457(3.5%) subjects discontinued because of a lack of efficacy/disease progression.

RA Study IV (DE031) primarily assessed safety in 636 patients with moderately to severely active RA who were  $\geq 18$  years old. These patients met the ACR criteria for diagnosis of RA for at least three months and had at least 6 swollen joints and 9 tender joints. Patients were permitted to be either DMARD naïve or to remain on their pre-existing rheumatologic therapy provided that therapy was stable for a minimum of 28 days. Patients were randomised to 40 mg of adalimumab or placebo fortnightly for 24 weeks.

RA Study V (DE013) was an active comparator trial of 2 years duration, which randomised 799 adult methotrexate (MTX)-naïve patients with early RA (mean disease duration less than 9 months) to treatment with adalimumab 40 mg fortnightly alone, methotrexate up to 20 mg/week alone, or the combination of the two, for 104 weeks. 31.5% of patients in the MTX group, 33.2% in the adalimumab group, and 32.5% in the combination group had taken previous DMARDs. The mean duration of RA was 0.8 years, 0.7 years, and 0.7 years in the MTX alone, adalimumab alone, and combination groups, respectively. The mean Tender Joint Count (TJC 68) at baseline was 32.3, 31.8 and 30.7 for the three groups, and the Erosion Score was 13.6, 11.3 and 11.0, respectively.

Results of all five trials were expressed in percentage of patients with improvement in RA using ACR response criteria. The primary endpoint in RA Studies I, II and III and the secondary endpoint in RA Study IV was the percent of patients who achieved an ACR20 response at Week 24 or 26. The primary endpoint in RA Study V was the percent of patients who achieved an ACR50 response at Week 52. RA Studies III and V had an additional primary endpoint at 52 weeks of retardation of disease progression (as detected by X-ray results). RA Study III also had a primary endpoint of changes in quality of life.

### **Clinical Response**

#### **RA Studies I, II and III**

The percent of adalimumab-treated patients achieving ACR20, 50 and 70 responses was consistent across all three trials. The results for the 40 mg fortnightly dose are summarised in Table 2.

**Table 2. ACR Responses in Placebo-controlled Trials (percent of patients)**

Response	RA study I <sup>a*</sup>		RA study II <sup>a*</sup>		RA study III <sup>ac*</sup>	
	Placebo/ MTX n = 60	Adalimumab <sup>b</sup> / MTX n = 63	Placebo n = 110	Adalimumab <sup>b</sup> n = 113	Placebo/ MTX n = 200	Adalimumab <sup>b</sup> / MTX n = 207
<b>ACR 20</b>						
6 months	13.3%	65.1%	19.1%	46.0%	29.5%	63.3%
12 months	NA	NA	NA	NA	24.0%	58.9%
<b>ACR 50</b>						
6 months	6.7%	52.4%	8.2%	22.1%	9.5%	39.1%
12 months	NA	NA	NA	NA	9.5%	41.5%
<b>ACR 70</b>						
6 months	3.3%	23.8%	1.8%	12.4%	2.5%	20.8%
12 months	NA	NA	NA	NA	4.5%	23.2%

<sup>a</sup> RA study I at 24 weeks, RA study II at 26 weeks, and RA study III at 24 and 52 weeks

<sup>b</sup> 40 mg adalimumab administered every other week

<sup>c</sup> The 12 months placebo-controlled phase of RA Study III was followed by 12 months of open-label treatment with ACR responses at 24 months of 48.8% (ACR20), 36.2% (ACR50) and 22.7% (ACR70)

\*p < 0.01, adalimumab versus placebo at all time points for ACR20, 50, 70  
MTX = methotrexate

Patients receiving adalimumab 40 mg every week in RA Study II also achieved statistically significant ACR20, 50 and 70 response rates of 53.4%, 35.0% and 18.4%, respectively, at six months.

The results of the components of the ACR response criteria for RA Study III are shown in Table 3. ACR response rates and improvement in all ACR response criteria were maintained to Week 104. Over the 2 years in RA Study III, 20% of adalimumab patients achieved a major clinical response, defined as maintenance of an ACR70 response over a > 6 month period.

**Table 3. Components of ACR Response in RA Study III**

Parameter (median)	Study RA-II			Study RA-III		
	Placebo/MTX (n = 200)			Adalimumab <sup>a</sup> /MTX (n = 207)		
	Baseline	Week 24	Week 52	Baseline	Week 24	Week 52
Number of tender joints (0-68)	26.0	15.0	15.0	24.0	8.0*	6.0*
Number of swollen joints (0-66)	17.0	11.0	11.0	18.0	5.0*	4.0*
Physician global assessment disease activity <sup>b</sup>	63.0	35.0	38.0	65.0	20.0*	16.0*
Patient global assessment disease activity <sup>b</sup>	53.5	39.0	43.0	52.0	20.0*	18.0*
Pain <sup>b</sup>	59.5	38.0	46.0	58.0	21.0*	19.0*
Disability index (HAQ) <sup>c</sup>	1.50	1.25	1.25	1.50	0.75*	0.75*
CRP (mg/L)	10.0	9.0	9.0	10.0	4.0*	4.0*

<sup>a</sup> 40 mg adalimumab administered fortnightly

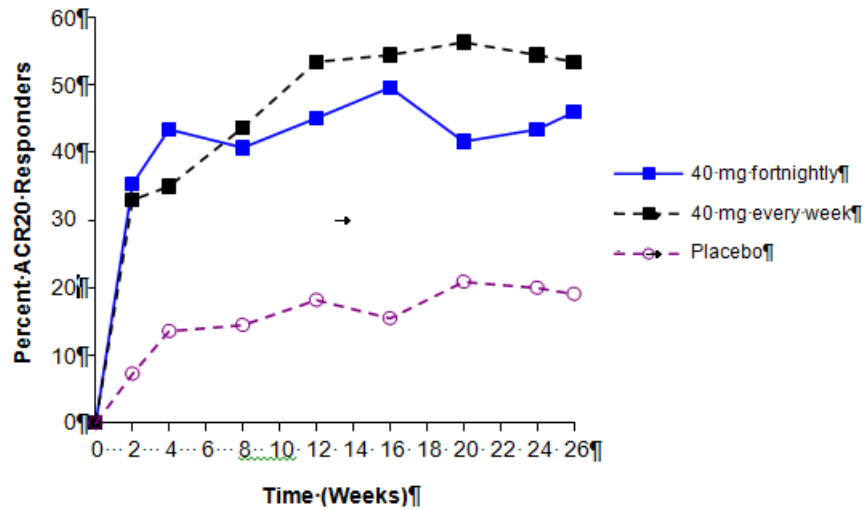
<sup>b</sup> Visual analogue scale; 0 = best, 10 = worst

<sup>c</sup> Disability Index of the Health Assessment Questionnaire; 0 = best, 3 = worst, measures the patient's ability to perform the following: dress/groom, arise, eat, walk, reach, grip, maintain hygiene, and maintain daily activity

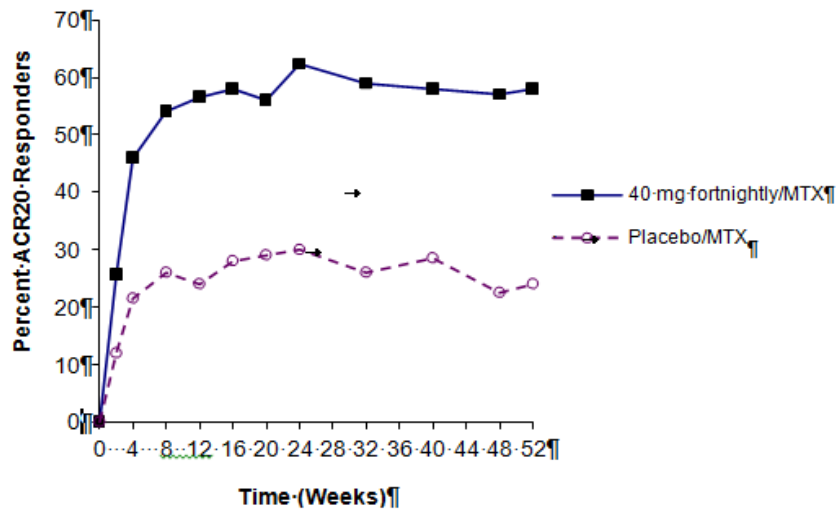
\* p < 0.001, adalimumab vs. placebo, based on mean change from baseline

In RA Study III, 84.7% of patients with ACR20 responses at Week 24 maintained the response at 52 weeks. Clinical responses were maintained for up to 5 years in the open-label portion of RA Study III. ACR responses observed at Week 52 were maintained or increased through 5 years of continuous treatment with 22% (115/534) of patients achieving major clinical response. A total of 372 (67.8%) subjects had no change in their methotrexate dose during the study, 141 (25.7%) subjects had a dose reduction and 36 (6.6%) subjects required a dose increase. A total of 149 (55.6%) subjects had no change in their corticosteroid dose during the study, 80 (29.9%) subjects had a dose reduction and 39 (14.6%) subjects required a dose increase. The following figures illustrate the durability of ACR20 responses to adalimumab in RA Studies II and III.

**Figure 2. RA Study II ACR20 Responses over 26 Weeks**



**Figure 3. RA Study III ACR20 Responses Over 52 Weeks**



**RA Study IV**

The ACR20 response of patients treated with adalimumab plus standard of care was statistically significantly better than patients treated with placebo plus standard of care ( $p < 0.001$ ).

In RA Studies I-IV, adalimumab-treated patients achieved statistically significant ACR20 and 50 responses compared to placebo as early as 1-2 weeks after initiation of treatment.

### **RA Study V**

In RA Study V for early rheumatoid arthritis patients who were methotrexate naïve, combination therapy with adalimumab plus methotrexate led to significantly greater ACR responses than methotrexate monotherapy at Week 52 and responses were sustained at Week 104 (see Table 4).

At Week 52 all individual components of the ACR response criteria improved with adalimumab/methotrexate therapy and improvements were maintained to Week 104.

Over the two-year study, 48.5% patients who received adalimumab/methotrexate combination therapy achieved a major clinical response (ACR70 for > six continuous months) compared to 27.2% of patients who received methotrexate monotherapy ( $p < 0.001$ ).

**Table 4. ACR20/50/70 Response at Weeks 26, 52, 76 and 104 (All Randomised Subjects) in RA Study V**

Response	MTX	Adalimumab	Adalimumab /MTX	p-value <sup>a</sup>	p-value <sup>b</sup>
	n = 257	n = 274	n = 268		
	n(%)				
ACR20					
Week 26	158 (61.5)	146 (53.3)	184 (68.7)	0.084	< 0.001
Week 52	161 (62.6)	149 (54.4)	195 (72.8)	0.013	< 0.001
Week 76	154 (59.9)	137 (50.0)	185 (69.0)	0.029	< 0.001
Week 104	144 (56.0)	135 (49.3)	186 (69.4)	0.002	< 0.001
ACR50					
Week 26	104 (40.5)	96 (35.0)	157 (58.6)	< 0.001	< 0.001
Week 52	118 (45.9)	113 (41.2)	165 (61.6)	< 0.001	< 0.001
Week 76	114 (44.4)	114 (41.6)	161 (60.1)	< 0.001	< 0.001
Week 104	110 (42.8)	101 (36.9)	158 (59.0)	< 0.001	< 0.001
ACR70					
Week 26	57 (22.2)	54 (19.7)	114 (42.5)	< 0.001	< 0.001
Week 52	70 (27.2)	71 (25.9)	122 (45.5)	< 0.001	< 0.001
Week 76	75 (29.2)	79 (28.8)	127 (47.4)	< 0.001	< 0.001
Week 104	73 (28.4)	77 (28.1)	125 (46.6)	< 0.001	< 0.001

Note: Subjects with missing values were counted as non-responders.

<sup>a</sup> p-value is from the pairwise comparison of methotrexate monotherapy and adalimumab + methotrexate combination therapy using the Pearson's chi-square test..

<sup>b</sup> p-value is from the pairwise comparison of adalimumab monotherapy and adalimumab + methotrexate combination therapy using the Pearson's chi-square test.

MTX: Methotrexate

In RA Study V, adalimumab/methotrexate combination therapy was superior to methotrexate monotherapy in achieving clinical remission defined as Disease Activity Score (DAS28) <2.6 at Week 52 (see Table 5).

**Table 5. Subjects in Remission as Defined by DAS28 < 2.6 at Week 52 (all randomised subjects) in RA Study V**

Response	MTX n = 257	Adalimumab n = 274	Adalimumab /MTX n = 268		
	n(%)			p-value <sup>a</sup>	p-value <sup>b</sup>
Subjects in Remission at week 52	53 (20.6)	64 (23.4)	115 (42.9)	<0.001	< 0.001

<sup>a</sup> p-value is from the pairwise comparison of methotrexate monotherapy and adalimumab + methotrexate combination therapy using the Pearson's chi-square test.

<sup>b</sup> p-value is from the pairwise comparison of adalimumab monotherapy and adalimumab + methotrexate combination therapy using the Pearson's chi-square test.

MTX: Methotrexate

### Radiographic Response

In RA Study III, adalimumab-treated patients had a mean duration of rheumatoid arthritis for approximately 11 years and a mean + standard deviation baseline modified Total Sharp Score for the 40 mg fortnightly group of 72.1 + 60.7 and placebo group of 66.4 + 47.4. Structural joint damage was assessed radiographically and expressed as change in modified Total Sharp Score (TSS) and its components, erosion score and joint space narrowing score (JSN) at month 12 compared to baseline. Adalimumab/methotrexate-treated patients demonstrated less radiographic progression than patients receiving placebo/methotrexate (see Table 6).

In the open-label extension of RA Study III, 77% of the original patients treated with any dose of adalimumab were evaluated radiographically at 2 years. Patients maintained inhibition of structural damage, as measured by the TSS, 54% had no progression of structural damage as defined by a change in the TSS of zero or less.

Fifty-five percent (113/207) of patients originally treated with 40 mg adalimumab fortnightly have been evaluated radiographically at 5 years. Patients had continued inhibition of structural damage with approximately 50% (57/113) showing no progression of structural damage defined by a change in the TSS of zero or less.



**Table 6. Radiographic Mean Changes Over 12 Months in RA Study III With Background MTX**

	Placebo/ MTX n=200	Adalimumab <sup>a</sup> / MTX n=207	Difference Between adalimumab <sup>a</sup> /MTX and Placebo/MTX (95% Confidence Interval*)	p-value
Total Sharp Score	2.7	0.1	2.6 (1.4, 3.8)	≤ 0.001 <sup>b</sup>
Erosions	1.6	0.0	1.6 (0.9, 2.2)	≤ 0.001
No New Erosions (% of Patients)	46.2	62.9	16.7	≤ 0.001
JSN Score	1.0	0.1	0.9 (0.3, 1.4)	0.002

<sup>a</sup> 40 mg administered fortnightly

<sup>b</sup> Based on rank analysis

MTX: Methotrexate

\*95% confidence intervals for the differences in change scores between MTX and adalimumab

In RA Study V, adalimumab-treated patients had a mean duration of rheumatoid arthritis of less than 9 months and had not previously received methotrexate. Structural joint damage was assessed radiographically and expressed as change in modified Total Sharp Score. The Week 52 results are shown in Table 7. A statistically significant difference for change in modified Total Sharp Score and the erosion score was observed at Week 52 and maintained at Week 104.

**Table 7. Change in Modified Total Sharp Score From Baseline at Weeks 52 and 104 (All Randomised Subjects) in RA Study V**

	<b>MTX n = 257</b>	<b>Adalimumab n = 274</b>	<b>Adalimumab + MTX n = 268</b>		
				<b>p-value<sup>a</sup></b>	<b>p-value<sup>b</sup></b>
<b>Week 52</b>					
Baseline (mean)	21.8 ± 22.2	18.8 ± 19.0	18.1 ± 20.1		
Week 52 (mean)	27.6 ± 24.6	21.8 ± 19.7	19.4 ± 19.9		
Change at week 52 (mean ± SD)	5.7 ± 12.7	3.0 ± 11.2	1.3 ± 6.5	< 0.001	< 0.002
<b>Week 104</b>					
Baseline (mean)	21.8 ± 22.2	18.8 ± 19.0	18.1 ± 20.1		
Week 104 (mean)	32.3 ± 30.0	24.3 ± 23.2	20.0 ± 20.5		
Change at week 104 (mean ± SD)	10.4 ± 21.7	5.5 ± 15.8	1.9 ± 8.3	< 0.001	< 0.001

Note: Primary analysis imputation used for missing data.

<sup>a</sup> P-value is from the pairwise comparison of MTX monotherapy and adalimumab + MTX combination therapy using the Mann-Whitney U test.

<sup>b</sup> P-value is from the pairwise comparison of adalimumab monotherapy and adalimumab + MTX combination therapy using the Mann-Whitney U test.

### Physical Function

Health-related quality of life and physical function was assessed using the disability index of the Stanford Health Assessment Questionnaire (HAQ), which was a pre-specified primary endpoint at Week 52 in RA Study III.

The HAQ was developed as a disease-specific outcome measure for rheumatoid arthritis and has been extensively studied in RA. HAQ has been shown to correlate with mortality, work disability, functional limitations, pain, fatigue and psychological relief. The score is based on 8 questions and normalised to a scale of 0 to 3, where higher scores indicate more disability, and lower scores indicate less disability. Studies have shown that a change in HAQ score of 0.22 or greater represents an improvement in disability that is perceptible and meaningful to the patient. All doses/schedules of adalimumab in RA Study III showed statistically significantly greater improvement in the disability index of the HAQ from baseline to Month 6 compared to placebo and the same was seen at Week 52.

There were 619 patients enrolled in RA Study III also known as the DE019 study. The patients were divided into three groups. The first group received placebo injections every week for 52 weeks. The second group received 20mg of adalimumab every week for 52 weeks. The third group received 40 mg of adalimumab fortnightly with placebo injections on alternate weeks. Upon completion of the first 52 weeks, 457 patients enrolled in an open-label extension phase (DE019OLE) in which 40 mg of adalimumab/MTX was administered fortnightly. Maintenance of physical function was defined as maintaining a reduction in HAQ of -0.5 over the second year of active treatment.

### Results

In RA Study III, the mean (95% CI) improvement in HAQ from baseline at Week 52 was -0.60 (-0.65, -0.55) for the adalimumab patients and -0.25 (-0.33, -0.17) for the placebo/MTX (p<0.001) patients. At Week 104, the mean improvement in HAQ from baseline was -0.70 (-0.8, -0.6) for the adalimumab patients.

**Table 8. Percentage of Patients Achieving Improvement in Physical Function After One and Two Years of Treatment In RA Study III**

Reduction in HAQ from Baseline	Proportion of patients who achieved HAQ reduction at Week 52		Proportion of patients who received adalimumab 40 mg fortnightly and who achieved HAQ reduction at Week 104	Proportion of all adalimumab-treated patients with HAQ reduction at Week 52 that was maintained at Week 104
	Adalimumab 40 mg	Placebo	Adalimumab 40 mg fortnightly	All adalimumab
-0.22	150/207 (72.5%)	96/200 (48%)	123/207 (59.4%)	231/258 (89.5%)
-0.5	114/207 (55.1%)	56/200 (28%)	94/207 (45.4%)	167/204 (81.9%)
-0.75	82/207 (39.6%)	40/200 (20%)	71/207 (34.3%)	124/149 (83.2%)
-1.0	56/207 (27.1%)	22/200 (11%)	40/207 (19.3%)	69/103 (67.0%)

At Year 2, 94/207 (45.4%) of patients who originally entered the study achieved a -0.5 reduction in HAQ.

79.5% (115/195) of the patients who achieved a reduction in HAQ of -0.5 at the end of one year of adalimumab treatment maintained this response over 5 years of active treatment.

### **Quality of Life**

Results from the Short Form Health Survey (SF-36) for all doses/schedules of adalimumab in all four studies support these findings, with statistically significant Physical Component Summary (PCS) scores, as well as statistically significant pain and vitality domain scores for the 40 mg fortnightly dose. A statistically significant decrease in fatigue as measured by Functional Assessment of Chronic Illness Therapy (FACIT) scores was seen in all three studies in which it was assessed (RA Studies I, III, IV). Improvement in SF-36 was measured up to Week 156 (3 years) and improvement was maintained through this time.

In RA Study V, the active-comparator controlled study in early rheumatoid arthritis, the improvement in the HAQ disability index and the physical component of the SF-36 showed greater improvement ( $p < 0.001$ ) for adalimumab/methotrexate combination therapy versus methotrexate monotherapy at Week 52, which was maintained through Week 104.

