



MABTHERA^o SC

Solution for subcutaneous (SC) injection

Rituximab (rch) (CAS registry number: 174722-31-7).

WARNING

Use of MABTHERA may be associated with an increased risk of progressive multifocal leukoencephalopathy (PML), an opportunistic viral infection of the brain that usually leads to death or severe disability. Patients must be monitored for any new or worsening neurological symptoms or signs suggestive of PML. If such symptoms occur, further administration of MABTHERA should be immediately suspended until a diagnosis of PML has been excluded. To establish or exclude a diagnosis of PML evaluation including MRI scan, CSF testing for JC viral DNA and repeat neurological assessments, should be considered. If a diagnosis of PML is confirmed MABTHERA must be permanently discontinued (see PRECAUTIONS).

DESCRIPTION

MABTHERA (rituximab) is a genetically engineered chimeric murine/human monoclonal antibody directed against the CD20 antigen found on the surface of normal and malignant B lymphocytes. The antibody is a glycosylated IgG₁ kappa immunoglobulin containing murine light- and heavy-chain variable region sequences (Fab domain) and human constant region sequences (Fc domain). Rituximab is composed of 1,328 amino acids and has an approximate molecular weight of 144 kD. Rituximab has a high binding affinity for the CD20 antigen of 5.2 to 11.0 nM.

The chimeric anti-CD20 antibody is produced by mammalian (Chinese hamster ovary) cell suspension culture in a nutrient medium containing 100 mg/mL of the antibiotic gentamicin. The antibiotic is not detectable in the final product. The anti-CD20 antibody is purified by affinity chromatography and ion exchange, including specific viral inactivation and removal procedures.

MABTHERA solution for subcutaneous (SC) injection (MABTHERA SC) is a sterile, clear to opalescent, colourless to yellowish, preservative-free, non-pyrogenic solution. MABTHERA SC is a ready-to-use solution and is supplied at a concentration of 1400mg/11.7mL in a 15 mL single-use vial. The product is formulated with hyaluronidase (human recombinant), histidine, histidine hydrochloride, trehalose dihydrate, methionine, polysorbate 80 and water for injection at a target pH of 5.5.

MABTHERA SC contains the excipient hyaluronidase (human recombinant), an enzyme used to increase the dispersion and absorption of co-administered drugs when administered subcutaneously (see PRECAUTIONS - *Use in Pregnancy*).



PHARMACOLOGY

Pharmacodynamics

General: Rituximab binds specifically to the antigen CD20, a transmembrane molecule located on pre-B and mature B lymphocytes. The antigen is expressed on > 95% of all B-cell non-Hodgkin's lymphomas (NHL). CD20 (human B lymphocyte-restricted differentiation antigen, Bp35) is a hydrophobic transmembrane protein with a molecular weight of approximately 35 kD. This non-glycosylated phosphoprotein is found on both normal and malignant B cells, but not on haematopoietic stem cells, pro-B cells, normal plasma cells or other normal tissues. CD20 regulates (an) early step(s) in the activation process for cell cycle initiation and differentiation, and possibly functions as a calcium ion channel. CD20 does not internalise upon antibody binding and is not shed from the cell surface. This antigen does not circulate in the plasma. Thus, free antigen does not compete for rituximab binding.

In Vitro Mechanisms of Action: The Fab domain of rituximab binds to the CD20 antigen on B-lymphocytes and the Fc domain recruits immune effector functions to mediate B-cell lysis. Possible mechanisms of cell lysis include complement-dependent cytotoxicity (CDC) and antibody-dependent cellular cytotoxicity (ADCC). The antibody also induces apoptosis in the DHL-4 human B-cell lymphoma line. Finally, *in vitro* studies have demonstrated that rituximab sensitises drug-resistant human B-cell lymphoma lines to the cytotoxic effects of some chemotherapeutic agents.

Binding specificity: In human tissue, the expression of the CD20 antigen is highly restricted; rituximab binding to CD20 was found only on lymphoid cells in the thymus, the white pulp of the spleen and a majority of B lymphocytes in peripheral blood and lymph nodes. Little or no non-specific binding was observed.