### **CLINICAL TRIALS FOR POLYARTICULAR JUVENILE IDIOPATHIC ARTHRITIS**

The safety and efficacy of adalimumab was assessed in two clinical studies (pJIA Studies I and II) in patients with active polyarticular or polyarticular-course juvenile idiopathic arthritis, who had a variety of JIA onset types (most frequently rheumatoid-factor negative polyarthritis, rheumatoid-factor positive polyarthritis or extended oligoarthritis).

#### **pJIA Study I**

The safety and efficacy of adalimumab were assessed in a multi-centre, randomised, withdrawal, double blind, parallel- group study in 171 patients (4 to 17 years of age) with polyarticular juvenile idiopathic arthritis (JIA). In the study, the patients were stratified into two groups: MTX-treated or non-MTX-treated. All patients had to show signs of active moderate or severe disease despite previous treatment with NSAIDs, analgesics, corticosteroids, or DMARDs. Patients who received prior treatment with any biologic DMARDs were excluded from the study.

The study included four phases: an open-label lead in phase (OL-LI; 16 weeks), a double-blind randomised withdrawal phase (DB; 32 weeks), an open-label extension phase (OLE-BSA; up to 136 weeks), and an open-label fixed dose phase (OLE-FD; 16 weeks). In the first three phases of the study, adalimumab was administered based on body surface area at a dose of 24 mg/m<sup>2</sup> up to a maximum total body dose of 40 mg subcutaneously (SC) fortnightly. In the OLE-FD phase, the patients were treated with 20 mg of adalimumab SC fortnightly if their weight was less than 30 kg and with 40 mg of adalimumab SC fortnightly if their weight was 30 kg or greater. Patients remained on stable doses of NSAIDs and or prednisone ( $\leq 0.2$  mg/kg/day or 10 mg/day maximum).

Patients demonstrating a Paediatric ACR 30 response at the end of OL-LI phase were randomised into the double blind (DB) phase of the study and received either adalimumab or placebo fortnightly for 32 weeks or until disease flare. Disease flare was defined as a worsening of  $\geq 30\%$  from baseline in  $\geq 3$  of 6 Paediatric ACR core criteria,  $\geq 2$  active joints, and improvement of  $>30\%$  in no more than 1 of the 6 criteria. After 32 weeks or at the time of disease flare during the DB phase, patients were treated in the open-label extension phase based on the BSA regimen (OLE-BSA), before converting to a fixed dose regimen based on body weight (OLE-FD phase).

### **pJIA Study I Clinical Response**

At the end of the 16-week OL-LI phase, 94% of the patients in the MTX stratum and 74% of the patients in the non- MTX stratum were Paediatric ACR 30 responders. In the DB phase significantly fewer patients who received adalimumab experienced disease flare compared to placebo, both without MTX (43% vs. 71%) and with MTX (37% vs. 65%). More patients treated with adalimumab continued to show paediatric ACR 30/50/70 responses at Week 48 compared to patients treated with placebo. Overall responses were generally better and, fewer patients developed antibodies when treated with the combination of adalimumab and MTX compared to adalimumab alone.

Paediatric ACR responses were maintained for up to six years in the OLE phase in patients who received adalimumab throughout the study. Overall, 19 patients were treated for 6 years or longer, with 11 of the 19 patients in the 4 to 12 year age group, and 8 of the 19 patients being between 13 and 17 years of age.

### **pJIA Study II**

The safety and efficacy of adalimumab was assessed in an open-label, multi-centre, uncontrolled study in 32 patients (2 to <4 years old or aged 4 years and above weighing <15 kg) with moderately to severely active polyarticular or polyarticular-course JIA. The patients received 24 mg/m<sup>2</sup> body surface area (BSA) of adalimumab up to a maximum of 20 mg fortnightly as a single dose via SC injection for at least 24 weeks. During the study, most patients used concomitant MTX, with fewer reporting use of corticosteroids or NSAIDs.

### **pJIA Study II Clinical Response**

At Week 12 and Week 24, Paediatric ACR 30 response was 93.5% and 90.0%, respectively, using the observed data approach. The proportions of patients with Paediatric ACR 50/70/90 at Week 12 and Week 24 were 90.3%/61.3%/38.7% and 83.3%/73.3%/36.7%, respectively. Amongst those who responded (Paediatric ACR 30) at Week 24 (n=27 out of 30 patients), the Paediatric ACR 30 responses were maintained for up to 60 weeks in patients who continued with adalimumab treatment throughout this time period. Overall, 20 patients were treated for 60 weeks or longer. The long term effects of adalimumab on the growth and development of children have not been studied.

### **Enthesitis-Related Arthritis (ERA)**

The safety and efficacy of adalimumab were assessed in a multicentre, randomised, double-blind study in 46 paediatric patients (6 to 17 years old) with enthesitis-related arthritis (M11-328). Subjects had to have a diagnosis of ERA prior to their sixteenth birthday, at least 3 active joints (swelling not due to deformity or joints with loss of motion plus pain and/or tenderness), evidence of past or present enthesitis in at least 1 location and an inadequate response or intolerance to at least 1 nonsteroidal anti-inflammatory drug (NSAID). In addition, subjects had to have an inadequate response or intolerance to at least 1 disease modifying anti-rheumatic drug, either sulfasalazine or methotrexate.

Patients were randomised to receive either 24 mg/m<sup>2</sup> body surface area (BSA) of adalimumab up to a maximum of 40 mg, or placebo fortnightly for 12 weeks. The double-blind period was followed by an open-label (OL) period, during which patients

received 24 mg/m<sup>2</sup> BSA of adalimumab up to a maximum of 40 mg fortnightly subcutaneously for up to an additional 192 weeks.

The primary endpoint was the percent change from Baseline to Week 12 in the number of active joints with arthritis (swelling not due to deformity or joints with loss of motion plus pain and/or tenderness), which was achieved (p=0.039) with mean percent decrease of -62.6% in patients in the adalimumab group compared to -11.6% in patients in the placebo group. The majority of patients demonstrated clinical improvement in secondary endpoints such as number of sites of enthesitis, tender joint count, swollen joint count, Paediatric ACR 30 response, Paediatric ACR 50 response, and Paediatric ACR 70 response, and maintained these results during the OL period through Week 52 of the study.

### **CLINICAL TRIALS FOR PSORIATIC ARTHRITIS**

Adalimumab 40 mg fortnightly was studied in patients with moderately to severely active psoriatic arthritis in two placebo- controlled studies, PsA Studies I (M02-518) and II (M02-570). PsA Study I with 24-week duration, treated 313 adult patients who had an inadequate response to non-steroidal anti-inflammatory drug therapy and of these, approximately 50% were taking methotrexate. PsA Study II with 12-week duration, treated 100 patients who had an inadequate response to DMARD therapy. Upon completion of both studies, 383 patients enrolled in an open-label extension study, in which 40 mg adalimumab was administered fortnightly.

#### **ACR and PASI response**

Adalimumab was superior to placebo in all measures of disease activity (p < 0.001) as shown in Table 9 and Table 10. Among patients with psoriatic arthritis who received adalimumab, the clinical responses were apparent at the time of the first visit (2 weeks), significant at 12 weeks and were maintained through 24 weeks of therapy. Patients with a psoriasis involvement of at least 3% Body Surface Areas (BSA) were evaluated for Psoriatic Area and Severity Index (PASI) response. In these patients the skin lesions of psoriasis were improved with adalimumab, relative to placebo, as measured by PASI. Responses were similar with and without concomitant methotrexate therapy. ACR responses were maintained in the open-label extension study for up to 136 weeks.

**Table 9. ACR and PASI Response in Placebo-Controlled Psoriatic Arthritis Study (Percent of Patients)**

Response*	Placebo n=162	Adalimumab n=151
ACR20		
Week 12	14%	58%
Week 24	15%	57%
ACR50		
Week 12	4%	36%
Week 24	6%	39%
ACR70		
Week 12	1%	20%
Week 24	1%	23%
	n=69	n=69
PASI 50		
Week 12	15%	72%
Week 24	12%	75%
PASI 75		
Week 12	4%	49%
Week 24	1%	59%

\* p<0.001 for all comparisons between adalimumab and placebo



**Table 10. Components of Disease Activity in Psoriatic Arthritis**

Parameter: mean (median)	Placebo (n=162 <sup>a</sup> )		Adalimumab (n =151 <sup>a</sup> )	
	Baseline	24 Weeks	Baseline	24 Weeks
Number of tender joints <sup>b</sup>	25.8 (23.0)	22.3 (17.0)	23.3 (19.0)	11.8 (5.0)
Number of swollen joints <sup>c</sup>	14.6 (11.0)	12.1 (8.0)	13.4 (10.0)	7.6 (3.0)
Physician global assessment <sup>d</sup>	53.2 (53.0)	46.0 (48.0)	53.5 (54.0)	21.4 (16.0)
Patient global assessment <sup>d</sup>	47.2 (49.0)	47.6 (49.0)	47.5 (48.0)	24.2 (18.5)
Pain <sup>d</sup>	47.6 (47.5)	47.9 (49.0)	50.6 (53.0)	25.4 (19.0)
Disability index (HAQ) <sup>e</sup>	1.0 (1.0)	0.9 (0.8)	1.0 (0.9)	0.6 (0.4)
CRP (mg/L) <sup>f</sup>	13.9 (7.8)	14.3 (7.4)	14.3 (8.0)	5.5 (2.1)

<sup>a</sup> As observed analysis presented. N at 24 weeks may be less than 162 for placebo or 151 for adalimumab.

<sup>b</sup> Scale 0 – 78

<sup>c</sup> Scale 0 – 76

<sup>d</sup> Visual analog scale; 0 = best, 100 = worst.

<sup>e</sup> Disability Index of the Health Assessment Questionnaire; 0 = best, 3 = worst; measures the patient's ability to perform the following: dress/groom, arise, eat, walk, reach, grip, maintain hygiene, and maintain daily activity.

<sup>f</sup> Normal range: 0-2.87 mg/L.

\*p< 0.001 for adalimumab vs. placebo comparisons based on mean changes.

### Radiographic Response

Radiographic changes were assessed in the psoriatic arthritis studies. Radiographs of hands, wrists and feet were obtained at baseline and Week 24 during the double-blind period when patients were on adalimumab or placebo and at Week 48 when all patients were on open-label adalimumab. A modified Total Sharp Score (mTSS), which included distal interphalangeal joints (i.e., not identical to the TSS used for rheumatoid arthritis), was used by readers blinded to treatment group to assess the radiographs.

Adalimumab-treated patients demonstrated greater inhibition of radiographic progression compared to placebo-treated patients and this effect was maintained at 48 weeks (see Table 11).

**Table 11. Change in Modified Total Sharp Score in Psoriatic Arthritis**

<b>Modified Total Sharp Score*</b>	Placebo	Adalimumab
<u>Baseline to Week 24</u>	n=162	n=151
baseline mean	19.0	22.6
mean change from baseline	1.6	1.0 <sup>a</sup>
	Placebo to adalimumab**	Adalimumab
<u>Baseline to Week 48</u>	n=141	n=133
baseline mean	21.2	22.2
mean change from baseline	0.9	0.0
<u>Week 48 to Week 144</u>	n=128	n=115
Week 48 mean	22.7	22.3
mean change from baseline	0.1	0.4
<b>Erosion Score</b>	Placebo to adalimumab**	Adalimumab
<u>Baseline to Week 48</u>	n=141	n=133
baseline mean	11.2	11.9
mean change from baseline	0.6	0.1
<u>Week 48 to Week 144</u>	n=128	n=115
Week 48 mean	12.1	12.1
mean change from baseline	-0.2	0.0
<b>Joint Space Narrowing Score</b>	Placebo to adalimumab**	Adalimumab
<u>Baseline to Week 48</u>	n=141	n=133
baseline mean	10.0	10.4
mean change from baseline	0.3	-0.1
<u>Week 48 to Week 144</u>	n=128	n=115
Week 48 mean	10.6	10.2
mean change from baseline	0.3	0.4

<sup>a</sup> p-value <0.001

\* Baseline to Week 24 data represents ITT data and belongs to a different x-ray reading than baseline to Week 48 and Week 48 to Week 144 data.

\*\*Patients changed over to adalimumab at Week 24

In subjects treated with adalimumab with no radiographic progression from baseline to Week 48 (n = 102), 84% continued to show no radiographic progression through 144 weeks of treatment.

### **Quality of Life and Physical Function**

In PsA study VI, physical function and disability were assessed using the HAQ Disability Index (HAQ-DI) and the Short Form Health Survey (SF-36). Patients treated with 40 mg of adalimumab fortnightly showed greater improvement from baseline in the HAQ-DI score (mean decreases of 47% and 49% at Weeks 12 and 24 respectively) in comparison to placebo (mean decreases of 1% and 3% at Weeks 12 and 24 respectively).

Results from the Short Form Health Survey (SF-36) support these findings, with statistically significant Physical Component Summary (PCS) scores, as well as statistically significant pain and vitality domain scores. At Weeks 12 and 24, patients treated with adalimumab showed greater improvement from baseline in the SF-36 Physical Component Summary score compared to patients treated with placebo, and no worsening in the SF-36 Mental Component Summary score. Improvement in physical function and disability measures were maintained for up to 136 weeks through the open label portion of the study.

### **CLINICAL TRIALS FOR ANKYLOSING SPONDYLITIS**

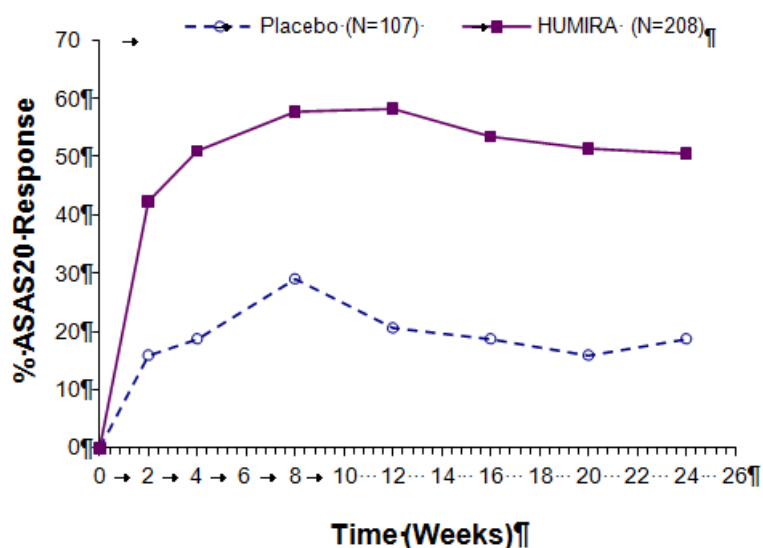
The safety and efficacy of adalimumab 40 mg fortnightly was assessed in 393 adult patients in two randomised, 24-week double-blind, placebo-controlled studies in patients with active ankylosing spondylitis (AS). The larger study (AS Study I or M03-607) enrolled 315 adult patients with active AS (defined as fulfilling at least two of the following three criteria: (1) a Bath AS disease activity index (BASDAI) score  $\geq 4$  cm, (2) a visual analog score (VAS) for total back pain  $\geq 40$  mm, (3) morning stiffness  $\geq 1$  hour), who had an inadequate response to conventional therapy. Seventy-nine (20.1%) patients were treated concomitantly with disease modifying anti-rheumatic drugs, and 37 (9.4%) patients with glucocorticoids. The blinded period was followed by an open-label period. Subjects (n=215, 54.7%) who failed to achieve ASAS 20 at Weeks 12, or 16 or 20 received early escape open-label adalimumab 40 mg fortnightly SC and were subsequently treated as non-responders in double-blind statistical analyses.

Results showed statistically significant improvement of signs and symptoms of AS in patients treated with adalimumab compared to placebo. Significant improvement in

measures of disease activity was first observed at Week 2 and maintained through 24 weeks as shown in Figure 4 and Table 12.

Patients with total spinal ankylosis were included in the larger study (n=11). Responses of these patients were similar to those without total ankylosis.

**Figure 4. ASAS 20 Response By Visit, AS Study I**



**Table 12. ASAS<sup>a</sup> Responses in Placebo-Controlled AS Study**

Response	Placebo n=107	Adalimumab n=208
ASAS 20		
Week 12	21%	58%*
Week 24	19%	51%*
ASAS 50		
Week 12	10%	38%*
Week 24	11%	35%*
ASAS 70		
Week 12	5%	23%*
Week 24	8%	24%*

\* Statistically significant at p<0.001 for all comparisons between adalimumab and placebo at Weeks 12 and 24

<sup>a</sup> Assessments in Ankylosing Spondylitis

A low level of disease activity [defined as a value <20 (on a scale of 0-100 mm) in each of the four ASAS response parameters] was achieved at 24 weeks in 22% of adalimumab-treated patients vs. 6% in placebo-treated patients (p<0.001).

**Table 13. Components of Ankylosing Spondylitis Disease Activity**

	Placebo n=107		Adalimumab n=208	
	Baseline mean	Week 24 mean	Baseline mean	Week 24 mean
ASAS 20 Response Criteria*				
Patient's Global Assessment of Disease Activity <sup>a</sup>	65	60	63	38
Total back pain	67	58	65	37
Inflammation <sup>b</sup>	6.7	5.6	6.7	3.6
BASFI <sup>c</sup>	56	51	52	34
BASDAI <sup>d</sup> score	6.3	5.5	6.3	3.7
CRP <sup>e</sup>	2.2	2.0	1.8	0.6

<sup>a</sup> Percent of subjects with at least a 20% and 10-unit improvement measured on a Visual Analog Scale (VAS) with 0 = "none" and 100 = "severe"

<sup>b</sup> mean of questions 5 and 6 of BASDAI (defined in 'd')

<sup>c</sup> Bath Ankylosing Spondylitis Functional Index

<sup>d</sup> Bath Ankylosing Spondylitis Disease Activity Index

<sup>e</sup> C-Reactive Protein (mg/dL)

\* Statistically significant as p<0.001 for all comparisons between adalimumab and placebo at Week 24

Results of this study were similar to those seen in the second randomised trial (AS Study II or M03-606), a multicenter, double-blind, placebo-controlled study of 82 patients with ankylosing spondylitis. Patient Reported Outcomes were assessed in both ankylosing spondylitis studies using the generic health status questionnaire SF-36 and the disease specific Ankylosing Spondylitis Quality of Life Questionnaire (ASQoL). The adalimumab-treated patients had significantly greater improvement in SF-36 Physical Component Score (mean change: 6.93) compared to placebo-treated patients (mean change: 1.55; p<0.001) at Week 12, which was maintained through Week 24.

Results from the ASQoL support these findings demonstrating improvement in overall quality of life. The adalimumab-treated patients had statistically significant improvement (mean change: -3.15) compared to placebo-treated patients (mean change: -0.95; p<0.001) at Week 12, which was maintained through Week 24.

## CLINICAL TRIALS FOR CROHN'S DISEASE

### ADULTS

The safety and efficacy of multiple doses of adalimumab were assessed in over 1500 patients with moderately to severely active Crohn's disease (Crohn's Disease Activity Index (CDAI)  $\geq 220$  and  $\leq 450$ ) in randomised, double-blind, placebo controlled studies. Concomitant stable doses of aminosalicylates, corticosteroids, and/or immunomodulatory agents were permitted and 80% of patients continued to receive at least one of these medications.

Induction of clinical remission (defined as CDAI  $< 150$ ) was evaluated in two studies, CD Study I (M02-403) and CD Study II (M04-691). In CD Study I, 299 TNF-antagonist naïve patients were randomised to one of four treatment groups; the placebo group received placebo at Weeks 0 to 2, the 160/80 group received 160 mg adalimumab at Week 0 and 80 mg at Week 2, the 80/40 group received 80 mg at Week 0 and 40 mg at Week 2, and the 40/20 group received 40 mg at Week 0 and 20 mg at Week 2. In CD Study II, 325 patients who had lost response or were intolerant to infliximab were randomised to receive either 160 mg adalimumab at Week 0 and 80 mg at Week 2, or placebo at Weeks 0 and 2.

Maintenance of clinical remission was evaluated in a third study, CD Study III (M02-404). In CD Study III, 854 patients received open-label 80 mg adalimumab at Week 0 and 40 mg adalimumab at Week 2. Patients were then randomised at Week 4 to 40 mg adalimumab fortnightly, 40 mg adalimumab every week or placebo with a total study duration of 56 weeks. Patients in clinical response (decrease in CDAI  $\geq 70$ ) at Week 4 were stratified and analysed separately from those not in clinical response at Week 4. Corticosteroid taper was permitted after Week 8. Fistula healing was an important pre-determined secondary endpoint for this study.

### Clinical Results

#### **CD Study I / CD Study II**

A statistically significantly greater percentage of the groups treated with 160/80 mg adalimumab achieved induction of clinical remission versus placebo at Week 4 regardless of whether the patients were TNF antagonist naïve (CD Study I) or had been previously exposed to infliximab (CD Study II) (see Table 14).

**Table 14. Induction of Clinical Remission and Response (Percent of Patients)**

	CD Study I		CD Study II	
	Placebo n=74	Adalimumab 160/80 mg n=76	Placebo n=166	Adalimumab 160/80 mg n=159
Week 4				
Clinical remission	12%	36%*	7%	21%*
Clinical response (CR-100)	24%	49%**	25%	38%**
Clinical response (CR-70)	34%	58%**	34%	52%**

Clinical remission is CDAI score <150; clinical response (CR-100) is decrease in CDAI ≥ 100 points; clinical response (CR-

70) is decrease in CDAI ≥ 70 points

All p-values are pairwise comparisons of proportions for adalimumab vs. placebo

\*p<0.001

\*\*p<0.01

### CD Study III (M02-404)

At Week 4, 58% (499/854) patients were in clinical response (decrease in CDAI ≥ 70 points) and were assessed in the primary analysis. Of those in clinical response at Week 4, 48% had been previously exposed to other anti-TNF therapy. At Weeks 26 and 56, statistically significantly greater proportions of patients who were in clinical response at Week 4 achieved clinical remission in the adalimumab maintenance groups compared to patients in the placebo maintenance group. Additionally, statistically significantly greater proportions of patients receiving concomitant corticosteroids at baseline were in clinical remission and were able to discontinue corticosteroid use for at least 90 days in the adalimumab maintenance groups compared to patients in the placebo maintenance group at Weeks 26 and 56 (see Table 16).

Disease-related hospitalisations and surgeries were statistically significantly reduced with adalimumab compared with placebo at Week 56 (see Table 15).

**Table 15. Hospitalisations to Week 56 (ITT population)**

	Placebo	40 mg adalimumab fortnightly	40 mg adalimumab every week	Combined Adalimumab
	n=261	n=260	n=257	n= 517
	n (%)	n (%)	n (%)	n (%)
All-cause Hospitalisation	47 (18)	25 (9.6)*	29 (11.3)*	54 (10.4)*
CD – Related Hospitalisation	31 (11.9)	16 (6.2)*	18 (7.0)*	34 (6.6)*
Major Surgery	11 (4.2)	1 (0.4)*	2 (0.8)*	3 (0.6)*

\*p≤ 0.05

Clinical remission results presented in Table 16 remained relatively constant irrespective of previous TNF antagonist exposure.

Of those in response at Week 4 who attained remission during the study, patients in adalimumab maintenance groups maintained remission for a significantly longer time than patients in the placebo maintenance group (see Figure 5). Among patients who were not in response by Week 12, therapy continued beyond 12 weeks did not result in significantly more responses. The group that received adalimumab every week did not show significantly higher remission rates than the group that received adalimumab fortnightly.



**Table 16. Maintenance of Clinical Remission and Response (Percent of Patients)**

	Placebo	40 mg adalimumab fortnightly	40 mg adalimumab every week
<b>Week 26</b>	<b>n=170</b>	<b>n=172</b>	<b>n=157</b>
Clinical remission	17%	40%*	47%*
Clinical response (CR-100)	27%	52%*	52%*
Clinical response (CR-70)	28%	54%*	56%*
Patients in steroid-free remission for $\geq 90$ days <sup>a</sup>	3% (2/66)	19% (11/58)**	15% (11/74)**
<b>Week 56</b>	<b>n=170</b>	<b>n=172</b>	<b>n=157</b>
Clinical remission	12%	36%*	41%*
Clinical response (CR-100)	17%	41%*	48%*
Clinical response (CR-70)	18%	43%*	49%*
Patients in steroid-free remission for $\geq 90$ days <sup>a</sup>	5% (3/66)	29% (17/58)**	20% (15/74)**

Clinical remission is CDAI score <150; clinical response (CR-100) is decrease in CDAI  $\geq 100$  points; clinical response (CR-70) is decrease in CDAI  $\geq 70$  points

\* p<0.001 for adalimumab vs. placebo pairwise comparisons of proportions

\*\* p<0.02 for adalimumab vs. placebo pairwise comparisons of proportions

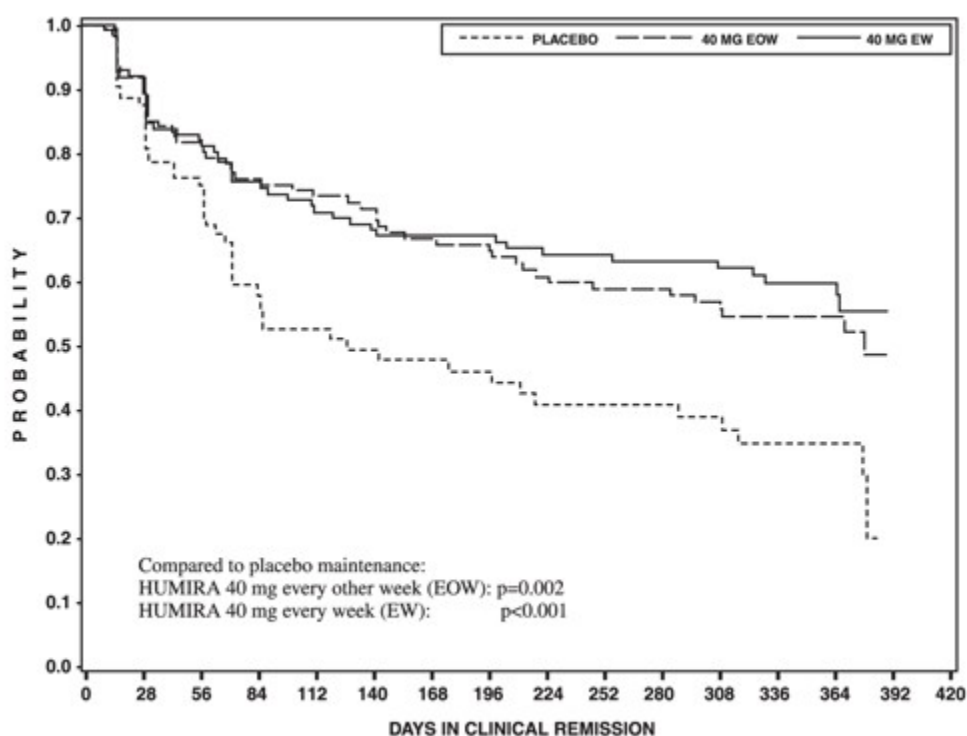
<sup>a</sup> Of those receiving corticosteroids at baseline

117/854 patients had draining fistulas both at screening and at baseline. For the assessment of fistula healing, the data for both doses of adalimumab used in the study were pooled. The proportion of subjects (ITT population) with fistula healing at Week 26 was statistically significantly greater in patients treated with adalimumab [21/70 (30.0%)] compared to placebo [6/47 (12.8%)]. Complete fistula healing was maintained through Week 56 in 23/70 (32.9%) and 6/47 (12.8%) patients (ITT population) in the adalimumab and placebo groups, respectively.

117/276 patients from CD study I and 272/777 patients from CD studies II and III were followed through at least 3 years of open-label adalimumab therapy. 88 (75.2%) and 189 (69.5%) patients, respectively, continued to be in clinical remission. Clinical response (CR-100) was maintained in 102 (87.2%) and 233 (85.7%) patients, respectively.

An endoscopy study (n=135) assessed rates of mucosal healing in patients with moderate to severe Crohn's Disease given either adalimumab or placebo. After 8 weeks of randomised treatment (Week 12 of study) there was a trend towards higher levels of mucosal healing in subjects given adalimumab compared with subjects given placebo but the differences were not statistically significant (healing in 27.4% (17/62) adalimumab vs 13.1% (8/61) given placebo;  $p=0.056$ ). Subjects who continued randomised adalimumab for 52 weeks (n=135) were more likely to experience mucosal healing relative to placebo (healing in 24.2% [15/62] adalimumab vs 0% [0/61] given placebo;  $p<0.001$ ).

**Figure 5. Days in Clinical Remission for Patients Who Achieved Clinical Remission in CD Study III**



### Patient Reported Outcomes

In CD Study I and CD Study II, statistically significant improvement in disease-specific inflammatory bowel disease questionnaire (IBDQ) total score was achieved at Week 4 in patients randomised to adalimumab 160/80 mg compared to placebo. Statistically significant improvement from baseline in IBDQ scores was seen at Weeks 26 and 56 in CD Study III among the adalimumab treatment groups compared to the placebo group.

## CHILDREN and ADOLESCENTS

Adalimumab was assessed in a multicentre, randomised, double-blind clinical trial designed to evaluate the efficacy and safety of induction and maintenance treatment with doses dependent on body weight (< 40 kg or ≥ 40 kg) in 192 paediatric subjects between the ages of 6 and 17 (inclusive) years, with moderate to severe Crohn's disease (CD) defined as Paediatric Crohn's Disease Activity Index (PCDAI) score >30. Subjects had to have failed conventional therapy (including a corticosteroid and/or an immunomodulator) for CD. Subjects may also have previously lost response or been intolerant to infliximab.

All subjects received open-label induction therapy at a dose based on their Baseline body weight: 160 mg at Week 0 and 80 mg at Week 2 for subjects ≥ 40 kg, and 80 mg and 40 mg, respectively, for subjects < 40 kg.

At Week 4, subjects were randomised 1:1 based on their body weight at the time to either the Low Dose or Standard Dose maintenance regimens as shown in Table 17.

**Table 17. Maintenance Regimen**

Patient Weight	Low Dose	Standard Dose
< 40 kg	10 mg fortnightly	20 mg fortnightly
≥40 kg	20 mg fortnightly	40 mg fortnightly

### **Efficacy Results**

The primary endpoint of the study was clinical remission at Week 26, defined as PCDAI score ≤10.

Clinical remission and clinical response (defined as reduction in PCDAI score of at least 15 points from Baseline) rates are presented in Table 18. Rates of discontinuation of corticosteroids or immunomodulators and fistula remission (defined as a closure of all fistulas that were draining at Baseline for at least 2 consecutive post-Baseline visits) are presented in Table 20.

**Table 18. Paediatric CD Study PCDAI Clinical Remission and Response**

	Standard Dose 40/20 mg fortnightly n =93	Low Dose 20/10 mg fortnightly n =95	P value*
Week 26			
Clinical Remission	38.7%	28.4%	0.075
Clinical Response	59.1%	48.4%	0.073
Week 52			
Clinical Remission	33.3%	23.2%	0.100
Clinical Response	41.9%	28.4%	0.038

\*p value for Standard Dose versus Low Dose comparison

The median PCDAI score of 40 observed in the study population at Baseline was chosen as the cut-off for differentiating moderate and severe disease. Subjects with Baseline PCDAI Scores <40 were classified as having moderate disease and subjects with Baseline PCDAI Scores ≥ 40 were classified as having severe disease. For subjects with Baseline PCDAI Scores (Median) ≥ 40 (severe CD subjects), Standard Dose was more effective than Low Dose at Week 52 for Clinical remission and Clinical response (see Table 19).

**Table 19. Maintenance of Clinical Remission and Response by Baseline PCDAI Score at Week 52 in Paediatric CD Study**

	Baseline PCDAI <40 (Moderate CD)			Baseline PCDAI ≥40 (Severe CD)		
	Standard Dose 40/20 mg fortnightly n=39	Low Dose 20/10 mg fortnightly n =41	P value*	Standard Dose 40/20 mg fortnightly n=54	Low Dose 20/10 mg fortnightly n =54	P value*
Clinical remission	35.9%	36.6%	0.949	31.5%	13.0%	0.021*
Clinical response	46.2%	41.5%	0.673	38.9%	18.5%	0.019*

\*p value for Standard Dose versus Low Dose from Chi-Square Test

**Table 20. Paediatric CD Study Discontinuation of Corticosteroids or Immunomodulators and Fistula Remission**

	Standard Dose 40/20 mg fortnightly	Low Dose 20/10 mg fortnightly	P value <sup>1</sup>
<b>Discontinued corticosteroids</b>	<b>n=33</b>	<b>n=38</b>	
Week 26	84.8%	65.8%	0.066
Week 52	69.7%	60.5%	0.420
<b>Discontinuation of Immunomodulators<sup>2</sup></b>	<b>n=60</b>	<b>n=57</b>	
Week 52	30.0%	29.8%	0.983
<b>Fistula remission<sup>3</sup></b>	<b>n=15</b>	<b>n=21</b>	
Week 26	46.7%	38.1%	0.608
Week 52	40.0%	23.8%	0.303

<sup>1</sup> p value for Standard Dose versus Low Dose comparison.

<sup>2</sup> Immunosuppressant therapy could only be discontinued at or after Week 26 at the investigator's discretion if the subject met the clinical response criterion

<sup>3</sup> defined as a closure of all fistulas that were draining at Baseline for at least 2 consecutive post-Baseline visits

Statistically significant increases (improvement) from Baseline to Week 26 and 52 in Body Mass Index and height velocity were observed for both treatment groups.

Statistically and clinically significant improvements from Baseline were also observed in both treatment groups for quality of life parameters (including IMPACT III).

### CLINICAL TRIALS FOR ULCERATIVE COLITIS

The safety and efficacy of adalimumab was assessed in adult patients with moderately to severely active ulcerative colitis (Mayo score 6 to 12 with endoscopy subscore of 2 to 3) in randomised, double-blind, placebo-controlled studies. Enrolled patients received concurrent or prior treatment with immunosuppressants such as corticosteroids, azathioprine, or 6-MP.

In Study UC-I, 576 TNF-antagonist naïve patients were randomised to receive either placebo at Weeks 0 and 2, 160 mg adalimumab at Week 0 followed by 80 mg at Week 2, or 80 mg adalimumab at Week 0 followed by 40 mg at Week 2. After Week 2, patients in both adalimumab arms received 40 mg fortnightly. Clinical remission (defined as Mayo score ≤ 2 with no subscore > 1) was assessed at Week 8. The primary endpoint was evaluated based on the 390 patients recruited after the 80/40 induction group was added by protocol amendment.

In Study UC-II, 248 patients received 160 mg of adalimumab at Week 0, 80 mg at Week 2 and 40 mg fortnightly thereafter, and 246 patients received placebo. Clinical results were assessed for induction of remission at Week 8 and for maintenance of remission at Week 52.

Subjects induced with 160/80 mg adalimumab achieved clinical remission versus placebo at Week 8 in statistically significantly greater percentages in Study UC-I (18% vs. 9% respectively, p=0.031) and Study UC-II (17% vs. 9% respectively, p=0.019). In Study UC-II, among those treated with adalimumab who were in clinical remission at Week 8, 21/41 (51%) were in clinical remission at Week 52. The percentage of subjects induced with 80/40 mg adalimumab in Study UC-I who achieved clinical remission at Week 8 was not statistically significantly different versus placebo.

Results from the overall UC-II study population are shown in Table 21.

**Table 21. Clinical Remission, Clinical Response and Mucosal Healing in Study UC-II (Percent of Patients)**

	Placebo	Adalimumab 40 mg fortnightly
<b>Week 8</b>	<b>n=246</b>	<b>n=248</b>
Clinical Remission	9%	17%*
Clinical Response	35%	50%**
Mucosal Healing	32%	41%*
<b>Week 52</b>	<b>n=246</b>	<b>n=248</b>
Clinical Remission	9%	17%*
Clinical Response	18%	30%*
Mucosal Healing	15%	25%*
Steroid-free remission <sup>a</sup>	6% (n=140)	13%* (n=150)
<b>Week 8 and 52</b>	<b>n=246</b>	<b>n=248</b>
Clinical Remission	4%	8%*
Clinical Response	12%	24%**
Sustained Mucosal Healing	11%	19%*

Clinical Remission is Mayo score ≤ 2 with no subscore > 1;

Clinical Response is decrease from baseline in Mayo score ≥ 3 points and ≥ 30%, and rectal bleeding subscore of 0 or 1 or its decrease from baseline ≥ 1 point.

Mucosal healing is defined as endoscopy subscore ≤ 1

\* p<0.05 for adalimumab vs. placebo pairwise comparison of proportions

\*\*p<0.001 for adalimumab vs. placebo pairwise comparison of proportions

<sup>a</sup> Of those receiving corticosteroids at baseline

Adalimumab should be discontinued in patients who do not achieve a clinical response during the first 8 weeks of therapy because very few patients will achieve clinical remission with continuing treatment. In UC-1 and UC-2, of patients given adalimumab 160/80 mg at baseline who did not achieve a clinical response at Week 8, 5.2%, and 17.0% went on to be in remission and response, respectively at Week 52.

**Table 22. Remission, Response and Mucosal Healing at Week 52 Among Week 8 Responders in Study UC-II (Percent of Patients)**

Week 52 Outcome	ITT Population		Adalimumab-Treated Patients	
	Adalimumab 40 mg fortnightly n=248	Placebo n=246	Week 8 Responders per Full Mayo Score n=125	Week 8 Responders per Partial Mayo Score n=123
Clinical Remission	17%	9%	29%	31%
Clinical Response	30%	18%	47%	50%
Mucosal healing	25%	15%	41%	43%
Steroid-free submission <sup>a</sup>	-	-	20%	-

<sup>a</sup> Of those receiving corticosteroids at baseline (N=90)

Statistically significant reductions of both all-cause and UC-related rates of hospitalisation were observed in a pooled analysis of Studies UC I and II.

Approximately 40% of patients in Study UC-II had failed prior anti-TNF treatment with infliximab. The efficacy of adalimumab in those patients was reduced compared to that in anti-TNF naïve patients.

The effectiveness of adalimumab in patients who have lost response to infliximab has not been established, statistically significant differences for Week 8 clinical remission and Week 8 clinical response were not observed for adalimumab versus placebo in those patients. However, at Week 52, clinical remission and clinical response were achieved in a statistically significantly greater number of patients on adalimumab versus placebo in patients who had failed prior anti-TNF treatment (i.e. remission: 3% on placebo versus 10% on adalimumab, and response: 10% on placebo versus 20% on adalimumab).

Patients from UC Studies I and II had the option to roll over into an open-label long-term extension study.

Patients who completed 52 weeks in UC Study I and II continued in an open, uncontrolled extension study (UC-III). Of the 588 patients who entered in the open-label study, 299 (51%) were in remission at year 3 and 273 (46%) were in remission at year 4. Patients, who lose response may benefit from an increase of dosing frequency to 40 mg weekly. 17% of patients initially responding to treatment with adalimumab required an increase in dosing frequency to 40 mg adalimumab every week.

### **Quality of Life**

In UC Study II, improvement in the disease-specific inflammatory bowel disease questionnaire (IBDQ) total score was achieved at Week 52 in patients randomised to adalimumab 160/80 mg compared to placebo (p=0.007).

## **CLINICAL TRIALS FOR PSORIASIS**

### **ADULTS**

The safety and efficacy of adalimumab were assessed in over 1,600 patients 18 years of age or older with moderate to severe chronic plaque psoriasis who were candidates for systemic therapy or phototherapy in randomised, double-blind, well-controlled studies. The safety and efficacy of adalimumab were also studied in adult patients with moderate to severe plaque psoriasis with concomitant hand and/or foot psoriasis who were candidates for systemic therapy.

Ps Study I (M03-656) evaluated 1212 patients with chronic plaque psoriasis with  $\geq 10\%$  BSA involvement and Psoriasis Area and Severity Index (PASI)  $\geq 12$  within three treatment periods. In period A, patients received placebo or adalimumab subcutaneously at an initial dose of 80 mg at Week 0 followed by a dose of 40 mg fortnightly starting at Week 1. After 16 weeks of therapy, patients who achieved at least a PASI 75 response at Week 16, defined as a PASI score improvement of at least 75% relative to baseline, entered period B and received open label 40 mg adalimumab fortnightly. After 17 weeks of open label therapy, patients who maintained at least a PASI 75 response at Week 33 and were originally randomised to active therapy in Period A were re-randomised in period C to receive 40 mg adalimumab fortnightly or placebo for an additional 19 weeks. Across all treatment groups the mean baseline PASI score was 18.9 and the baseline Physician's Global Assessment (PGA) score ranged from "moderate" (52.6%) to "severe" (41.3%) to "very severe" (6.1%).



Ps Study II (M04-716) compared the efficacy and safety of adalimumab versus methotrexate and placebo in 271 patients with 10% BSA involvement and PASI  $\geq$  10. Patients received placebo, an initial dose of MTX 7.5 mg and thereafter dose increases up to Week 12, with a maximum dose of 25 mg or an initial dose of 80 mg adalimumab followed by 40 mg fortnightly (starting one week after the initial dose) for 16 weeks. There are no data available comparing adalimumab and MTX beyond 16 weeks of therapy. Patients receiving MTX who achieved a  $\geq$ PASI 50 response at Week 8 and/or 12 did not receive further dose increases. Across all treatment groups, the mean baseline PASI score was 19.7 and the baseline PGA score ranged from “mild” (<1%) to “moderate” (48%) to “severe” (46%) to “very severe” (6%).