In Vivo: In cynomolgus monkeys, four or eight weekly doses of 269 mg/m² of intravenous rituximab resulted in plasma concentrations of 161 to 386 µg/mL, approximately 24 hours after the first dose. Two weeks after the last dose, rituximab was still detected in the plasma of 3/6 monkeys treated for four weeks and in 4/6 monkeys treated for eight weeks.

B lymphocyte numbers were reduced by 99% or more in comparison with pre-test values in the peripheral blood of all monkeys, approximately 24 hours after the first dose. Two weeks after the last dose, B lymphocyte numbers were still reduced by more than 99% in 3/6 monkeys dosed for four weeks and in 4/6 monkeys dosed for eight weeks, and B lymphocyte numbers were also depleted in the mandibular lymph nodes and femoral bone marrow. A partial recovery of B lymphocyte numbers in the peripheral blood of some monkeys in both dose groups was correlated with the development of antibodies against rituximab.

Human Pharmacodynamics: A marked decline in median peripheral blood B-cell counts was seen beginning after the first dose of intravenous MABTHERA.

In patients treated for haematological malignancies, B-cell recovery began at approximately six months following the completion of treatment. Generally B-cell levels returned to normal within twelve months following completion of treatment, although in some patients this may take longer. In one clinical trial in approximately half of the patients with available data on B-cell recovery after end of MABTHERA infusion induction treatment, it took 12 months or more for their B-cell levels to return to normal values (see ADVERSE EFFECTS – *Further*



information on selected, serious adverse drug reactions, Haematologic Events, Maintenance Treatment (NHL) up to 2 years).

Pharmacokinetics

Absorption

Study BP22333 (SparkThera) was a two-stage phase Ib study to investigate the pharmacokinetics, safety and tolerability of MABTHERA SC in patients with follicular NHL as part of maintenance treatment. In stage 2, MABTHERA SC was administered at a fixed dose of 1400 mg as subcutaneous injection during maintenance treatment. The subcutaneous injection was given after at least one cycle of intravenous MABTHERA formulation 375 mg/m² to patients who had previously responded to intravenous MABTHERA in induction. The predicted median C_{max} of rituximab following MABTHERA SC and intravenous MABTHERA administered every two months (q2m) were comparable at 201 and 209 µg/mL, respectively. Similarly for MABTHERA SC and intravenous MABTHERA administered every three months (q3m), the predicted median C_{max} were comparable at 189 and 184 µg/mL, respectively. The median T_{max} of rituximab administered subcutaneously was approximately 3 days compared to the T_{max} occurring at or close to the end of the infusion for IV administration.

In study BO22334 (SABRINA), previously untreated patients with follicular NHL were randomised 1:1 to receive MABTHERA SC as a 1400 mg subcutaneous injection (first cycle intravenous MABTHERA 375 mg/m² followed by 7 cycles of MABTHERA SC) or intravenous MABTHERA 375 mg/m² (8 cycles) in combination with up to 8 cycles of CHOP or CVP chemotherapy every three weeks as part of induction treatment (see also CLINICAL TRIALS). Rituximab serum C_{max} at cycle 7 was similar between the two treatment arms, with geometric mean (CV%) values of 250.63 (19.01) µg/mL and 236.82 (29.41) µg/mL for IV and SC, respectively, with the resulting geometric mean ratio (C_{max} SC/C_{max} IV) of 0.941 (90% CI: 0.872, 1.015).

Distribution

In the SparkThera study, the predicted mean and geometric mean rituximab C_{trough} values at cycle 2 were higher in the MABTHERA SC arm compared to the intravenous MABTHERA arm. The geometric mean values in the SC q2m and IV q2m arms were 32.2 and 25.9 µg/mL, respectively, and 12.1 and 10.9 µg/mL in the SC q3m and IV q3m arms, respectively. The C_{trough(SC)}/C_{trough(IV)}} geometric mean ratio (GMR) values were 1.24 and 1.12, respectively, for the q2m and q3m regimens. The lower boundaries of the two-sided 90% CI for the GMR of C_{trough} at cycle 2 were 1.02 for the q2m regimen and 0.86 for the q3m regimen. Both of these lower-limit values were greater than the pre-specified non-inferiority margin of 0.8. The results for the primary endpoint, C_{trough} at cycle 2, demonstrated that MABTHERA SC 1400 mg was non-inferior compared to intravenous MABTHERA 375 mg/m². The predicted mean and geometric mean rituximab AUC_{tau} values at cycle 2 were higher in the MABTHERA SC arm compared to the intravenous MABTHERA arm. The geometric mean values in the SC q2m and IV q2m arms were 5430 and 4012 µg•day/mL, respectively, and 5320 and 3947 µg•day/mL in the SC q3m and IV q3m arms, respectively.}