Ps Study III (M02-528) evaluated 148 patients with chronic plaque psoriasis with  $\geq$  5% BSA involvement for at least 1 year. Patients received placebo or adalimumab subcutaneously at a dose of 40 mg fortnightly starting at Week 1 after an initial dose of 80 mg at Week 0 or adalimumab at an initial dose of 80 mg at Week 0 followed by a dose of 40 mg weekly.

Patients participating in all Phase 2 and Phase 3 psoriasis studies were eligible to enrol into an open-label extension trial (M03-658) where adalimumab was given for at least an additional 108 weeks at 40 mg fortnightly, with the option to dose-escalate to 40 mg weekly if response was sub-optimal.

### **Clinical Results**

In Ps Studies I, II and III, the primary endpoint was the proportion of patients who achieved a reduction in PASI score of at least 75% (PASI 75) from baseline at Week 16 for Ps Studies I and II and Week 12 for Ps Study III. Other evaluated outcomes in Ps Studies I, II, and III included the PGA and other PASI measures. Ps Study I had an additional primary endpoint of loss of adequate response after Week 33 and on or before Week 52. Loss of adequate response is defined as a PASI score after Week 33 and on or before Week 52 that resulted in a <PASI 50 response relative to baseline with a minimum of a 6-point increase in PASI score relative to Week 33. In Ps Studies I and II, more patients randomised to adalimumab than to placebo achieved at least a 75% reduction from baseline of PASI score at Week 16. Other relevant clinical parameters including PASI 100 (i.e. complete clearance of psoriasis skin signs) and PGA of “clear or minimal” were also improved over placebo. Patients with  $\geq$ PASI 75 response continued

to Week 33. In Ps Study I, patients who were PASI 75 responders and were re-randomised to continue adalimumab therapy at Week 33 were less likely to experience a loss of adequate response on or before Week 52 than the PASI 75 responders who were re-randomised to placebo at Week 33 (4.9% versus 28.4%,  $p < 0.001$ ). In Ps Study II, superior results were achieved for PASI 75, PASI 100 and PGA of "clear or minimal" in patients randomised to the adalimumab treatment group versus those randomised to receive methotrexate (see Table 23 and Table 24).

**Table 23. Ps Study I (M03-656)**

	Period A		Period B	Period C	
	Efficacy Results at 16 Weeks (Percent of Patients)		Efficacy Results at 33 Weeks (Percent of Patients)	Among PASI 75 Responders at Week 33, Efficacy Results at 52 Weeks (Percent of Patients)	
	Placebo n=398	Adalimumab 40 mg fortnightly n=814	Adalimumab 40 mg fortnightly n=580	Placebo n=240	Adalimumab 40 mg fortnightly n=250
<b>≥PASI 75</b>	6.5	70.9 <sup>a</sup>	84.5	42.5	79.2
<b>PASI 100</b>	0.8	20.0 <sup>a</sup>	30.3	7.5	32.0
<b>PGA: Clear/minimal</b>	4.3	62.2 <sup>a</sup>	73.3	27.9	68.0

<sup>a</sup>  $p < 0.001$ , Adalimumab vs. placebo

**Table 24. Ps Study II (M04-716) Efficacy Results at 16 Weeks (Percent of Patients)**

	Placebo n=53	MTX n=110	Adalimumab 40 mg fortnightly n=108
<b>≥PASI 75</b>	18.9	35.5	79.6 <sup>a,b</sup>
<b>PASI 100</b>	1.9	7.3	16.7 <sup>c,d</sup>
<b>PGA:</b>	11.3	30.0	73.1 <sup>a,b</sup>

<sup>a</sup>  $p < 0.001$ , adalimumab vs. placebo

<sup>b</sup>  $p < 0.001$  adalimumab vs. methotrexate

<sup>c</sup>  $p < 0.01$  adalimumab vs. placebo

<sup>d</sup>  $p < 0.05$  adalimumab vs. methotrexate

Two of the continuous treatment populations entering trial M03-658 were those from Period C of Study I and those from Study II.

250 subjects in the adalimumab group in Period C of Study I achieved PASI 75 at Weeks 16 and 33 and received continuous adalimumab therapy at 40 mg fortnightly for up to 52 weeks. Of these, 233 entered the extension trial M03-658 and the proportion of patients with PGA of “clear or minimal” response was 70.0% at entry to the extension trial (52 weeks adalimumab treatment), 73.4% after 76 weeks treatment, and 59.0% after 160 weeks treatment. The corresponding percentages for PASI 75 were 83.7% at entry, 86.5% after 76 weeks treatment, and 74.7% after 160 weeks treatment.

108 subjects in the adalimumab group of Study II received continuous adalimumab therapy at 40 mg fortnightly for 16 weeks. Of these, 94 entered the extension trial M03-658, and the proportion of these patients with PGA of “clear or minimal” response was 68.1% at entry to the extension trial (16 weeks adalimumab treatment) and 46.2% after 124 weeks treatment. The corresponding percentages for PASI 75 were 74.5% at entry and 58.1% after 124 weeks treatment.

There was a withdrawal and retreatment evaluation in the extension trial (M03-658) after subjects had received at least 2 years of treatment with adalimumab. A pre-specified evaluable population of stable responders to adalimumab was assessed after withdrawal of adalimumab. This population consisted of subjects with stable psoriasis defined as PGA clear or minimal at the last 2 visits at least 12 weeks apart and receiving adalimumab 40 mg fortnightly during the last 12 weeks. If subjects relapsed (PGA became moderate or worse) during the withdrawal period, adalimumab was recommenced at an initial dose of 80 mg and then, from the following week, at 40 mg fortnightly. After 178 subjects had relapsed and recommenced adalimumab, the remaining subjects who had not relapsed were also eligible for retreatment with adalimumab.

Of 347 stable responders withdrawn from adalimumab, 339 had at least one post-baseline evaluation. Approximately half (55.5%) of these subjects relapsed. The median time to relapse was approximately 5 months. None of the subjects experienced rebound of disease (PASI  $\geq$  125% or new generalised erythrodermic or pustular psoriasis within 3 months of withdrawal of adalimumab). The number of retreated subjects was 285, of whom 178 had relapsed during the withdrawal period. At week 16 of retreatment, PGA

“clear or minimal” increased from 0% to 69.1% in relapsed subjects and from 59.8% to 88.8% in non-relapsed subjects. Therefore, after withdrawal of adalimumab and relapse, most subjects responded to retreatment within 16 weeks.

An additional Ps Study (M10-405) compared the efficacy and safety of adalimumab versus placebo in 72 patients with moderate to severe chronic plaque psoriasis and hand and/or foot psoriasis. Patients received an initial dose of 80 mg of adalimumab, followed by 40 mg fortnightly (starting one week after the initial dose), or placebo for 16 weeks. At Week 16, a statistically significantly greater proportion of patients who received adalimumab achieved a PGA score of “clear” or “almost clear” for the hands and/or feet compared to patients who received placebo (30.6% versus 4.3%, respectively [P = 0.014]).

### **Quality of Life**

Patient Reported Outcomes (PRO) were evaluated by several measures. Quality of Life was assessed using the disease-specific Dermatology Life Quality Index (DLQI) in Ps Study I and Ps Study II. In Ps Study I, patients receiving adalimumab demonstrated clinically meaningful improvement in the DLQI total score, disease severity, pain, and pruritus compared to the placebo group at both Weeks 4 & 16. The DLQI result was maintained at Week 52. In Ps Study II, patients receiving adalimumab demonstrated clinically meaningful improvement in the DLQI total score, disease severity, and pruritus compared to the placebo and methotrexate groups at Week 16, and clinically meaningful improvement in pain compared to the placebo group at Week 16.

The Short Form Health Survey (SF-36) was used to assess general health-related quality of life in Ps Study I. The adalimumab-treated patients had significantly greater improvement in the SF-36 Physical Component Summary (PCS) and Mental Component Summary (MCS) scores.

### **CHILDREN AND ADOLESCENTS**

The efficacy of adalimumab was assessed in a randomised, double-blind, controlled study of 114 paediatric patients from 4 years of age with severe chronic plaque psoriasis (as defined by a PGA  $\geq$  4 or  $>$  20% BSA involvement or  $>$  10% BSA involvement with very thick lesions or PASI  $\geq$  20 or  $\geq$  10 with clinically relevant facial, genital, or hand/foot involvement) who were inadequately controlled with topical therapy and heliotherapy or phototherapy.

Patients received adalimumab 0.8 mg/kg fortnightly (up to 40 mg), 0.4 mg/kg fortnightly (up to 20 mg), or methotrexate 0.1 – 0.4 mg/kg weekly (up to 25 mg). At week 16, more patients randomised to adalimumab 0.8 mg/kg had positive efficacy responses (e.g., PASI 75) than those randomised to MTX.

**Table 25. Paediatric Plaque Psoriasis Efficacy Results at 16 Weeks**

	<b>MTX<sup>a</sup></b> <b>n=37</b>	<b>Adalimumab 0.8mg/kg fortnightly</b> <b>n=38</b>
PASI 75 <sup>b</sup>	12 (32.4%)	22 (57.9%)
PGA: Clear/minimal <sup>c</sup>	15 (40.5%)	23 (60.5%)

<sup>a</sup> MTX = methotrexate

<sup>b</sup> p=0.027, adalimumab 0.8 mg/kg versus MTX

<sup>c</sup> p=0.083, adalimumab 0.8 mg/kg versus MTX

Patients who achieved PASI 75 and PGA clear or minimal were withdrawn from treatment for up to 36 weeks and monitored for loss of disease control (loss of PGA response). Patients were then re-treated with adalimumab 0.8 mg/kg fortnightly for an additional 16 weeks. Among patients who were responders to the initial 16 weeks of treatment but who relapsed upon withdrawal and were retreated, PASI 75 response of 78.9% (15 of 19 subjects) and PGA clear or minimal of 52.6% (10 of 19 subjects) was observed.

In the open label period of the study, PASI 75 and PGA clear or minimal responses were maintained for up to an additional 52 weeks with no new safety findings. A total of 91 subjects received only adalimumab 0.8 mg/kg in period D, the mean duration of treatment with adalimumab 0.8 mg/kg in period D was 315.0 days (range 42 to 380 days). Of the 91 subjects who only received adalimumab 0.8mg/kg in period D, the PASI 75 response rate and PGA clear/minimal response rate at week 52 were 69.2% and 59.3%, respectively.

### **CLINICAL TRIALS FOR HIDRADENITIS SUPPURATIVA**

The safety and efficacy of adalimumab were assessed in randomised, double-blind, placebo-controlled studies and an open-label extension study in adult patients with moderate to severe hidradenitis suppurativa (HS) who were intolerant, had a contraindication or an inadequate response to at least a 3-month trial of systemic

antibiotic therapy. The patients in Studies HS-I and HS-II had Hurley Stage II or III disease with at least 3 abscesses or inflammatory nodules.

Study HS-I (M11-313) evaluated 307 patients with 2 treatment periods. In Period A, patients received placebo or adalimumab at an initial dose of 160 mg at Week 0, 80 mg at Week 2, and 40 mg every week starting at Week 4 to Week 11. Concomitant antibiotic use was not allowed during the study. After 12 weeks of therapy, patients who had received adalimumab in Period A were re-randomised in Period B to 1 of 3 treatment groups (adalimumab 40 mg every week, adalimumab 40 mg every other week, or placebo from Week 12 to Week 35). Patients who had been randomised to placebo in Period A were assigned to receive adalimumab 40 mg every week in Period B.

Study HS-II (M11-810) evaluated 326 patients with 2 treatment periods. In Period A, patients received placebo or adalimumab at an initial dose of 160 mg at Week 0 and 80 mg at Week 2 and 40 mg every week starting at Week 4 to Week 11. 19.3% of patients had continued baseline oral antibiotic therapy during the study. After 12 weeks of therapy, patients who had received adalimumab in Period A were re-randomised in Period B to 1 of 3 treatment groups (adalimumab 40 mg every week, adalimumab 40 mg every other week, or placebo from Week 12 to Week 35). Patients who had been randomised to placebo in Period A were assigned to receive placebo in Period B.

Patients participating in Studies HS-I and HS-II were eligible to enrol into an open-label extension study in which adalimumab 40mg was administered every week. Throughout all 3 studies patients used topical antiseptic wash daily.

### **Clinical Response**

Reduction of inflammatory lesions and prevention of worsening of abscesses and draining fistulas was assessed using Hidradenitis Suppurativa Clinical Response (HiSCR; at least a 50% reduction in total abscess and inflammatory nodule count with no increase in abscess count and no increase in draining fistula count relative to Baseline). Reduction in HS-related skin pain was assessed using a Numeric Rating Scale in patients who entered the study with an initial baseline score of 3 or greater on a 11 point scale.

At Week 12, a significantly higher proportion of patients treated with adalimumab versus placebo achieved HiSCR. At Week 12, a significantly higher proportion of patients in

Study HS II experienced a clinically relevant decrease in HS-related skin pain (see Table 26). Patients treated with adalimumab had reduced risk of disease flare during the initial 12 weeks of treatment.

**Table 26. Efficacy Results at 12 weeks, HS Studies I and II**

Endpoint	HS Study 1		HS Study II	
	Placebo	Adalimumab 40 mg weekly	Placebo	Adalimumab 40 mg weekly
Hidradenitis Suppurativa Clinical Response (HiSCR) <sup>a</sup>	n = 154 40 (26.0%)	n = 153 64 (41.8%)*	n = 163 45 (27.6%)	n = 163 96 (58.9%***)
≥30% Reduction in Skin Pain <sup>b</sup>	n=109 27 (24.8%)	n=122 34 (27.9%)	n=111 23 (20.7%)	n=105 48 (45.7%***)

\*  $P < 0.05$ , \*\*\*  $P < 0.001$ , adalimumab versus placebo

<sup>a</sup> Among all randomised patients.

<sup>b</sup> Among patients with baseline HS-related skin pain assessment  $\geq 3$ , based on Numeric Rating Scale 0–10; 0 = no skin pain, 10 = skin pain as bad as you can imagine.

There is a statistically significantly higher HiSCR rate at Week 36 in patients who continued to receive weekly adalimumab compared to those who stopped adalimumab at Week 12.

At Week 36 HiSCR was achieved by 43% of the patients receiving ongoing weekly adalimumab and 28% of the patients who were withdrawn from adalimumab treatment after Week 12 ( $p < 0.05$ ), in the pooled Study HS-I and Study HS-II population.

Greater improvements at Week 12 from baseline compared to placebo were demonstrated in skin-specific health-related quality of life, as measured by the Dermatology Life Quality Index (DLQI; Study HS-II), and patient global satisfaction with medication treatment as measured by the Treatment Satisfaction Questionnaire - medication (TSQM; Study HS-II).

#### CLINICAL TRIALS FOR UVEITIS

The safety and efficacy of adalimumab were assessed in adult patients with non-infectious intermediate, posterior, and panuveitis (also known as “non-infectious uveitis affecting the posterior segment”), excluding patients with isolated anterior uveitis, in two randomised, double-masked, placebo-controlled studies (UV I and II). Patients received placebo or adalimumab at an initial dose of 80 mg followed by 40 mg fortnightly starting



one week after the initial dose. Concomitant stable doses of non-biologic immunosuppressants were permitted. The primary efficacy endpoint in both studies was 'time to treatment failure'. Following initial control of disease, a prolongation in time to treatment failure will result in reduced risk of disease flares, inflammation and vision loss.

Treatment failure was defined by a multi-component outcome based on inflammatory chorioretinal and/or inflammatory retinal vascular lesions, anterior chamber (AC) cell grade, vitreous haze (VH) grade and best corrected visual acuity (BCVA).

Study UV I evaluated 217 patients with active uveitis despite treatment with corticosteroids (oral prednisone at a dose of 10 to 60 mg/day). A majority of the 217 patients were female and Caucasian with mean age of 42.7 years. There was no statistically significant demographic difference between the placebo and adalimumab groups. All patients received a standardised dose of prednisone 60 mg/day at study entry followed by a mandatory taper schedule, with complete corticosteroid discontinuation by Week 15.

Study UV II evaluated 226 patients with inactive uveitis requiring chronic corticosteroid treatment (oral prednisone 10 to 35 mg/day) at baseline to control their disease. A majority of the 226 patients were female and Caucasian with mean age of 42.5 years. There was no statistically significant demographic difference between the placebo and adalimumab groups. Patients subsequently underwent a mandatory taper schedule, with complete corticosteroid discontinuation by Week 19.

### **Clinical Results**

Results from both studies demonstrated statistically significant reduction of the risk of treatment failure in patients treated with adalimumab versus patients receiving placebo (See Table 27). Both studies demonstrated an early and sustained effect of adalimumab on the treatment failure rate versus placebo (see Figure 6 and Figure 7).



**Table 27. Time to Treatment Failure in Studies UV I and UV II**

Analysis	n	Failure n=(%)	Median time to failure (Months)	HR	CI 95% for HR <sup>a</sup>	P Value <sup>b</sup>
<b>Time to Treatment Failure At or After Week 6 in Study UV I</b>						
Primary analysis (ITT)						
Placebo	107	84 (78.5)	3.0	-	-	-
Adalimumab	110	60 (54.5)	5.6	0.50	0.36, 0.70	< 0.001
<b>Time to Treatment Failure At or After Week 2 in Study UV II</b>						
Primary analysis (ITT)						
Placebo	111	61 (55.0)	8.3	-	-	-
Adalimumab	115	45 (39.1)	NE <sup>c</sup>	0.57	0.39, 0.84	0.004

Note: Treatment failure at or after Week 6 (Study UV I), or at or after Week 2 (Study UV II), was counted as event. Drop outs due to reasons other than treatment failure were censored at the time of dropping out.

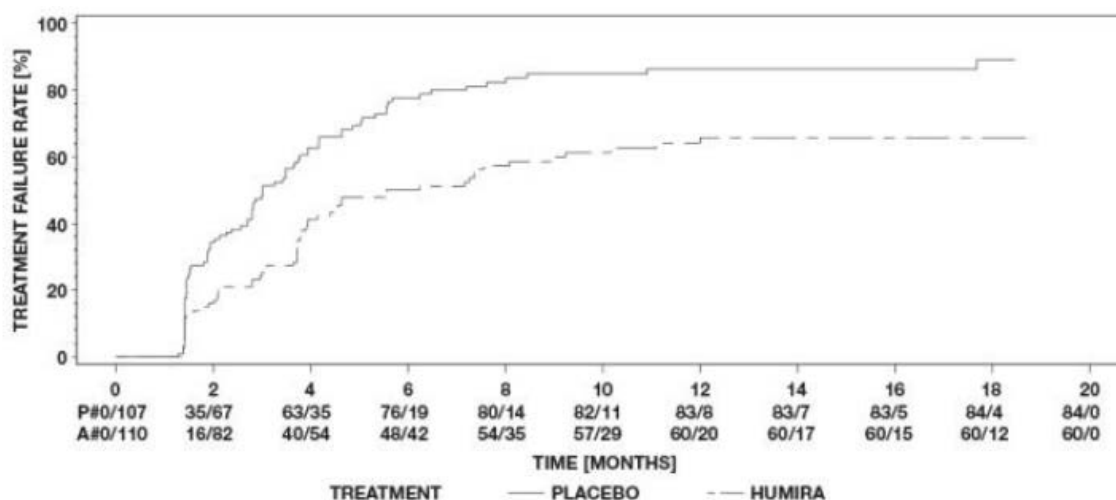
a. HR of Adalimumab vs placebo from proportional hazards regression with treatment as factor.

b. 2-sided P value from log rank test.

c. NE = not estimable. Fewer than half of at-risk subjects had an event.

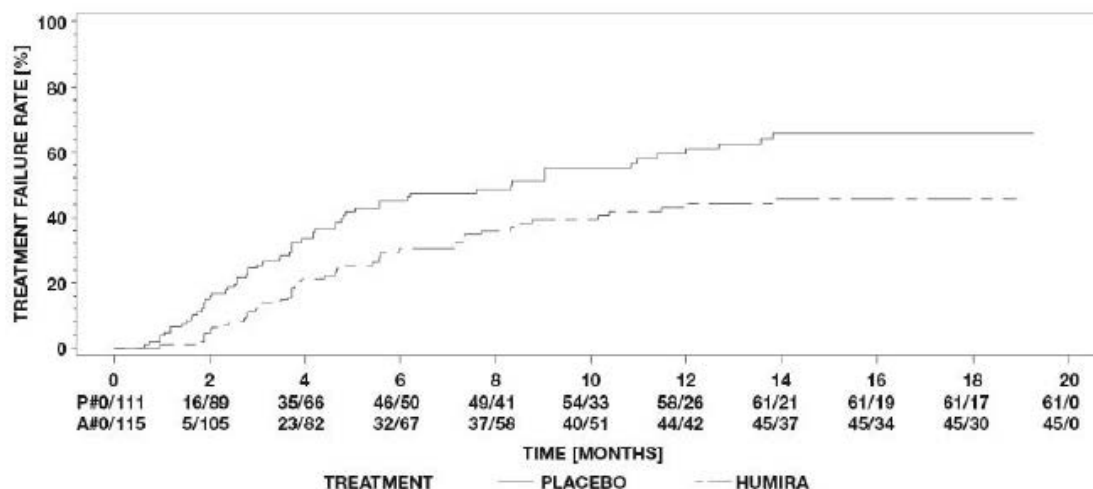
**Figure 6. Kaplan-Meier Curves Summarising Time to Treatment Failure on-or-after Week 6**

(Study UV I)



**Figure 7. Kaplan-Meier Curves Summarising Time to Treatment Failure on-or-after Week 2**

(Study UV II)



In both studies, all components of the primary endpoint contributed cumulatively to the overall difference between adalimumab and placebo groups (Table 28).

**Table 28. Treatment Failure Components in Study UV I and UV II**

Component of Time-to-Treatment Failure	HR <sup>a</sup>	UV I		UV II		
		CI 95%	P value <sup>b</sup>	HR <sup>a</sup>	CI 95%	P value <sup>b</sup>
New Active Inflammatory Lesions	0.38	0.21 – 0.69	0.001	0.55	0.26-1.15	0.105
Anterior Chamber Cells Grade	0.51	0.30-0.86	0.01	0.7	0.42-1.18	0.18
Vitreous Haze Grade	0.32	0.18-0.58	<0.001	0.79	0.34-1.81	0.569
Deterioration of Best Corrected Visual Acuity	0.56	0.32-0.98	0.04	0.33	0.16-0.70	0.002

Note: Treatment failure at or after Week 6 (Study UV I), or at or after Week 2 (Study UV II), was counted as event. Drop outs due to reasons other than treatment failure were censored at the time of dropping out.

a. HR of adalimumab vs placebo from proportional hazards regression with treatment as factor.

b. 2-sided P value from log rank test.

Additionally, in Study UV I, statistically significant differences in favour of adalimumab versus placebo were observed for the secondary endpoints changes in AC cell grade,

vitreous haze grade, and logMAR BCVA (mean change from best state prior to Week 6 to the final visit; *P* Values: 0.011, <0.001 and 0.003, respectively).

### **Quality of Life**

In Study UV 1, treatment with adalimumab resulted in maintenance of vision-related functioning and health-related quality of life, as measured by the National Eye Institute Visual Functioning Questionnaire-25 (NEI VFQ-25).

### **COMPARABILITY OF AMGEVITA WITH HUMIRA**

#### **CLINICAL TRIAL FOR RHEUMATOID ARTHRITIS**

The efficacy and safety of AMGEVITA compared with Humira were assessed in a randomised active-control, double-blind study in patients ≥ 18 years of age with moderate to severe active rheumatoid arthritis with inadequate response to methotrexate. The patients had either rheumatoid factor or anti-cyclic citrullinated peptide positivity. The study evaluated 526 patients on stable doses of Methotrexate. Patients were randomised to receive 40 mg of AMGEVITA or Humira subcutaneously every other week for up to 22 weeks.

The percent of AMGEVITA-treated subjects achieving ACR 20 at week 24 in the RA Study is shown in Table 29. At week 24, 74.6% (194/260) subjects in the AMGEVITA group and 72.4% (189/261) subjects in the Humira group met the ACR 20 response criteria. The risk ratio (RR) of ACR 20 for AMGEVITA versus Humira was 1.039 with the 2-sided 90% confidence interval (CI) of (0.954, 1.133).

**Table 29. Clinical Responses in RA Study similarity of AMGEVITA vs Humira**

	<b>AMGEVITA (24 weeks)</b>	<b>Humira (24 weeks)</b>
ACR20	74.6%	72.4%

The RR of ACR 20 primary endpoint was within the pre-specified margin and showed clinical equivalence between AMGEVITA and Humira.

The results of the components of the ACR response criteria for RA ABP-Study 1 are shown in Table 30. ACR response rates and improvement in all components of ACR response showed an absence of clinically meaningful differences between the two groups at week 24.

**Table 30. Components of ACR Response**

Parameter (median)	AMGEVITA <sup>a</sup> N = 264		Humira <sup>a</sup> N = 262	
	Baseline	Week 24	Baseline	Week 24
Number of tender joints (0-68)	21.0	4.0	20.5	4.0
Number of swollen joints (0-66)	12.0	2.0	12.0	2.0
Physician global assessment <sup>b</sup>	7.0	2.0	7.0	2.0
Patient global assessment <sup>b</sup>	7.0	3.0	7.0	3.0
Pain <sup>c</sup>	60.0	19.0	65.0	21.0
Disability index (HAQ) <sup>d</sup>	1.5	1.0	1.5	0.9
CRP (mg/L)	6.1	3.0	7.6	3.0

<sup>a</sup> 40 mg administered every other week

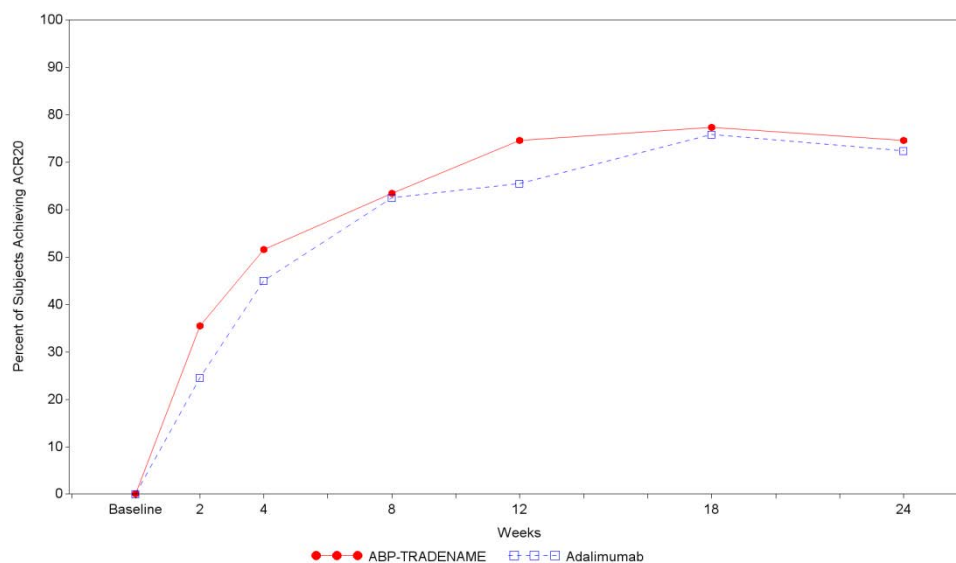
<sup>b</sup> Visual analogue scale; 0 = best, 10 = worst

<sup>c</sup> Pain scale; 0 = no pain; 100 = severe pain

<sup>d</sup> Disability Index of the Health Assessment Questionnaire; 0 = best, 3 = worst, measures the patient's ability to perform the following: dress/groom, arise, eat, walk, reach, grip, maintain hygiene, and maintain daily activity

The time course of ACR20 response is shown in Figure 8.

**Figure 8. RA Study With AMGEVITA and Humira ACR20 Responses Over 24 Weeks**



## CLINICAL TRIAL FOR PSORIASIS

The efficacy and safety of AMGEVITA were assessed in a randomised active-control, double-blind study in 350 patients  $\geq$  18 years of age with moderate to severe plaque psoriasis (Ps) who were candidates for systemic therapy or phototherapy. Patients had stable moderate to severe plaque Ps for at least 6 months, a body surface area (BSA)  $\geq$  10%, and Psoriasis Area and Severity Index (PASI)  $\geq$  12 at study entry. The patients received AMGEVITA or Humira at an initial loading dose of 80 mg administered SC on week 1/day1, followed by 40 mg SC given every other week starting one week after the loading dose. The PASI percent improvement from baseline was measured and compared with adalimumab (see Table 31) and it was within the pre-specified equivalence margin to demonstrate clinical equivalence between AMGEVITA and Humira.

**Table 31. Efficacy Results at Week 16 in Ps Study AMGEVITA vs Humira**

	<b>AMGEVITA</b> <b>n = 175</b>	<b>Humira</b> <b>n = 175</b>
PASI % Improvement from baseline	80.91	83.06

The primary endpoint was PASI percent improvement from baseline to week 16. At week 16, the PASI percent improvement from baseline was 80.9 in the AMGEVITA group and 83.1 in the Humira group. The least-squares (LS) mean difference of PASI percent improvement from baseline to week 16 between AMGEVITA and Humira was -2.18 with the 2-sided 95% CI of (-7.39, 3.02). The 95% CI was within the predefined equivalence margin, thus demonstrating clinical equivalence of AMGEVITA and Humira.

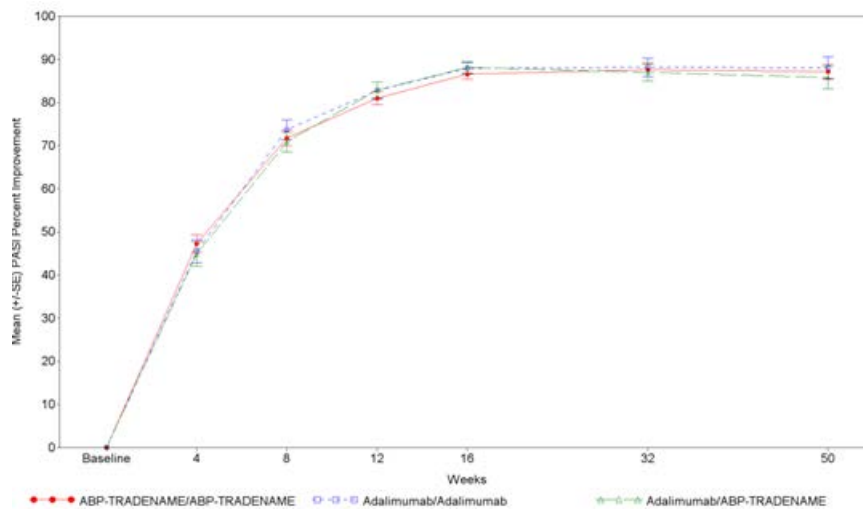
The Ps study was also designed to evaluate clinically meaningful differences in safety and immunogenicity in subjects who underwent a single transition from Humira to AMGEVITA at week 16 and to provide a descriptive comparison with patients who continued on Humira. The 350 subjects in the Ps study were initially randomised (1:1) to Treatment Group A (AMGEVITA) or Treatment Group B (Humira). At week 16, subjects with a PASI 50 response (50% or better improvement) continued on study for up to 52 weeks. Subjects who continued treatment beyond week 16 were re-randomised in a blinded fashion such that all subjects initially randomised to Treatment Group A

(AMGEVITA) continued treatment with AMGEVITA (AMGEVITA / AMGEVITA) and subjects initially randomised to Treatment Group B (Humira) were re-randomised (1:1) to either continue treatment with Humira, Treatment Group B1 (Humira/Humira) or were transitioned to AMGEVITA, Treatment Group B2 (Humira/ AMGEVITA). Subjects continued with their assigned treatment until week 48, when the last dose of assigned investigational product was administered and week 52 was the end of study.

The overall safety profile of the subjects who transitioned from Humira to AMGEVITA was similar to the subjects who remained on Humira throughout the study.

The mean PASI percent improvement from baseline over the duration of the study is shown in Figure 9.

**Figure 9. Mean PASI Percent Improvement From Baseline Over the Duration of Ps Study**



## IMMUNOGENICITY OF HUMIRA

Patients in rheumatoid arthritis studies I, II, and III were tested at multiple time points for anti-adalimumab antibodies during the 6 to 12 month period. Approximately 5.5% (58 of 1,062) of adult rheumatoid arthritis patients receiving adalimumab developed low-titre antibodies to adalimumab at least once during treatment, which were neutralising in vitro. Patients treated with concomitant MTX had a lower rate of antibody development than patients on adalimumab monotherapy (1% versus 12%). No apparent correlation of antibody development to adverse events was observed. With monotherapy, patients receiving fortnightly dosing may develop antibodies more frequently than those receiving weekly dosing. In patients receiving the recommended dosage of 40 mg fortnightly as monotherapy, the ACR 20 response was lower among antibody-positive patients than among antibody-negative patients. The long-term immunogenicity of adalimumab is unknown.

In pJIA Study I a greater percentage of patients developed antibodies to adalimumab compared to adult rheumatoid arthritis patients. Antibody formation was lower when adalimumab was given together with methotrexate in comparison with use as monotherapy. There was no apparent correlation between the presence of antibodies and adverse events. Anti-adalimumab antibodies were identified in 15.8% (27/171) of patients treated with adalimumab. In patients not given concomitant methotrexate, the incidence was 25.6% (22/86), compared to 5.9% (5/85) when adalimumab was used as add-on to methotrexate.

In pJIA Study II anti-adalimumab antibodies were identified in 7% (1/15) of patients, and the one patient was receiving concomitant methotrexate.

In patients with enthesitis-related arthritis, anti-adalimumab antibodies were identified in 11% (5/46) of patients treated with adalimumab. In patients not given concomitant methotrexate, the incidence was 14% (3/22), compared to 8% (2/24) when adalimumab was used as add-on to methotrexate.

In paediatric patients with moderately to severely active Crohn's disease, the rate of antibody development in patients receiving adalimumab was 3.3%.

In patients with ankylosing spondylitis, the rate of development of anti-adalimumab antibodies in adalimumab-treated patients was comparable to patients with rheumatoid arthritis. In patients with psoriatic arthritis, the rate of antibody development in patients

receiving adalimumab monotherapy was comparable to patients with rheumatoid arthritis; however, in patients receiving concomitant methotrexate the rate was 7% compared to 1% in rheumatoid arthritis. The immunogenicity rate was 8% for psoriasis patients who were treated with adalimumab monotherapy.

In patients with Crohn's disease, anti-adalimumab antibodies were identified in 2.6% (7/269) of patients treated with adalimumab.

In patients with ulcerative colitis, anti-adalimumab antibodies were identified in 3.9% (19/487) of patients treated with adalimumab. However, due to the limitation of the assay conditions, antibodies to adalimumab could be detected only when serum adalimumab levels were <2 micrograms/mL. Among the patients whose serum adalimumab levels were < 2 micrograms/mL (approximately 25% of total patients studied), the immunogenicity rate was 20.7%.

In plaque psoriasis patients on long term adalimumab without concomitant methotrexate who participated in a withdrawal and retreatment study, the rate of anti-adalimumab antibodies after retreatment was similar to the rate observed prior to withdrawal.

In patients with paediatric psoriasis, anti-adalimumab antibodies were identified in 13% (5/38) of subjects treated with 0.8 mg/kg adalimumab monotherapy. 37 of the 38 subjects completed the initial double blind period (16 weeks) of Study M04-717, and one subject entered the long term follow up period after Week 4.

In patients with moderate to severe hidradenitis suppurativa, anti-adalimumab antibodies were identified in 10/99 subjects (10.1%) treated with adalimumab.

In patients with non-infectious uveitis, anti-adalimumab antibodies were identified in 4.8% (12/249) of patients treated with adalimumab.

The data reflect the percentage of patients whose test results were considered positive for antibodies to adalimumab in an ELISA assay, and are highly dependent on the sensitivity and specificity of the assay. For these reasons, comparison of the incidence of antibodies to adalimumab with the incidence of antibodies to other products may be misleading.



## **IMMUNOGENICITY of AMGEVITA**

Differences in assay methodology for measuring immunogenicity prevents direct comparison of immunogenicity rates between AMGEVITA and Humira or other biologics in different studies. In the RA and Ps studies, binding ADA activity was determined using a bridging immunoassay and the neutralising ADA activity was determined using a TNF $\alpha$ -ligand binding based bioassay.

### **Immunogenicity in the RA study**

Patients were tested at multiple time points for antibodies to AMGEVITA and Humira during the 26-week study period. The incidence of developing binding antibodies was 38.3% (101/264) in the AMGEVITA group and 38.2% (100/262) in the Humira group; the incidence of developing neutralising antibodies was 9.1% (24/264) in the AMGEVITA group and 11.1% (29/262) in the Humira group. The immunogenicity profile of AMGEVITA was similar to Humira.

### **Immunogenicity in the Ps study**

Patients in the Ps study were tested at multiple time points for antibodies to Humira and AMGEVITA during the 52-week study period. The incidence of developing binding antibodies through the duration of the study was 68.4% (104/152) in the AMGEVITA/AMGEVITA group, 74.7% (59/79) in the Humira/Humira group, and 72.7% (56/77) in the Humira/AMGEVITA group; the incidence of developing neutralising antibodies was 13.8% (21/152) in the AMGEVITA/AMGEVITA group, 20.3% (16/79) in the Humira/Humira group, and 24.7% (19/77) in the Humira/AMGEVITA group. The Humira/AMGEVITA group reflects data for subjects exposed to both Humira and AMGEVITA before and after the transition. The safety and immunogenicity profiles of patients who transitioned from Humira to AMGEVITA were comparable to those who continued on Humira until the end of the study (week 52).

## **INDICATIONS**

### **Rheumatoid Arthritis**

AMGEVITA is indicated for reducing signs and symptoms, as well as inhibiting the progression of structural damage in adult patients with moderate to severely active rheumatoid arthritis. This includes the treatment of patients with recently diagnosed moderate to severely active disease who have not received methotrexate.

AMGEVITA can be used alone or in combination with methotrexate.

### **Juvenile Idiopathic Arthritis**

#### *Polyarticular Juvenile Idiopathic Arthritis*

AMGEVITA in combination with methotrexate is indicated for reducing the signs and symptoms of moderately to severely active polyarticular juvenile idiopathic arthritis in patients 2 years of age and older who have had an inadequate response to one or more disease modifying anti-rheumatic drugs (DMARDs). AMGEVITA can be given as monotherapy in case of intolerance to methotrexate or when continued treatment with methotrexate is inappropriate.

### **Enthesitis-Related Arthritis**

AMGEVITA is indicated for the treatment of enthesitis-related arthritis in children, who have had an inadequate response to, or who are intolerant to, conventional therapy.

### **Psoriatic Arthritis**

AMGEVITA is indicated for the treatment of signs and symptoms, as well as inhibiting the progression of structural damage, of moderately to severely active psoriatic arthritis in adult patients where response to previous DMARDs has been inadequate.

### **Ankylosing Spondylitis**

AMGEVITA is indicated for reducing signs and symptoms in patients with active ankylosing spondylitis.

### **Crohn's Disease in Adults and Children (≥6 years)**

AMGEVITA is indicated for the treatment of moderate to severe Crohn's disease, to reduce the signs and symptoms of the disease and to induce and maintain clinical remission in patients;

- who have had an inadequate response to conventional therapies or,
- who have lost response to or are intolerant of infliximab.

### **Ulcerative colitis**

AMGEVITA is indicated for the treatment of moderate to severe ulcerative colitis in adult patients who have had an inadequate response to conventional therapy or who are intolerant to or have medical contraindications for such therapies. Patients should show a clinical response within 8 weeks of treatment to continue treatment beyond that time. (see **CLINICAL TRIALS**).

### **Psoriasis in Adults and Children**

AMGEVITA is indicated for the treatment of moderate to severe chronic plaque psoriasis in adult patients who are candidates for systemic therapy or phototherapy.

AMGEVITA is indicated for the treatment of severe chronic plaque psoriasis in children and adolescent patients from 4 years of age who have had an inadequate response to or are inappropriate candidates for topical therapy and phototherapy.

### **Hidradenitis Suppurativa**

AMGEVITA is indicated for the treatment of active moderate to severe hidradenitis suppurativa (acne inversa) in adult patients with an inadequate response to conventional systemic hidradenitis suppurativa therapy.

### **Uveitis**

AMGEVITA is indicated for the treatment of non-infectious intermediate, posterior and pan-uveitis in adult patients who have had an inadequate response to corticosteroids, in patients in need of corticosteroid sparing, or in whom corticosteroid treatment is inappropriate.

## **CONTRAINDICATIONS**

AMGEVITA should not be administered to patients with known hypersensitivity to adalimumab or any of its excipients.

AMGEVITA is contraindicated in severe infections including sepsis, active tuberculosis and opportunistic infections (see **PRECAUTIONS**).

Concurrent administration of AMGEVITA and anakinra (interleukin-1 receptor antagonist) is contraindicated (see **PRECAUTIONS**).

Moderate to severe heart failure (NYHA class III/IV).