In the SABRINA study, the mean and geometric mean rituximab C_{trough} values at pre-dose cycle 8 were higher in the MABTHERA SC arm compared to the intravenous MABTHERA



arm. The geometric mean was 134.6 µg/mL for the SC arm compared to 83.1 µg/mL for the IV arm. The $C_{trough(SC)}/C_{trough(IV)}$ GMR value was 1.62 and the lower limit of the two-sided 90% CI was 1.36. The lower limit of the two-sided 90% CI was greater than the pre-specified non-inferiority margin of 0.8. The results for the primary endpoint, C_{trough} pre-dose at cycle 8, demonstrated that MABTHERA SC 1400 mg was non-inferior compared to intravenous MABTHERA 375 mg/m². The mean and geometric mean AUC values at cycle 7 were higher in the SC arm compared to the IV arm. The geometric mean AUC was 3779 µg•day/mL for the SC group compared with 2734 µg•day/mL for the IV group.

In a population pharmacokinetic analysis in patients who received single or multiple infusions of MABTHERA as a single agent or in combination with chemotherapy, the population estimates of non-specific clearance (CL1), initial specific clearance (CL2) (likely contributed by B cells or tumour burden) and central compartment volume of distribution (V1) were 0.194 L/day, 0.535 L/day, and 4.37 L, respectively. The estimated median terminal elimination half-life of rituximab administered subcutaneously was 29.7 days (range, 9.9 to 91.2 days). Based on a population pharmacokinetic analysis an absolute bioavailability of 71% (95% CI: 70.0 – 72.1) was estimated.

In the final analysis dataset from 403 patients administered MABTHERA SC and/or intravenous MABTHERA in studies SparkThera (277 patients) and SABRINA (126 patients) the mean (range) weight and body surface area (BSA) were 74.4 kg (43.9 to 130 kg) and 1.83 m² (1.34 to 2.48 m²), respectively. Mean (range) age was 57.4 years (23 to 87 years). There were no differences between demographic and laboratory parameters of the two studies. However, the baseline B-cell counts were markedly lower in SparkThera, than in SABRINA, as patients in SparkThera entered the study having received a minimum of four cycles of intravenous MABTHERA in induction and at least one cycle of intravenous MABTHERA maintenance, whereas patients in SABRINA had not received MABTHERA prior to study enrollment. Data on baseline tumour load was available only for patients in SABRINA.

BSA was identified as the main covariate. All clearance and volume parameters increased with the body size. Among other covariate dependencies, central volume increased with age and the absorption rate constant decreased with age (for patients aged > 60 years), but these age dependencies were shown to result in negligible changes in MABTHERA exposure. Anti-drug antibodies were detected in only 13 patients and did not result in any clinically relevant increase in clearance.

The model-based simulations indicated that body size had an effect on SC to IV exposure ratios. C_{trough} and AUC ratios for representative patients with low (1.4m²), medium (1.9m²) and high (2.4 m²) BSA were simulated in Cycles 7, 10 and 18 of treatment, with the results shown in Table 1.