## **PRECAUTIONS**

In order to improve the traceability of biological medicines, the trade name and the batch number of the administered product should be clearly recorded in the patient's medical record and/or dispensing record.

### **Infections**

Serious infections, due to bacterial, mycobacterial, invasive fungal (disseminated or extrapulmonary histoplasmosis, aspergillosis, coccidioidomycosis), viral, parasitic or

other opportunistic infections such as listeriosis, Legionellosis and pneumocystis have been reported in patients receiving TNF-blocking agents, including adalimumab. Sepsis, rare cases of tuberculosis and candidiasis have also been reported with the use of TNF antagonists, including adalimumab. Other serious infections seen in clinical trials include pneumonia, pyelonephritis, septic arthritis and septicaemia. Hospitalisation or fatal outcomes associated with infections have been reported. Many of the serious infections have occurred in patients on concomitant immunosuppressive therapy that, in addition to their underlying disease could predispose them to infections.

Treatment with adalimumab should not be initiated in patients with active infections including chronic or localised infections until infections are controlled. In patients who have been exposed to tuberculosis, and patients who have travelled in areas of high risk of tuberculosis or endemic mycoses, such as histoplasmosis, coccidioidomycosis, or blastomycosis, the risk and benefits of treatment with adalimumab should be considered prior to initiating therapy (see **Other Opportunistic Infections**).

Patients should be monitored closely for infections – including tuberculosis before, during and after treatment with adalimumab.

Patients who develop a new infection while undergoing treatment with adalimumab should be monitored closely and undergo a complete diagnostic evaluation.

Administration of adalimumab should be discontinued if a patient develops a new serious infection or sepsis, and appropriate antimicrobial or antifungal therapy should be initiated. Physicians should exercise caution when considering the use of adalimumab in patients with a history of recurring infection or with underlying conditions, which may predispose patients to infections.

### **Hepatitis B Virus**

Use of TNF blockers, including adalimumab, has been associated with reactivation of hepatitis B virus (HBV) in patients who are chronic carriers of this virus. In some instances, HBV reactivation occurring in conjunction with TNF blocker therapy has been fatal. The majority of these reports have occurred in patients concomitantly receiving other medications that suppress the immune system, which may also contribute to HBV reactivation. Patients at risk for HBV infection should be evaluated for evidence of prior HBV infection before initiating TNF blocker therapy. Prescribers should exercise caution in prescribing TNF blockers for patients identified as carriers of HBV. Patients who are

carriers of HBV and require treatment with TNF blockers should be closely monitored for signs and symptoms of active HBV infection throughout therapy and for several months following termination of therapy. Adequate data are not available on the safety or efficacy of treating patients who are carriers of HBV with anti-viral therapy in conjunction with TNF blocker therapy to prevent HBV reactivation. In patients who develop HBV reactivation, adalimumab should be stopped and effective anti-viral therapy with appropriate supportive treatment should be initiated.

### **Tuberculosis**

Tuberculosis including reactivation and new onset of tuberculosis, has been reported in patients receiving adalimumab. Reports included cases of pulmonary and extrapulmonary (i.e., disseminated).

Before initiation of therapy with adalimumab, all patients should be evaluated for both active and inactive (latent) tuberculosis infection. This evaluation should include a detailed medical assessment of patient history of tuberculosis or possible previous exposure to people with active tuberculosis and previous and/or current immunosuppressive therapy. Appropriate screening tests (e.g., chest X-ray and tuberculin skin test) should be performed in accordance with local recommendations. Treatment of latent tuberculosis infections should be initiated prior to therapy with adalimumab. When tuberculin skin testing is performed for latent tuberculosis infection, an induration size of 5mm or greater should be considered positive, even if vaccinated previously with Bacille Calmette-Guerin (BCG).

The possibility of undetected latent tuberculosis should be considered especially in patients who have immigrated from or travelled to countries with a high prevalence of tuberculosis or who had close contact with a person with active tuberculosis.

If active tuberculosis is diagnosed, adalimumab therapy must not be initiated.

If latent tuberculosis is diagnosed, appropriate treatment must be started with anti-tuberculosis prophylactic treatment before the initiation of adalimumab in accordance with local recommendations. Use of anti-tuberculosis prophylactic treatment should also be considered before the initiation of adalimumab in patients with several or significant risk factors for tuberculosis despite a negative test for tuberculosis and in patients with a past history of latent or active tuberculosis in whom an adequate course of treatment cannot be confirmed. The decision to initiate anti-tuberculosis therapy in these patients

should only be made after taking into account both the risk for latent tuberculosis infection and the risks of anti-tuberculosis therapy. If necessary, consultation should occur with a physician with expertise in the treatment of tuberculosis. The benefit/risk balance of therapy with adalimumab should be very carefully considered.

Anti-tuberculosis treatment of patients with latent tuberculosis infection reduces the risk of reactivation in patients receiving treatment with adalimumab. Despite prophylactic treatment for tuberculosis, cases of reactivated tuberculosis have occurred in patients treated with adalimumab. Also, active tuberculosis has developed in patients receiving adalimumab whose screening for latent tuberculosis infection was negative, and some patients who have been successfully treated for active tuberculosis have redeveloped tuberculosis while being treated with TNF blocking agents.

Patients receiving adalimumab should be monitored for signs and symptoms of active tuberculosis, particularly because tests for latent tuberculosis infection may be falsely negative. The risk of false negative tuberculin skin test results should be considered especially in patients who are severely ill or immunocompromised.

Patients should be instructed to seek medical advice if signs/symptoms suggestive of a tuberculosis infection (e.g., persistent cough, wasting/weight loss, low grade fever) occur during or after therapy with adalimumab.

### **Other Opportunistic Infections**

Opportunistic infections, including invasive fungal infections, have been observed in patients receiving adalimumab. These infections are not consistently recognised in patients taking TNF blockers and this has resulted in delays in appropriate treatment, sometimes resulting in fatal outcomes.

Patients taking TNF blockers are more susceptible to serious fungal infections such as histoplasmosis, coccidioidomycosis, blastomycosis, aspergillosis, candidiasis, and other opportunistic infections. Those who develop fever, malaise, weight loss, sweats, cough, dyspnoea, and/or pulmonary infiltrates, or other serious systemic illness with or without concomitant shock should promptly seek medical attention for a diagnostic evaluation.

For patients who reside or travel in regions where mycoses are endemic, invasive fungal infections should be suspected if they develop the signs and symptoms of possible systemic fungal infection. Patients are at risk of histoplasmosis and other invasive fungal

infections and hence clinicians should consider empiric antifungal treatment until the pathogen(s) are identified. Antigen and antibody testing for histoplasmosis may be negative in some patients with active infection. When feasible, the decision to administer empiric antifungal therapy in these patients should be made in consultation with a physician with expertise in the diagnosis and treatment of invasive fungal infections and should take into account both the risk for severe fungal infection and the risks of antifungal therapy. Patients who develop a severe fungal infection are also advised to stop the TNF blocker until infections are controlled.

### **Neurologic Events**

Adalimumab has been associated in rare cases with new onset or exacerbation of clinical symptoms and/or radiographic evidence of central nervous system demyelinating disease, including multiple sclerosis, and optic neuritis, and peripheral demyelinating disease, including Guillain Barré syndrome. Prescribers should exercise caution in considering the use of adalimumab in patients with pre-existing or recent-onset central or peripheral nervous system demyelinating disorders; discontinuation should be considered if any of these disorders develop.

There is a known association between intermediate uveitis and central demyelinating disorders. Neurologic evaluation should be performed in patients with non-infectious intermediate uveitis prior to the initiation of adalimumab therapy and regularly during treatment to assess for pre-existing or developing central demyelinating disorders.

### **Hypersensitivity Reactions**

Serious allergic reactions associated with adalimumab were rare during clinical trials. Allergic reactions overall (e.g., allergic rash, anaphylactoid reaction, fixed-drug reaction, non-specific drug reaction, urticaria) have been observed in approximately 1% of patients. Reports of serious allergic reactions including anaphylaxis have been received following adalimumab administration. If an anaphylactic reaction or other serious allergic reaction occurs, administration of adalimumab should be discontinued immediately and appropriate therapy initiated.

The needle cover of the syringe contains natural rubber (latex). This may cause severe allergic reactions in patients sensitive to latex.



### **Haematologic Events**

Rare reports of pancytopenia including aplastic anaemia have been reported with TNF blocking agents. Adverse events of the haematologic system, including medically significant cytopenia (e.g., thrombocytopenia, leukopenia) have been infrequently reported with adalimumab (see **ADVERSE REACTIONS**). The causal relationship of these reports to adalimumab remains unclear. All patients should be advised to seek immediate medical attention if they develop signs and symptoms suggestive of blood dyscrasias or infection (e.g., persistent fever, bruising, bleeding, pallor) while on adalimumab. Discontinuation of adalimumab therapy should be considered in patients with confirmed significant haematologic abnormalities.

### **Immunosuppression**

The possibility exists for TNF blocking agents, including adalimumab, to affect host defences against infections and malignancies since TNF mediates inflammation and modulates cellular immune responses. In a study of 64 patients with rheumatoid arthritis treated with adalimumab, there was no evidence of depression of delayed-type hypersensitivity, depression of immunoglobulin levels, or change in enumeration of effector T- and B-cells and NK-cells, monocyte/macrophages, and neutrophils. The impact of treatment with adalimumab on the development and course of malignancies, as well as active and/or chronic infections is not fully understood. The safety and efficacy of adalimumab in patients with immunosuppression have not been evaluated. (See **PRECAUTIONS - Infections** and **ADVERSE REACTIONS - Infections and Malignancies**).

### **Vaccinations**

In a randomised, double-blind, placebo-controlled study in 226 adult rheumatoid arthritis patients treated with adalimumab, antibody responses to concomitant pneumococcal and influenza vaccines were assessed. Protective antibody levels to the pneumococcal antigens were achieved by 86% of patients in the adalimumab group compared to 82% in the placebo group. A total of 37% of adalimumab-treated subjects and 40% of placebo-treated subjects achieved at least a 2-fold increase in at least 3 out of 5 pneumococcal antigens. In the same study 98% of patients in the adalimumab group and 95% in the placebo group achieved protective antibody levels to the influenza antigens. A total of 52% of adalimumab-treated subjects and 63% of placebo-treated subjects achieved at least a 4-fold increase in at least 2 out of 3 influenza antigens.



Patients on adalimumab may receive concurrent vaccinations, except for live vaccines. No data are available on the secondary transmission of infection by live vaccines in patients receiving adalimumab.

Administration of live vaccines to infants exposed to adalimumab in utero is not recommended for 5 months following the mother's last adalimumab injection during pregnancy.

It is recommended that paediatric patients, if possible, be brought up to date with all immunisations in agreement with current immunisation guidelines prior to initiating adalimumab therapy.

### **Congestive Heart Failure**

In a clinical trial with another TNF antagonist worsening congestive heart failure and increased mortality due to congestive heart failure have been observed. Cases of worsening congestive heart failure have been reported in patients receiving adalimumab. Adalimumab should be used with caution in patients with mild heart failure (NYHA class I/II). Adalimumab is contraindicated in moderate or severe heart failure. Treatment with adalimumab must be discontinued in patients who develop new or worsening symptoms of congestive heart failure.

### **Malignancies**

In the controlled portions of clinical trials of TNF-antagonists, more cases of malignancies including lymphoma have been observed among patients receiving a TNF-antagonist, including adalimumab, compared with control patients (see **ADVERSE REACTIONS – Malignancies**). However, the occurrence was rare. Furthermore, there is an increased background lymphoma risk in rheumatoid arthritis patients with long-standing, highly active inflammatory disease, which complicates the risk estimation.

Very rare post marketing reports of hepatosplenic T-cell lymphoma (HSTCL), a rare aggressive lymphoma that is often fatal, have been identified in patients treated with adalimumab. Most of the patients had prior infliximab therapy as well as concomitant azathioprine or 6-mercaptopurine use for inflammatory bowel disease. The potential risk with the combination of azathioprine or 6-mercaptopurine and adalimumab should be carefully considered. The causal association of HSTCL with adalimumab is not clear.

With the current knowledge, a possible risk for the development of lymphomas or other malignancies in patients treated with a TNF-antagonist cannot be excluded.

Malignancies, some fatal, have been reported among children and adolescents who received treatment with TNF- blocking agents. Approximately half the cases were lymphomas, including Hodgkin's and non-Hodgkin's lymphoma. The other cases represented a variety of different malignancies and included rare malignancies usually associated with immunosuppression. The malignancies occurred after a median of 30 months of therapy. Most of the patients were receiving concomitant immunosuppressants. These cases were reported post marketing and are derived from a variety of sources including registries and spontaneous post marketing reports.

No studies have been conducted that include patients with a history of malignancy or that continue treatment in patients who develop malignancy while receiving adalimumab. Thus, additional caution should be exercised in considering adalimumab treatment of these patients.

In an exploratory clinical trial evaluating the use of another anti-TNF agent, infliximab, in patients with moderate to severe chronic obstructive pulmonary disease (COPD), more malignancies, mostly in the lung or head and neck, were reported in infliximab-treated patients compared with control patients. All patients had a history of heavy smoking. Therefore, caution should be exercised when using any TNF-antagonist in COPD patients, as well as in patients with an increased risk for malignancy due to heavy smoking.

All patients, and in particular patients with a medical history of extensive immunosuppressant therapy or psoriasis patients with a history of PUVA treatment should be examined for the presence of non-melanoma skin cancer prior to and during treatment with adalimumab. Melanoma and Merkel cell carcinoma have also been reported in patients treated with TNF-antagonists including adalimumab (See **ADVERSE EFFECTS**).

Cases of acute and chronic leukaemia have been reported in association with post marketing TNF blocker use in rheumatoid arthritis and other indications. Patients with rheumatoid arthritis may be at a higher risk (up to 2-fold) than the general population for the development of leukaemia, even in the absence of TNF-blocking therapy.

With current data it is not known if adalimumab treatment influences the risk for developing dysplasia or colon cancer. All patients with ulcerative colitis who are at increased risk for dysplasia or colon carcinoma (for example, patients with long-standing ulcerative colitis or primary sclerosing cholangitis), or who had a prior history of dysplasia or colon carcinoma should be screened for dysplasia at regular intervals before therapy and throughout their disease course. This evaluation should include colonoscopy and biopsies per local recommendations.

### **Autoimmune Processes**

Treatment with adalimumab may result in the formation of autoantibodies and rarely in the development of a lupus-like syndrome. The impact of long-term treatment with adalimumab on the development of autoimmune disease is unknown. If a patient develops symptoms suggestive of a lupus-like syndrome following treatment with adalimumab, treatment should be discontinued (see **ADVERSE REACTIONS – Autoantibodies**).

### **Concurrent Administration of biologic DMARDS or TNF- antagonists**

Concurrent administration of etanercept and anakinra has been associated with an increased risk of serious infections, an increased risk of neutropenia and no additional benefit compared to these medicinal products alone. Because of the nature of the adverse events seen with the combination of etanercept and anakinra therapy, similar toxicities may also result from the combination of anakinra and other TNF-antagonists. Therefore, combination of adalimumab and anakinra is contraindicated.

Concomitant administration of adalimumab with other biologic DMARDS (e.g., anakinra and abatacept) or other TNF- antagonists is not recommended based upon the increased risk of infections including serious infections and other potential pharmacological interactions.

### **Use in Psoriasis**

The safety and efficacy of adalimumab in combination with other systemic agents used in psoriasis or with phototherapy have not been studied. Adalimumab should not be used in combination with such agents.

### **Renal and Hepatic Impairment**

Adalimumab has not been studied in these patient populations. No dose recommendations can be made.

### **Surgery**

There is limited safety experience of surgical procedures in patients treated with adalimumab. The long half-life of adalimumab should be taken into consideration if a surgical procedure is planned. A patient who requires surgery while on adalimumab should be closely monitored for infections, and appropriate actions should be taken. There is limited safety experience in patients undergoing arthroplasty while receiving adalimumab.

### **Effects on Fertility**

The effect of adalimumab on fertility has not been investigated.

### **Use in Pregnancy (Category C)**

Results obtained with a very high intravenous adalimumab dose (100 mg/kg/week) in an embryofetal toxicity study in cynomolgus monkeys were inconclusive. No developmental toxicity was observed with an intravenous dose of 30 mg/kg/week, which resulted in a serum drug concentration greater than 100-fold higher than the maximum value expected during therapy during 40 mg fortnightly. Parturition was unaffected by both doses.

Limited clinical data on pregnant women exposed to adalimumab are available.

Due to its inhibition of TNF $\alpha$ , adalimumab administered during pregnancy could affect immune response in the in utero-exposed newborn and infant. Data from eight infants exposed to adalimumab in utero suggest it crosses the placenta. Administration of live vaccines to infants exposed to adalimumab in utero is not recommended for 5 months following the mother's last adalimumab injection during pregnancy.

Because animal studies are not always predictive of human responses, the use of adalimumab during pregnancy is not recommended. Women of child bearing potential should be advised to use adequate contraception during adalimumab therapy. The long half-life of adalimumab should also be considered when discontinuing therapy.

### **Use in Lactation**

It is not known whether adalimumab is excreted in animal or human milk or whether it would be absorbed by neonates after ingestion.

However, because many drugs and human immunoglobulins are excreted in human milk, and because of the potential for serious adverse reactions, breast feeding is not

recommended for at least 5 months after the last adalimumab treatment. A decision should be made whether to discontinue breastfeeding or to discontinue the drug, taking into account the importance of the drug to the mother. The long half-life of adalimumab should also be considered when discontinuing therapy.

### **Paediatric Use**

The safety and efficacy of adalimumab has not been established in other forms of JIA such as systemic JIA or oligoarticular JIA. The long term effects of adalimumab on the growth and development of children have not been studied. Treatment with adalimumab should only be initiated in patients with paediatric Crohn's disease following diagnosis by a specialist gastroenterologist, where other diseases with potentially similar presentations (e.g., Inflammatory Bowel Disease (IBD) associated with chronic granulomatous disease) have been ruled out. Adalimumab has not been studied in children with Crohn's disease aged less than 6 years.

### **Use in the Elderly**

Of the total number of subjects in clinical studies of adalimumab 10.4% were 65 years and over, while approximately 2.2% were 75 and over. A total of 519 RA patients 65 years of age and older, including 107 patients 75 years and older, received adalimumab in clinical RA studies I-IV. No overall difference in effectiveness was observed between these subjects and younger subjects. The frequency of serious infection and malignancy among adalimumab-treated subjects over age 65 was higher than for those under age 65. Because there is a higher incidence of infections and malignancies in the elderly population in general, caution should be used when treating the elderly (see **DOSAGE** and **ADMINISTRATION**).

### **Carcinogenicity**

Long-term animal studies have not been conducted to evaluate the carcinogenic potential of adalimumab.

### **Genotoxicity**

No genotoxicity was observed in an in-vitro test for bacterial gene mutation or in an in-vivo mouse micronucleus test for clastogenicity.

### **Effects on Ability to Drive and Use Machines**

No studies on the effects on the ability to drive and use machines have been performed.

### **Effects on Laboratory Tests**

There is no known interference between adalimumab and laboratory tests.

### **INTERACTIONS WITH OTHER MEDICINES**

Adalimumab has been studied in RA patients taking concomitant methotrexate (see **CLINICAL STUDIES** and *Pharmacokinetics – Steady State*). The data do not suggest the need for dose adjustment of either adalimumab or methotrexate. Interactions between adalimumab and drugs other than methotrexate have not been evaluated in formal pharmacokinetic studies. Concurrent administration of TNF-alpha inhibitors with anakinra or abatacept has been associated with an increased risk of serious infections (see **PRECAUTIONS**)

### **ADVERSE EFFECTS**

#### **Clinical Trials**

Adalimumab was studied in 9316 patients in controlled and open label trials. These trials included rheumatoid arthritis patients with short term and long standing disease, juvenile idiopathic arthritis (polyarticular juvenile idiopathic arthritis and enthesitis-related arthritis) as well as psoriatic arthritis, ankylosing spondylitis, Crohn's disease, ulcerative colitis, psoriasis, hidradenitis suppurativa and uveitis patients. The pivotal controlled studies involved 5994 patients receiving adalimumab and 3704 patients receiving placebo or active comparator during the controlled period.

The proportion of patients who discontinued treatment due to adverse events during the double-blind, controlled portion of pivotal studies across all indications was 5.9% for patients taking adalimumab and 5.5% for control treated patients. The proportion of patients who discontinued treatment due to adverse events during the double-blind, placebo-controlled portion of RA Studies I, II, III and IV was 6.6% for patients taking adalimumab and 4.2% for placebo- treated patients.

Approximately 13% of patients can be expected to experience injection site reactions, based on the most common adverse event with adalimumab in controlled clinical studies.