Table 1 Model-based simulations of C_{trough} and AUC_{tau} for Cycles 7, 10 and 18, by treatment and BSA

	BSA	C_{trough} (µg/mL) GMR (SC/IV)	AUC_{tau} (µg•day/mL) GMR (SC/IV)
Cycle 7 (induction, q3w)	Low (1.4m ²)	2.25	1.96
	Medium (1.9m ²)	1.65	1.45
	High (2.4 m ²)	1.21	1.09



Cycle 10 (maintenance, q2m)	Low (1.4m ²)	2.09	1.92
	Medium (1.9m ²)	1.54	1.44
	High (2.4 m ²)	1.24	1.12
Cycle 18 (maintenance, q2m)	Low (1.4m ²)	2.05	1.87
	Medium (1.9m ²)	1.49	1.4
	High (2.4 m ²)	1.21	1.12

Intravenous formulation

Information in this section reports data from the separate Product Information for intravenous MABTHERA.

Based on a population pharmacokinetic analysis in 298 NHL patients who received single or multiple infusions of rituximab as a single agent or in combination with CHOP therapy, the typical population estimates of nonspecific clearance (CL₁), specific clearance (CL₂) likely contributed by B cells or tumour burden, and central compartment volume of distribution (V₁) were 0.14 L/day, 0.59 L/day, and 2.7 L, respectively. The estimated median terminal elimination half-life of rituximab was 22 days (range, 6.1 to 52 days). Baseline CD19-positive cell counts and size of measurable tumour lesions contributed to some of the variability in CL₂ of rituximab in data from 161 patients given 375 mg/m² as an intravenous (IV) infusion for 4 weekly doses. Patients with higher CD19-positive cell counts or tumour lesions had a higher CL₂. However, a large component of inter-individual variability remained for CL₂ after correction for CD19-positive cell counts and tumour lesion size. V₁ varied by body surface area (BSA) and CHOP therapy. The variability in V₁ caused by the range in BSA (1.53 to 2.32 m²) and concurrent CHOP therapy was relatively small (27.1% and 19% respectively). Age, gender, race, and WHO (World Health Organisation) performance status had no effect on the pharmacokinetics of rituximab. This analysis suggests that dose adjustment of rituximab with any of the tested covariates is not expected to result in a meaningful reduction in its pharmacokinetic variability.

Rituximab at a dose of 375 mg/m² was administered as an IV infusion at weekly intervals for 4 doses to 203 patients with NHL naive to rituximab. The mean C_{max} following the fourth infusion was 486 µg/mL (range 77.5 - 996.6 µg/mL). The peak and trough serum levels of rituximab were inversely correlated with baseline values for the number of circulating CD19-positive B-cells and measures of disease burden. Median steady-state serum levels were higher for responders compared with non-responders. Serum levels were higher in patients with International Working Formulation (IWF) subtypes B, C, and D as compared with those with subtype A.

Rituximab was detectable in the serum of patients 3 – 6 months after completion of last treatment.

Rituximab at a dose of 375 mg/m² was administered as an IV infusion at weekly intervals for 8 doses to 37 patients with NHL. The mean C_{max} increased with each successive infusion, spanning from a mean of 243 µg/mL (range, 16 – 582 µg/mL) after the first infusion to 550 µg/mL (range 171 – 1177 µg/mL) after the eighth infusion.



The pharmacokinetic profile of rituximab when administered as 6 infusions of 375 mg/m² in combination with 6 cycles of CHOP chemotherapy was similar to that seen with rituximab alone.



CLINICAL TRIALS

The clinical experience of MABTHERA SC in follicular NHL is based on data from a phase III clinical study (SABRINA) and a phase Ib dose-finding/dose-confirmation study (SparkThera).

SparkThera was a two-stage, randomised, open-label, multicenter adaptive phase Ib study to investigate the pharmacokinetics, safety and tolerability of MABTHERA SC in patients with follicular NHL as part of maintenance treatment. The primary objective was to select and confirm a MABTHERA SC dose that achieved non-inferior serum C_{trough} levels to that of intravenous MABTHERA. In stage 2, 157 patients who had previously responded to intravenous MABTHERA in induction and had received at least one cycle intravenous MABTHERA were randomised to receive MABTHERA SC at a fixed dose of 1400 mg ($n = 78$) or intravenous MABTHERA 375 mg/m² ($n = 79$). The maintenance dosing regimens were MABTHERA SC or IV administered once every three months or once every two months for a total of 8 or 12 cycles, respectively. Results from SparkThera are presented under PHARMACOLOGY - *Pharmacokinetics*.

SABRINA was a two-stage phase III, international, multi-center, randomised, controlled, open-label study conducted in patients with previously untreated follicular NHL. The study investigated the non-inferiority of the pharmacokinetic profile, together with efficacy and safety of MABTHERA SC in combination with CHOP or CVP versus intravenous MABTHERA in combination with CHOP or CVP.

The objective of the first stage was to establish the MABTHERA SC dose that resulted in comparable rituximab serum C_{trough} levels compared with intravenous MABTHERA, when given as part of induction treatment every 3 weeks (see PHARMACOLOGY - *Pharmacokinetics*). Stage 1 enrolled 127 patients. In the second stage a greater number of patients were enrolled ($n = 283$) with the same study design as Stage 1, except for a less intensive PK sampling schedule. Stage 2 was intended to provide additional efficacy and safety data of MABTHERA SC compared with intravenous MABTHERA with the primary endpoint being overall response rate (ORR, comprising complete response [CR], complete response unconfirmed [CRu], and partial response [PR]) in each treatment arm at the end/completion of induction treatment.

In Stages 1 and 2, previously untreated patients ($n = 410$) suffering from CD20 positive, follicular NHL grade 1, 2 or 3a were randomised into the following two treatment groups:

- MABTHERA SC ($n = 205$): 1st cycle intravenous MABTHERA plus 7 cycles of MABTHERA SC in combination with up to 8 cycles of CHOP or CVP chemotherapy administered every 3 weeks. Intravenous MABTHERA was used at the standard dose of 375 mg/m². MABTHERA SC was given at a dose of 1400 mg. Patients achieving at least PR were entered into the maintenance phase of the study receiving MABTHERA SC once every 8 weeks for 24 months.
- Intravenous MABTHERA formulation ($n = 205$): 8 cycles of intravenous MABTHERA in combination with up to 8 cycles of CHOP or CVP chemotherapy administered every 3 weeks. Intravenous MABTHERA was used at the standard dose of 375 mg/m². Patients



achieving at least PR were entered into the maintenance phase of the study receiving intravenous MABTHERA once every 8 weeks for 24 months.

In a pooled analysis of the Stage 1 and 2 results, at the end of the induction phase, 84.4% (95% CI [78.7% - 89.1%]), of patients in the IV arm achieved an overall response compared with 83.4% (95% CI [77.6% - 88.2%]) of patients in the MABTHERA SC arm. The proportion of patients with a complete response (CR and CR unconfirmed) was 31.7% (95% CI [25.04% - 38.6%]) in the IV arm and 32.7% (95% CI [26.3% - 39.6%]) in the SC arm. Although no statistical testing was planned as per protocol, the differences between the two treatment arms in terms of overall and complete response rates were found to be non-significant using the Chi-squared Test ($p = 0.7881$ and $p = 0.8326$ for ORR and CRR, respectively).

Intravenous MABTHERA

Information in this section reports data from the separate Product Information for intravenous MABTHERA.

Relapsed/Refractory Low Grade or Follicular non-Hodgkin's Lymphoma

Monotherapy

In the pivotal study, an open label, single arm trial of 166 patients with relapsed or refractory low-grade or follicular B-cell NHL, subjects received 375 mg/m² of MABTHERA as an IV infusion once a week for four weeks (4 doses). The overall response rate (ORR) in the intent-to-treat (ITT) population was 48% (CI_{95%} 41% – 56%), comprising a 6% complete response (CR) and 42% partial response (PR). The projected median time to progression (TTP) for responding patients was 13.0 months.

In a subgroup analysis, the ORR was significantly higher in patients with IWF B, C, and D histological subtypes as compared to IWF A subtype (58% vs. 12%) and in patients with prior autologous bone marrow transplantation (ABMT) compared to those with no prior ABMT (78% vs. 43%). Age, sex, lymphoma grade, years since initial diagnosis, presence or absence of bulky disease, normal or high LDH, or presence of extranodal disease did not have a significant effect (Fisher's exact test) on response to MABTHERA.