Undesirable effects in paediatric patients with polyarticular juvenile idiopathic arthritis: In general, the adverse events in paediatric patients were similar in frequency and type to those seen in adult patients.

Adverse events at least possibly causally-related to adalimumab for clinical studies, both clinical and laboratory, are displayed by system organ class and frequency (very common  $\geq 1/10$ ; common  $\geq 1/100$  to  $<1/10$ ; uncommon  $\geq 1/1000$  to  $< 1/100$ ); and rare  $\geq 1/10000$  to  $< 1000$  in Table 32 below.

The highest frequency seen among the various indications has been included.

**Table 32. Adverse Drug Reactions in Clinical Studies**

<b>System Organ Class <sup>a)</sup></b>	<b>Frequency</b>	<b>Adverse Reaction <sup>a)</sup></b>
Infections and infestations	Very common	Respiratory tract infections (including lower and upper respiratory tract infection, pneumonia, sinusitis, pharyngitis, nasopharyngitis and pneumonia herpes viral)
	Common	Systemic infections (including sepsis, candidiasis and influenza), Intestinal infections (including gastroenteritis viral), Skin and soft tissue infections (including paronychia, cellulitis, impetigo, necrotising fasciitis and herpes zoster), Ear infections, Oral infections (including herpes simplex, oral herpes and tooth infections), Reproductive tract infections (including vulvovaginal mycotic infection), Urinary tract infections (including pyelonephritis), Fungal infections, Joint infections
	Uncommon	Opportunistic infections and tuberculosis (including coccidioidomycosis, histoplasmosis and mycobacterium avium complex infection), Neurological infections (including viral meningitis), Eye infections, Bacterial infections
Neoplasms benign, malignant and unspecified (including cysts and polyps)	Common	Benign neoplasm, Skin cancer excluding melanoma (including basal cell carcinoma and squamous cell carcinoma)
	Uncommon	Lymphoma* Solid organ neoplasm (including breast cancer, lung neoplasm and thyroid neoplasm), Melanoma*



**Table 32. Adverse Drug Reactions in Clinical Studies**

<b>System Organ Class <sup>a)</sup></b>	<b>Frequency</b>	<b>Adverse Reaction <sup>a)</sup></b>
Blood and the lymphatic system disorders	Very common	Leucopaenia (including neutropaenia and agranulocytosis), Anaemia
	Common	Thrombocytopaenia, Leucocytosis
	Uncommon	Idiopathic thrombocytopaenic purpura
	Rare	Pancytopenia
Immune system disorders	Common	Hypersensitivity, Allergies (including seasonal allergy)
Metabolism and nutrition disorders	Very common	lipids increased
	Common	Hypokalaemia, Uric acid increased, Blood sodium abnormal, Hypocalcaemia, Hyperglycemia, Hypophosphotemia, Dehydration
Psychiatric disorders	Common	Mood alterations (including depression), Anxiety, Insomnia
Nervous system disorders	Very common	Headache
	Common	Paraesthesias (including hypoaesthesia), Migraine, Nerve root compression
	Uncommon	Tremor, neuropathy
	Rare	Multiple sclerosis
Eye disorders	Common	Visual impairment, Conjunctivitis, Blepharitis, Eye swelling
	Uncommon	Diplopia
Ear and labyrinth disorders	Common	Vertigo
	Uncommon	Deafness, Tinnitus

**Table 32. Adverse Drug Reactions in Clinical Studies**

<b>System Organ Class<sup>a)</sup></b>	<b>Frequency</b>	<b>Adverse Reaction<sup>a)</sup></b>
Cardiac disorders	Common	Tachycardia
	Uncommon	Arrhythmia, Congestive heart failure
	Rare	Cardiac arrest
Vascular disorders	Common	Hypertension, Flushing, Haematoma
	Uncommon	Vascular arterial occlusion, Thrombophlebitis, Aortic aneurysm
Respiratory, thoracic and mediastinal disorders	Common	Cough, Asthma, Dyspnoea
	Uncommon	Chronic obstructive pulmonary disease, Interstitial lung disease, Pneumonitis
Gastrointestinal disorders	Very common	Abdominal pain, Nausea and vomiting
	Common	GI haemorrhage, Dyspepsia, Gastroesophageal reflux disease, Sicca syndrome
	Uncommon	Pancreatitis, Dysphagia, Face oedema
Hepato-biliary disorders	Very common	Liver enzymes elevated
	Uncommon	Cholecystitis and cholelithiasis, Bilirubin increased, Hepatic steatosis

**Table 32. Adverse Drug Reactions in Clinical Studies**

<b>System Organ Class<sup>a)</sup></b>	<b>Frequency</b>	<b>Adverse Reaction<sup>a)</sup></b>
Skin and subcutaneous tissue disorders	Very Common	Rash (including exfoliative rash)
	Common	Pruritus, Urticaria, Bruising (including purpura), Dermatitis (including eczema), Onychoclasia (e.g. nail disorders), Hyperhidrosis
	Uncommon	Night sweats, Scar
Musculoskeletal, connective tissue and bone disorders	Very Common	Musculoskeletal pain
	Common	Muscle spasms (including blood creatine phosphokinase increased)
	Uncommon	Rhabdomyolysis, Systemic lupus erythematosus
Renal and urinary disorders	Common	Haematuria, Renal impairment
	Uncommon	Nocturia
Reproductive system and breast disorders	Uncommon	Erectile dysfunction
General disorders and administration site conditions	Very Common	Injection site reaction (including injection site erythema)
	Common	Chest pain, Oedema
	Uncommon	Inflammation
Investigations	Common	Coagulation and bleeding disorders (including activated partial thromboplastin time prolonged), Autoantibody test positive (including double stranded DNA antibody)
Injury and poisoning	Common	Impaired healing

\* including open label extension studies

<sup>a)</sup> MedDRA

Table 32 contains adverse reactions (ADRs), which in some cases represent groups of related Preferred Terms to represent a medical concept. The ADRs presented in the table were included based on criteria including statistical significance, doubling in rate in adalimumab treated patients compared to placebo treated patients, a rate greater than 1% for adalimumab treated patients and medical importance assessment.

### **Rheumatoid Arthritis**

Table 33 contains adverse reactions reported in at least 1% of RA patients with higher incidence ( $\geq 1\%$ ) in patients treated with adalimumab compared to control in 4 placebo-controlled RA trials (RA study I-IV). In general, the adverse reactions across all indications were similar to those seen in RA patients.

**Table 33. Adverse Reactions Reported by Patients Treated With Adalimumab during Placebo-Controlled Period of Rheumatoid Arthritis Studies**

<b>System Organ Class<sup>a)</sup></b>	<b>Adverse Reaction<sup>a)</sup></b>	<b>Adalimumab (n=1380) %</b>	<b>Control (n=690) %</b>
Infections and infestations	Respiratory tract infections (including lower and upper respiratory tract infection, pneumonia, sinusitis, pharyngitis, nasopharyngitis and pneumonia herpes viral)	39	33
	Oral infections (including herpes simplex, oral herpes and tooth infections)	7	5
	Reproductive tract infections (including vulvovaginal mycotic infection)	3	1
Blood and the lymphatic system disorders	Anaemia	13	8
	Leucopaenia (including neutropaenia and agranulocytosis)	14	8
	Leucocytosis	1	0
	Thrombocytopenia	1	0
Metabolism and nutrition disorders	Lipids increased	17	8
	Uric acid increased	6	3
	Blood sodium abnormal	10	3
	Hypokalaemia	3	2
	Hypophosphotaemia	2	1

	Blood potassium increased	3	1
Nervous system disorders	Headache	14	8
Vascular disorders	Hypertension	6	3
	Flushing	2	1

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Footnotes defined on next page of the table

**Table 33. Adverse Reactions Reported by Patients Treated With Adalimumab during Placebo-Controlled Period of Rheumatoid Arthritis Studies**

<b>System Organ Class<sup>a)</sup></b>	<b>Adverse Reaction<sup>a)</sup></b>	<b>Adalimumab (n=1380) %</b>	<b>Control (n=690) %</b>
Respiratory, thoracic and mediastinal disorders	Cough	7	6
Gastrointestinal disorders	Nausea and vomiting	12	11
	Abdominal pain	10	6
	Sicca syndrome	3	2
	GI haemorrhage	2	1
Hepato-biliary disorders	Liver enzymes elevated	12	8
Skin and subcutaneous tissue disorders	Rash (including exfoliative rash)	14	7
	Pruritus	5	1
	Dermatitis (including eczema)	3	1
	Bruising (including purpura)	2	0
Musculoskeletal, connective tissue and bone disorders	Musculoskeletal pain	14	9
	Muscle spasms (including blood creatine phosphokinase increased)	5	4
Renal and urinary disorders	Haematuria	9	4
	Renal impairment	8	4
General disorders and administration site conditions	Injection site reaction (including injection site erythema)	20	13
	Oedema	5	4
Investigations	Coagulation and bleeding disorders (including activated partial thromboplastin time prolonged)	9	4
	Blood lactate dehydrogenase increased	2	1

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<sup>a)</sup> MedDRA

### **Polyarticular Juvenile Idiopathic Arthritis**

In general, the adverse events in paediatric patients were similar in frequency and type to those seen in adult patients.

### **Hidradenitis Suppurativa**

The safety profile for patients with hidradenitis suppurativa treated with adalimumab weekly was consistent with the known safety effects of adalimumab.

### **Uveitis**

The safety profile for patients with non-infectious uveitis treated with adalimumab was consistent with the known safety profile of adalimumab.

### **Description of selected adverse reactions**

#### **Injection Site Reactions**

In the pivotal controlled trials in adults and children, 12.9% of patients treated with adalimumab developed injection site reactions (erythema and/or itching, haemorrhage, pain or swelling), compared to 7.3% of patients receiving control treatments. Most injection site reactions were described as mild and generally did not necessitate drug discontinuation.

#### **Infections**

In pivotal controlled trials in adults and children, the rate of infection was 1.51 per patient year in the adalimumab-treated patients and 1.46 per patient year in the control treated patients. The infections consisted primarily of upper respiratory tract infections, bronchitis and urinary tract infections. Most patients continued on adalimumab after the infection resolved. The incidence of serious infections was 0.04 per patient year in adalimumab-treated patients and 0.03 per patient year in control treated patients.

In the controlled and open label adult and paediatric studies with adalimumab, serious infections (including fatal infections, which occurred rarely) have been reported, which include reports of tuberculosis (including miliary and extrapulmonary locations) and invasive opportunistic infections (e.g. disseminated histoplasmosis, pneumocystis carinii pneumonia, aspergillosis and listeriosis). Most, but not all of the cases of tuberculosis occurred within the first eight months after initiation of therapy and may reflect recrudescence of latent disease.

### **Malignancies**

During the controlled portions of pivotal adalimumab trials in adults at least 12 weeks in duration in patients with moderately to severely active rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, Crohn's disease, ulcerative colitis, psoriasis, hidradenitis suppurativa, and uveitis malignancies, other than lymphoma and non-melanoma skin cancer, were observed at a rate (95% confidence interval) of 6.9 (4.4, 10.6) per 1000 patients years among 5196 adalimumab-treated patients versus a rate of 6.4 (3.5, 11.9) per 1000 patient years among 3347 control patients (median duration of treatment was 4.0 months for adalimumab and 3.9 months for control-treated patients).

The rate (95% confidence interval) of non-melanoma (basal cell and squamous cell) skin cancers was 8.9 (6.1, 13.1) per 1000 patient years among adalimumab-treated patients and 3.2(1.3, 7.7) per 1000 patient years among control patients. Of these skin cancers, squamous cell carcinomas occurred at rates (95% confidence interval) of 2.7 (1.4,5.5) per 1000 patient years among adalimumab-treated patients and 0.6 (0.1, 4.6) per 1000 patient years among control patients.

The rate (95% confidence interval) of lymphomas was 0.7 (0.2, 2.7) per 1000 patient years among adalimumab-treated patients and 0.6(0.1, 4.6) per 1000 patient years among control patients.

When combining controlled portions of these trials and ongoing open label extension studies with a median duration of approximately 3.3 years including 6279 patients and over 26045 patient years of therapy, the observed rate of malignancies, other than lymphoma and non-melanoma skin cancers is approximately 8.6 per 1000 patient years. The observed rate of non-melanoma skin cancers is approximately 9.8 per 1000 patient years and the observed rate of lymphomas is approximately 1.3 per 1000 patient years.

No malignancies were observed in 217 paediatric patients with an exposure of 610.4 patient years during adalimumab trials in patients with juvenile idiopathic arthritis (polyarticular juvenile idiopathic arthritis and enthesitis-related arthritis).

In addition, no malignancies were observed in 192 paediatric patients with an exposure of 258.9 patient years during an adalimumab trial in paediatric patients with Crohn's disease.

No malignancies were observed in 77 paediatric patients with an exposure of 80.0 patient years during an adalimumab trial in paediatric patients with plaque psoriasis.

In post marketing experience from January 2003 to December 2010, predominantly in patients with rheumatoid arthritis, the reported rate of malignancies is approximately 2.7 per 1000 patient years. The reported rates for non-melanoma skins cancers and lymphomas is approximately 0.3 per 1000 patient years.

Rare post-marketing cases of hepatosplenic T-cell lymphoma have been reported in patients treated with adalimumab (See **PRECAUTIONS**)

### **Autoantibodies**

Patients had serum samples tested for autoantibodies at multiple time points in rheumatoid arthritis studies I – V. In these adequate and well-controlled trials, 11.9% of patients treated with adalimumab and 8.1% of placebo and active control treated patients that had negative baseline antinuclear antibody titres reported positive titres at Week 24. Two patients out of 3989 treated with adalimumab in all rheumatoid and psoriatic arthritis, and ankylosing spondylitis studies developed clinical signs suggestive of new-onset lupus-like syndrome. The patients improved following discontinuation of therapy. No patients developed lupus nephritis or central nervous system symptoms. The impact of long-term treatment with adalimumab on the development of autoimmune diseases is unknown.

### **Psoriasis: New-onset and Worsening**

Cases of new onset psoriasis, including pustular psoriasis and palmoplantar psoriasis, and cases of worsening of pre-existing psoriasis have been reported with the use of TNF blockers, including adalimumab. Many of these patients were taking concomitant immunosuppressants (e.g., MTX, corticosteroids). Some of these patients required hospitalisation. Most patients had improvement of their psoriasis following discontinuation of their TNF blocker. Some patients have had recurrences of the psoriasis when they were re-challenged with a different TNF blocker. Discontinuation of adalimumab should be considered for severe cases and those that do not improve or that worsen despite topical treatments.

### **Liver Enzyme Elevations**

*Rheumatoid Arthritis and Psoriatic Arthritis clinical trials:* In controlled Phase 3 trials of adalimumab (40 mg fortnightly), in patients with RA and PsA with a control period



duration ranging from 4 to 104 weeks, ALT elevations  $\geq 3 \times$  ULN occurred in 3.7% of adalimumab -treated patients and 1.6% of control-treated patients. Since many of the patients in these trials were also taking medications that cause liver enzyme elevations (e.g., NSAIDS, MTX), the relationship between adalimumab and the liver enzyme elevations is not clear.

Juvenile Idiopathic Arthritis clinical trials: In a controlled Phase 3 trial of adalimumab in patients with polyarticular JIA who were 4 to 17 years and Enthesitis-related arthritis who were 6 to 17 years,, ALT elevations  $\geq 3 \times$  ULN occurred in 6.1% of adalimumab-treated patients and 1.3% of control-treated patients. Most ALT elevations occurred with concomitant methotrexate use. No ALT elevations  $\geq 3 \times$  ULN occurred in the Phase 3 trial of adalimumab in patients with polyarticular JIA who were 2 to <4 years or aged 4 years and above weighing <15 kg.

Ankylosing Spondylitis Clinical Trials: In controlled Phase 3 trials of adalimumab (40 mg fortnightly), in patients with ankylosing spondylitis with a control period of 12 to 24 weeks, ALT elevations  $\geq 3 \times$  ULN occurred in 2.44% of adalimumab -treated patients and 0.66% of control-treated patients.

Hidradenitis Suppurativa clinical trials: In controlled trials of adalimumab (initial doses of 160 mg at Week 0 and 80 mg at Week 2, followed by 40 mg every week starting at Week 4), in patients with hidradenitis suppurativa with a control period duration ranging from 12 to 16 weeks, ALT elevations  $\geq 3 \times$  ULN occurred in 0.3% of adalimumab-treated patients and 0.6% of control-treated patients.

Crohn's Disease Clinical Trials: In controlled Phase 3 trials of adalimumab (initial doses of 160 mg and 80 mg, or 80 mg and 40 mg on Days 1 and 15, respectively, followed by 40 mg fortnightly), in patients with Crohn's disease with a control period duration ranging from 4 to 52 weeks, ALT elevations  $\geq 3 \times$  ULN occurred in 0.9% of adalimumab -treated patients and 0.9% of control-treated patients.

Paediatric Crohn's Disease Clinical Trials : In the Phase 3 trial of adalimumab in patients with paediatric Crohn's disease which evaluated efficacy and safety of two body weight adjusted maintenance dose regimens following body weight adjusted induction therapy up to 52 weeks of treatment, ALT elevations  $\geq 3 \times$  ULN occurred in 2.6% (5/192) of patients of whom 4 were receiving concomitant immunosuppressants at baseline.

Ulcerative colitis clinical trials: In controlled Phase 3 trials of adalimumab (initial doses of 160 mg and 80 mg on Days 1 and 15 respectively, followed by 40 mg fortnightly), in patients with ulcerative colitis with a control period duration ranging from 1 to 52 weeks, ALT elevations  $\geq 3 \times$  ULN occurred in 1.5% of adalimumab -treated patients and 1.0% of control-treated patients.

Psoriasis Clinical Trials: In controlled Phase 3 trials of adalimumab (initial dose of 80 mg then 40 mg fortnightly), in patients with plaque psoriasis with control a period duration ranging from 12 to 24 weeks, ALT elevations  $\geq 3 \times$  ULN occurred in 1.8% of adalimumab-treated patients and 1.8% of control-treated patients.

Paediatric Patients with Plaque Psoriasis Clinical Trial: No ALT elevations  $\geq 3 \times$  ULN occurred in the Phase 3 trial.

Uveitis Clinical Trials: In controlled trials of adalimumab (initial doses of 80 mg at Week 0 followed by 40 mg fortnightly starting at Week 1) in patients with uveitis with an exposure of 165.4 patient years and 119.8 patient years in adalimumab-treated and control-treated patients, respectively, ALT elevations  $\geq 3 \times$  ULN occurred in 2.4% of adalimumab-treated patients and 2.4% of control-treated patients.

In all indications patients with raised ALT were asymptomatic and in most cases elevations were transient and resolved on continued treatment. However, there have been very rare post marketing reports of severe hepatic reactions including liver failure in patients receiving TNF blockers, including adalimumab. The causal relationship to adalimumab treatment remains unclear.

#### **Concurrent Treatment with Azathioprine/6-Mercaptopurine**

In adult Crohn's disease studies, higher incidences of malignant and serious infection-related adverse events were seen with the combination of adalimumab and azathioprine/6-mercaptopurine compared with adalimumab alone.

#### **Polyarticular Juvenile Idiopathic Arthritis Clinical Trials**

In general, the adverse reactions in patients with polyarticular juvenile idiopathic arthritis (pJIA Studies I and II) were similar in frequency and type to those seen in adult patients. Important findings and differences from adults are discussed in the following paragraphs.

In pJIA Study I, adalimumab was studied in 171 patients, 4 to 17 years of age, with polyarticular juvenile idiopathic arthritis. Severe adverse reactions reported in the study

included neutropenia, streptococcal pharyngitis, increased aminotransferases, herpes zoster, myositis, metrorrhagia and appendicitis. Serious infections were observed in 4% of patients within approximately 2 years of initiation of treatment with adalimumab and included cases of herpes simplex, pneumonia, urinary tract infection, pharyngitis, and herpes zoster.

In pJIA Study I, 45% of patients experienced an infection while receiving adalimumab with or without concomitant methotrexate in the first 16 weeks of treatment. The types of infections reported in polyarticular juvenile idiopathic arthritis (JIA) patients were generally similar to those commonly seen in outpatient polyarticular JIA populations. Upon initiation of treatment, the most common adverse reactions occurring in this patient population treated with adalimumab were injection site pain and injection site reaction (19% and 16%, respectively). A less commonly reported adverse event in patients receiving adalimumab was granuloma annulare which did not lead to discontinuation of adalimumab treatment.

In the first 48 weeks of treatment in pJIA Study I, non-serious hypersensitivity reactions were seen in approximately 6% of patients and included primarily localised allergic hypersensitivity reactions and allergic rash. Isolated mild to moderate elevations of liver aminotransferases (ALT more common than AST) were observed in patients with polyarticular JIA exposed to adalimumab alone; liver function tests (LFT) elevations were more frequent among those treated with the combination of adalimumab and methotrexate. In general, these elevations did not lead to discontinuation of adalimumab treatment.