ORR was also significantly higher in patients with no bone marrow involvement compared to those with bone marrow involvement (59% vs. 40%). This finding was not supported by a stepwise logistic regression analysis in which the following factors were identified as prognostic factors: histologic type, bcl-2 positivity at baseline, resistance to last chemotherapy and bulky disease.

Re-treatment

In a multicentre, single-arm study, 58 patients with relapsed or refractory low grade or follicular B-cell NHL, who had achieved an objective clinical response to a prior course of MABTHERA, were re-treated with 375 mg/m² of MABTHERA as IV infusion weekly for four doses. Three of the patients had received two courses of MABTHERA before enrolment and thus were given a third course in the study. Two patients were re-treated twice in the study. For the 60 re-treatments on study, the ORR was 38% (CR 10% and PR 28%) with a



projected median TTP for responding patients of 17.8 months (range 5.4 – 26.6). This compares favourably with the TTP achieved after the prior course of MABTHERA 12.4 months.

Bulky Disease

In pooled data from three studies, 39 patients with relapsed or refractory, bulky disease (single lesion ≥ 10 cm in diameter), low-grade or follicular B-cell NHL received 375 mg/m² of MABTHERA given as an IV infusion once weekly for four doses). The overall response rate (ORR) was 36% (CR 3%, PR 33%) with a median TTP for responding patients of 9.6 months (range 4.5 to 26.8 months).

Clinical Laboratory Findings

Molecular Genetic Markers: Results from the exploratory analysis of the bcl-2 gene rearrangement showed that samples of peripheral blood obtained at baseline were positive for the bcl-2 rearrangement (bcl-2 positive) by nested Polymerase Chain Reaction (PCR) in 70 (42%) of the 166 enrolled patients. Of these 70 patients, 55 patients had a follow-up blood sample at 3 months and more than 60% showed a conversion to negative bcl-2 gene rearrangement.

With regard to bone marrow assessment, of 71 (45%) of the 166 enrolled patients who were bcl-2 positive in marrow at baseline, 22 were assessed for bcl-2 rearrangement at 3 months. Of these, 12 (55%) were bcl-2 negative at three months.

Of 67 patients evaluated for human anti-mouse antibody (HAMA), none were positive. Of 356 patients evaluated for HACA, 1.1% (4 patients) were positive.

Previously Untreated Follicular non-Hodgkin's Lymphoma

Combination with chemotherapy

In an open-label randomised study (M39021), a total of 322 previously untreated Stage III or IV follicular B cell NHL patients were randomised to receive either CVP chemotherapy (cyclophosphamide 750 mg/m², vincristine 1.4 mg/m² up to a maximum of 2 mg on day 1, and prednisolone 40 mg/m²/day on days 1 –5) every 3 weeks for 8 cycles or MABTHERA 375 mg/m² in combination with CVP (R-CVP). MABTHERA was administered on the first day of each treatment cycle. A total of 321 patients (162 R-CVP, 159 CVP) received therapy and were analysed for efficacy.

The median follow-up of patients was 53 months. Addition of MABTHERA to CVP significantly increased time to treatment failure (the primary endpoint), tumour response, progression-free survival (PFS) and overall survival (OS) (Table 2).

Table 2 Summary of key results from study M39021

	CVP (N=159)	R-CVP (N=162)	Hazard Ratio [95% CI] log-rank p
Median Time to Treatment Failure (months)	6.6	27.0	0.34 [0.26, 0.44] p<0.0001



Median Progression-free Survival (months)	14.7	33.6	0.44 [0.33, 0.57] p<0.001
Overall Tumour Response¹ (%)	57	81	-
Overall Survival (%)	71	81	0.60 [0.38, 0.95] p=0.029 ²

¹Tumour response = CR (complete response), CRu (complete response unconfirmed) and PR (partial response)

²Stratified by centre

Results from three other randomised studies using MABTHERA in combination with chemotherapy regimens other than CVP (CHOP, MCP, CHVP/interferon-alfa 2a) have also demonstrated significant improvements in response rates, time dependent parameters as well as in overall survival (Table 3).