In the pJIA Study I, 10% of patients treated with adalimumab who had negative baseline anti-dsDNA antibodies developed positive titres after 48 weeks of treatment. No patient developed clinical signs of autoimmunity during the clinical trial.

Approximately 15% of patients treated with adalimumab developed mild-to-moderate elevations of creatine phosphokinase (CPK) in pJIA Study I. Elevations exceeding 5 times the upper limit of normal were observed in several patients. CPK levels decreased or returned to normal in all patients. Most patients were able to continue adalimumab without interruption.

In pJIA Study II, adalimumab was studied in 32 patients who were 2 to <4 years of age or 4 years of age and older weighing <15 kg with polyarticular JIA. Thirty-one of 32 patients

(97%) received the required minimum of 24 weeks of adalimumab treatment. Patients were able to continue up to a maximum of 120 weeks of treatment. The safety profile for this patient population was similar to the safety profile seen in patients 4 to 17 years of age with polyarticular JIA.

In pJIA Study II, 78% of patients experienced an infection while receiving adalimumab. These included nasopharyngitis, bronchitis, upper respiratory tract infection, otitis media, and were mostly mild to moderate in severity. Serious infections were observed in 9% of patients receiving adalimumab in the study and included dental caries, rotavirus gastroenteritis, and varicella.

In pJIA Study II, non-serious allergic reactions were observed in 6% of patients and included intermittent urticaria and rash, which were all mild in severity.

#### **Additional Adverse Reactions from Postmarketing Surveillance or Phase IV Clinical Trials**

Adverse events have been reported during post-approval use of adalimumab. Because these events are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to adalimumab exposure.

**Table 34. Additional Adverse Reactions From Postmarketing Surveillance or Phase IV Clinical Trials**

<b>Body System</b>	<b>Adverse Reaction</b>
Infections and infestations	Diverticulitis
Neoplasms benign, malignant and unspecified (including cysts and polyps)	Hepatosplenic T-cell lymphoma, leukaemia, Merkel Cell Carcinoma (neuroendocrine carcinoma of the skin)
Immune system disorders	Anaphylaxis, sarcoidosis
Nervous System Disorders	Cerebrovascular accident, Demyelinating disorders, (e.g.optic neuritis, Guillain-Barré syndrome)
Cardiac disorders	Myocardial infarction
Respiratory, thoracic and mediastinal disorders	Pulmonary embolism, pulmonary fibrosis, pleural effusion
Gastrointestinal Disorders	Intestinal perforation
Hepato-biliary disorders	Reactivation of hepatitis B, liver failure, hepatitis
Skin and subcutaneous tissue disorders	Alopecia, angioedema, cutaneous vasculitis, new onset or worsening of psoriasis (including palmoplantar pustular psoriasis), erythema multiforme, Stevens Johnson Syndrome,
Musculoskeletal and connective tissue disorders	Lupus-like syndrome
General disorders and administration site conditions	Pyrexia

**Comparability of AMGEVITA with Humira**

Both the AMGEVITA Rheumatoid Arthritis (RA) and Psoriasis (Ps) Studies showed clinical equivalence between AMGEVITA and Humira (see **CLINICAL TRIALS**).

Table 35 and Table 36 below show comparative data for adverse events between AMGEVITA and Humira from the RA and Ps studies, respectively.

The data in Table 35 reflect exposure to AMGEVITA in 264 subjects and Humira in 262 subjects in the RA Study treated at the recommended dose and schedule for a median of 480 mg doses (See CLINICAL TRIALS). 52.3% of all subjects had at least 1 treatment-emergent adverse event during the study, and similar proportions were reported in each treatment group (50.0% in ABP 501 group and 54.6% in Adalimumab group). The overall safety profile of AMGEVITA is similar to that of Humira.

**Table 35. Adverse Events Reported by ≥ 2% of Patients Treated With AMGEVITA and Humira in RA Study**

	<b>AMGEVITA (n = 264)</b>	<b>Humira (n = 262)</b>
Adverse Events (Preferred Term)		
Nasopharyngitis	6.4%	7.3%
Headache	4.5%	4.2%
Arthralgia	3.0%	3.4%
Cough	2.7%	3.1%
Upper respiratory tract infection	1.5%	3.8%
Hypertension	2.3%	1.9%
Bronchitis	2.3%	1.9%
Back pain	1.9%	2.3%
Alanine aminotransferase increased	2.7%	1.1%
Diarrhoea	2.3%	1.5%
Rheumatoid arthritis	1.5%	2.3%
Pharyngitis	0.8%	2.7%

The data in Table 36 reflect exposure to AMGEVITA/AMGEVITA in 152 subjects, Humira/Humira in 79 subjects, and Humira/AMGEVITA in 77 subjects in the Ps study treated at the recommended dose and schedule for a median of 1040 mg doses [see CLINICAL TRIALS]. 82.1% of subjects, from baseline to end of study, had at least 1 treatment emergent adverse event and similar proportions were reported across treatment groups ( 86.2% of subjects in Treatment Group A (AMGEVITA/AMGEVITA), 78.5% of subjects in Treatment Group B1 (Humira/Humira), and 85.7% of subjects in Treatment Group B2 (Humira/AMGEVITA). The overall safety profiles of the AMGEVITA/AMGEVITA, Humira/Humira and Humira/AMGEVITA groups were similar.

**Table 36. Adverse Events Reported by ≥ 2% of Patients Treated with AMGEVITA, Adalimumab or Adalimumab switched to AMGEVITA in Ps Study**

	AMGEVITA/ AMGEVITA (n = 152)	Humira/Humira (n = 79)	Humira/ AMGEVITA <sup>a</sup> (n = 77)
Adverse Events (Preferred Term)			
Nasopharyngitis	27.0%	27.8%	32.5%
Headache	8.6%	17.7%	9.1%
Upper respiratory tract infection	11.8%	11.4%	10.4%
Arthralgia	5.9%	10.1%	6.5%
Psoriasis	7.2%	6.3%	5.2%
Diarrhea	3.3%	6.3%	13.0%
Back pain	6.6%	6.3%	2.6%
Oropharyngeal pain	2.6%	7.6%	3.9%
Pruritus	2.6%	2.5%	9.1%
Hypertension	5.3%	6.3%	0.0%
Rhinitis	2.6%	5.1%	3.9%
Toothache	3.3%	2.5%	5.2%
Gastroenteritis	3.9%	2.5%	2.6%
Psoriatic arthropathy	2.6%	0.0%	2.6%
Sinusitis	2.6%	3.8%	2.6%
Abdominal pain	1.3%	2.5%	3.9%
Cough	2.0%	2.5%	3.9%
Pain in extremity	2.6%	3.8%	1.3%
Nausea	2.0%	1.3%	3.9%
Conjunctivitis	0.7%	3.8%	2.6%
Bronchitis	0.7%	0.0%	5.2%
Gamma-glutamyltransferase increased	3.9%	1.3%	0.0%
Pharyngitis	2.6%	2.5%	1.3%
Injection site pain	0.0%	5.1%	2.6%
Tonsillitis	2.0%	2.5%	0.0%
Dyspnoea	1.3%	1.3%	2.6%
Contusion	0.7%	0.0%	6.5%
Dermatitis contact	3.9%	0.0%	0.0%
Influenza	1.3%	1.3%	3.9%

	<b>AMGEVITA/ AMGEVITA (n = 152)</b>	<b>Humira/Humira (n = 79)</b>	<b>Humira/ AMGEVITA<sup>a</sup> (n = 77)</b>
Alanine aminotransferase increased	3.3%	0.0%	1.3%
Myalgia	2.6%	2.5%	0.0%
Oral herpes	1.3%	1.3%	2.6%
Blood pressure increased	1.3%	3.8%	0.0%
Musculoskeletal pain	0.7%	1.3%	2.6%
Dental caries	2.0%	2.5%	0.0%
Gastroesophageal reflux disease	0.7%	1.3%	3.9%
Injection site reaction	1.3%	1.3%	2.6%
Seasonal allergy	2.0%	0.0%	2.6%
Depression	1.3%	2.5%	0.0%
Muscle spasm	2.6%	0.0%	0.0%
Urinary tract infection	1.3%	0.0%	2.6%
Dyspepsia	0.7%	2.5%	1.3%
Ligament strain	1.3%	2.5%	0.0%
Skin papilloma	0.7%	1.3%	2.6%
Injection site swelling	0.0%	1.3%	2.6%
Migraine	0.0%	2.5%	1.3%
Pulpitis dental	0.7%	0.0%	2.6%
Excoriation	0.7%	0.0%	2.6%
Intertrigo	0.7%	0.0%	2.6%
Spinal pain	0.0%	1.3%	2.6%
Thermal burn	0.7%	0.0%	2.6%
Tinea pedis	0.7%	2.5%	0.0%
Decreased appetite	0.0%	0.0%	2.6%
Neutropenia	0.0%	0.0%	2.6%
Cystitis	0.0%	2.5%	0.0%
Diffuse alopecia	0.0%	0.0%	2.6%
Hypercholesterolaemia	0.0%	0.0%	2.6%
Rhinnorrhoea	0.0%	0.0%	2.6%
Urticaria	0.0%	0.0%	2.6%

<sup>a</sup> This group reflects data for subjects exposed to both Humira and AMGEVITA before and after the transition of Humira subjects to AMGEVITA



## DOSAGE AND ADMINISTRATION

AMGEVITA is administered by subcutaneous injection. This product is for one dose in one patient only.

### **Rheumatoid Arthritis**

The recommended dose of AMGEVITA for adult patients with rheumatoid arthritis is 40 mg administered fortnightly as a single dose. Methotrexate, glucocorticoids, salicylates, nonsteroidal anti-inflammatory drugs or analgesics may be continued during treatment with AMGEVITA.

Some patients not taking concomitant methotrexate may derive additional benefit from increasing the dosing frequency of AMGEVITA to 40 mg every week.

### **Juvenile Idiopathic Arthritis**

The recommended dose of AMGEVITA for patients 2 years of age and older with polyarticular juvenile idiopathic arthritis and enthesitis-related arthritis is based on weight as shown below. Methotrexate, glucocorticoids, NSAIDs and/or analgesics may be continued during treatment with AMGEVITA.

<b>Paediatric Patients (2 years of age and older)</b>	<b>Dose</b>
15 kg to <30 kg	20 mg fortnightly (20 mg Pre-filled Syringe)
≥ 30 kg	40 mg fortnightly (40 mg Pre-filled Pen or Pre-filled Syringe)

Available data suggest that a clinical response is usually achieved within 12 weeks of treatment. Continued therapy should be carefully reconsidered in a patient not responding within this time period.

Adalimumab has not been studied in patients with polyarticular JIA less than 2 years of age, or in patients with a weight below 10 kg.

Adalimumab has not been studied in patients with enthesitis-related arthritis aged less than 6 years or any child weighing less than 10kg.

An AMGEVITA presentation is not available for patients 2 years of age weighing less than 15kg. Other adalimumab products with appropriate dosage forms for children are available.

### **Psoriatic Arthritis**

The recommended dose of AMGEVITA for patients with psoriatic arthritis is 40 mg adalimumab administered fortnightly as a single dose.

Glucocorticoids, salicylates, nonsteroidal anti-inflammatory drugs, analgesics or disease-modifying anti-rheumatic drugs can be continued during treatment with AMGEVITA.

### **Ankylosing Spondylitis**

The recommended dose of AMGEVITA for patients with ankylosing spondylitis is 40 mg adalimumab administered every fortnight as a single dose.

Glucocorticoids, salicylates, nonsteroidal anti-inflammatory drugs, analgesics or disease-modifying anti-rheumatic drugs can be continued during treatment with AMGEVITA.

### **Crohn's Disease**

	<b>Dose</b>	<b>Frequency</b>
<b>Induction</b>	160 mg	Initial Dose (Day 0) as four injections OR as two injections on Day 0 and two injections on Day 1
	80 mg	Second Dose (Day 14) as two injections
<b>Maintenance</b>	40 mg	Starting Day 28 & continuing fortnightly

Aminosaliclates, corticosteroids, and/or immunomodulatory agents (e.g., 6-mercaptopurine and azathioprine) may be continued during treatment with AMGEVITA.

### **Paediatric Crohn's Disease (6 to 17 years)**

<b>Patients &lt; 40 kg body weight</b>			
	<b>Moderate CD</b>	<b>Severe CD</b>	<b>Frequency</b>
<b>Induction</b>	80 mg	80 mg	Initial Dose (Day 0) as two 40 mg injections
	40 mg	40 mg	Second Dose (Day 14) as one 40 mg injection
<b>Maintenance</b>	10 mg*	20 mg	Starting Day 28 & continuing fortnightly
*: 10 mg presentation is not available (see <b>PRESENTATIONS AND STORAGE CONDITIONS</b> )			
<b>Patients ≥ 40 kg body weight</b>			
	<b>Moderate CD</b>	<b>Severe CD</b>	<b>Frequency</b>
<b>Induction</b>	160 mg	160 mg	Initial Dose (Day 0) as four 40 mg injections OR as two 40 mg injections on Day 0 and two 40 mg injections on Day 1
	80 mg	80 mg	Second Dose (Day 14) as two 40 mg injections
<b>Maintenance</b>	20 mg	40 mg	Starting Day 28 & continuing fortnightly

An AMGEVITA presentation is not available for paediatric patients less than 40kg with moderate CD, who require a 10mg maintenance dose. Other adalimumab products with appropriate dosage forms for children are available.

Some patients may benefit from increasing the frequency to weekly if a disease flare or an inadequate response is experienced during maintenance dosing. Continued therapy should be carefully considered in a subject not responding by week 12. Good nutrition should be encouraged alongside pharmacological therapy to allow appropriate growth.

### **Ulcerative colitis**

	<b>Dose</b>	<b>Frequency</b>
<b>Induction</b>	160 mg	Initial Dose (Day 0) as four injections OR as two injections on Day 0 and two injections on Day 1
	80 mg	Second Dose (Day 14) as two injections
<b>Maintenance</b>	40 mg	Starting Day 28 & continuing fortnightly

During maintenance treatment, corticosteroids may be tapered in accordance with clinical practice guidelines.

Some patients who experience decrease in their response may benefit from an increase in dosing frequency to 40 mg AMGEVITA every week.

AMGEVITA should not be continued in patients who do not achieve a clinical response in the first 8 weeks of treatment. Efficacy of AMGEVITA in the treatment of ulcerative colitis has not been demonstrated in patients who've failed previous anti-TNF therapy (see **CLINICAL TRIALS**).

### **Psoriasis**

The recommended dose of AMGEVITA for adult patients is an initial dose of 80 mg, followed by 40 mg fortnightly, starting one week after the initial dose.

### **Paediatric Plaque Psoriasis (4 to 17 years)**

The recommended dose of AMGEVITA is based on body weight as shown in the table below. Doses are administered subcutaneously weekly for the first two doses and fortnightly thereafter. Continued therapy beyond 16 weeks should be carefully considered in a patient not responding within this time period.

<b>Paediatric Patients (4 years of age and older)</b>	<b>Dose</b>
<40 kg	20 mg fortnightly (20 mg Pre-filled Syringe)
≥ 40 kg	40 mg fortnightly (40 mg Pre-filled Pen or Pre-filled Syringe)

If retreatment with AMGEVITA is indicated, the above guidance on dose and treatment duration should be followed. There is no relevant use of AMGEVITA in children aged less than 4 years in this indication. There is limited data on the efficacy or safety of the use of AMGEVITA for paediatric plaque psoriasis beyond 52 weeks.

### **Hidradenitis Suppurativa**

The recommended AMGEVITA dose regimen for adult patients with hidradenitis suppurativa (HS) is 160 mg initially at Day 1 (given as four 40 mg injections in one day or as two 40 mg injections per day for two consecutive days), followed by 80 mg two weeks later at Day 15 (given as two 40 mg injections in one day). Two weeks later (Day 29) continue with a dose of 40 mg every week. Antibiotics may be continued during treatment with AMGEVITA if necessary.

Should treatment need to be interrupted, AMGEVITA may be re-introduced.

In patients without any benefit after 12 weeks of treatment, therapy should be discontinued.

Ongoing evidence of benefit, potential loss of response and the risks of treatment in patients continuing adalimumab beyond 12 weeks should be periodically evaluated (for example, after a further 12 weeks and every 6 months thereafter). In the two pivotal studies, the primary measure of efficacy was hidradenitis suppurativa clinical response (HiSCR), defined as  $\geq 50\%$  reduction from baseline in total abscess and inflammatory nodule (AN) count, with no observed increase in either abscess or draining fistula counts (see **CLINICAL TRIALS**).

### **Uveitis**

Ophthalmologists are advised to consult with an appropriate specialist before initiation of treatment with adalimumab. Use of adalimumab for uveitis should be supervised by an ophthalmologist or other appropriate specialist.

Patients treated with adalimumab should be given the special alert card.

The recommended dose of adalimumab for adult patients with uveitis is an initial dose of 80 mg, followed by 40 mg fortnightly, starting one week after the initial dose.

Treatment with adalimumab can be initiated in combination with corticosteroids and/or with other non-biologic immunomodulatory agents. There is limited experience in the initiation of treatment with adalimumab alone.

Concomitant corticosteroids may be tapered in accordance with clinical practice starting two weeks after initiating treatment with adalimumab

It is recommended that the benefit and risk of continued long-term treatment should be evaluated on a yearly basis.

### **Preparation of AMGEVITA**

AMGEVITA is intended for use under the guidance and supervision of a physician.

Patients may self -inject AMGEVITA if their physician determines that it is appropriate and with medical follow-up, as necessary, after proper training in subcutaneous injection technique.

Sites for self-injection include thigh or abdomen. Injection sites should be rotated. New injections should never be given into areas where the skin is tender, bruised, red or hard.

Parenteral drug products should be inspected visually for particulate matter and discolouration prior to administration, whenever solution and container permit.

AMGEVITA contains no antimicrobial agent. Discard any residue.

### **OVERDOSAGE**

The maximum tolerated dose of adalimumab has not been established in humans. No dose-limiting toxicities have been observed during clinical trials with adalimumab.

Multiple doses up to 10 mg/kg have been administered to patients in clinical trials without evidence of dose-limiting toxicities. In case of overdose, it is recommended that the patient be monitored for any signs or symptoms of adverse reactions or effects and appropriate symptomatic treatment instituted immediately.

For advice on the management of overdose please contact the Poisons Information Centre. In Australia please call 13 11 26.

### **PRESENTATION AND STORAGE CONDITIONS**

AMGEVITA (adalimumab) solution for injection for paediatric use is supplied as a sterile solution of 20mg adalimumab in 0.4 mL sterile solution for subcutaneous administration in the following packaging configurations:

AMGEVITA 20mg solution for injection in single-use pre-filled syringe:

- Carton containing 1 pre-filled syringe
- Carton containing 2 pre-filled syringes

AMGEVITA (adalimumab) solution for injection is supplied as a sterile solution of 40 mg adalimumab dissolved in 0.8 mL sterile solution for subcutaneous administration in the following packaging configurations:

AMGEVITA 40 mg solution for injection in single-use pre-filled syringe or pre-filled SureClick pen (for patient use):

- Carton containing 1 pre-filled syringe or pre-filled pen,
- Carton containing 2 pre-filled syringes or pre-filled pens,

- Carton containing 4 pre-filled syringes or pre-filled pens
- Carton containing 6 pre-filled syringes or pre-filled pens.

The needle cap on the pre-filled syringe and on the pre-filled pen contains dry natural rubber (a derivative of latex) that may cause allergic reactions in individuals sensitive to latex.

Store at 2°C to 8°C (in a refrigerator) and store the syringe or vial in the outer carton to protect from light. Do not freeze.

Do not use beyond the expiration date.

When required (for example, when travelling), a single AMGEVITA pre-filled syringe or pre-filled pen may be stored below 25°C (room temperature) for a maximum period of 14 days, but must be protected from light. Once removed from the refrigerator for room temperature storage, the syringe **must be used within 14 days or discarded**, even if it is returned to the refrigerator.

The date of removal from the refrigerator should be recorded on the syringe label, to allow the syringe to be discarded after the maximum 14 days if not used.

#### **NAME AND ADDRESS OF THE SPONSOR**

Amgen Australia Pty Ltd

Level 7, 123 Epping Road

North Ryde, NSW 2113

ABN 31 051 057 428

Medical Information 1800 803 638

#### **POISON SCHEDULE OF THE MEDICINE**

S4 – Prescription Only Medicine

#### **DATE OF FIRST INCLUSION IN THE ARTG:**

9 November 2017

#### **DATE OF MOST RECENT AMENDMENT:**

Not applicable at this time