Table 3 Summary of key results from three phase III randomised studies evaluating the benefit of MabThera with different chemotherapy regimens in follicular lymphoma

Study	Treatment, n	Median follow up, months	ORR, %	CR, %	Outcome ¹ (months)	OS rates, %
GLSG'00	CHOP, 205	18	90	17	Median TTF: 31.2	90
	R-CHOP, 223		96	20	Not reached p<0.001	95 p=0.016
OSHO-39	MCP, 96	47	75	25	Median PFS: 28.8	74
	R-MCP, 105		92	50	Not reached p<0.0001	87 p=0.0096
FL2000	CHVP-IFN, 183	42	85	49	Median EFS: 36	84
	R-CHVP-IFN, 175		94	76	Not reached p<0.0001	91 p=0.029

Abbreviations: ORR – overall response rate; CR – complete response; OS rates – overall survival rates at the time of the analyses; R – MABTHERA; CHOP - cyclophosphamide, doxorubicin, vincristine, prednisone; MCP – mitoxantrone, chlorambucil, prednisolone; CHVP - cyclophosphamide, doxorubicin, etoposide, prednisolone ; IFN – interferon-alfa 2a.

¹GLSG'00 outcome: TTF (time to treatment failure); OSHO-39: PFS (progression free survival); FL2000 outcome: EFS (event free survival)

Maintenance Therapy

Relapsed/Refractory follicular NHL

In a prospective, open label, international, multicentre, Phase III trial, 465 patients with relapsed/refractory follicular NHL were randomised in a first step to induction therapy with either CHOP (cyclophosphamide, doxorubicin, vincristine, prednisolone; n = 231) or MABTHERA plus CHOP (R-CHOP, n=234), one dose of rituximab combined with each cycle of chemotherapy. The two treatment groups were well balanced with regard to baseline characteristics and disease status. A total of 334 patients achieving a complete or partial remission following induction therapy were randomised in a second step to MABTHERA maintenance therapy (n = 167) or observation (n = 167). MABTHERA maintenance treatment consisted of a single infusion of intravenous MABTHERA at 375 mg/m² body surface area given every 3 months until disease progression or for a maximum period of two years. Patients with hypogammaglobulinaemia (IgG <3g/L) or known HIV infection were excluded from the trial.



The final efficacy analysis included all patients randomised to both parts of the study. After a median observation time of 31 months for patients randomised to the induction phase, R-CHOP significantly improved the outcome of patients with relapsed/refractory follicular NHL when compared to CHOP (see Table 4).

Table 4 Induction phase: overview of efficacy results for CHOP vs. R-CHOP (31 months median observation time)

	CHOP	R-CHOP	p-value	Risk Reduction ¹⁾
Primary Efficacy				
ORR ²⁾	74%	87%	0.0003	NA
CR ²⁾	16%	29%	0.0005	NA
PR ²⁾	58%	58%	0.9449	NA
Secondary Efficacy				
OS (median)	NR	NR	0.0508	32%
PFS (median)	19.4 mo.	33.2 mo.	0.0001	38%

¹⁾ Estimates were calculated by hazard ratios

²⁾ Last tumour response as assessed by the investigator. The “primary” statistical test for “response” was the trend test of CR versus PR versus non-response ($p < 0.0001$)

Abbreviations: NA, not available; NR, not reached; mo, months; ORR: overall response rate; CR: complete response; PR: partial response; OS : overall survival ; PFS : progression free survival

For patients randomised to the maintenance phase of the trial, the median observation time was 28 months from maintenance randomisation. Maintenance treatment with MABTHERA led to a clinically relevant and statistically significant improvement in the primary endpoint, PFS, (time from maintenance randomisation to relapse, disease progression or death) when compared to observation alone ($p < 0.0001$ log-rank test). The median PFS was 42.2 months in the MABTHERA maintenance arm compared to 14.3 months in the observation arm. Using a cox regression analysis, the risk of experiencing progressive disease or death was reduced by 61% with MABTHERA maintenance treatment when compared to observation (95% CI; 45%-72%). Kaplan-Meier estimated progression-free rates at 12 months were 78% in the MABTHERA maintenance group vs. 57% in the observation group. An analysis of overall survival confirmed the significant benefit of MABTHERA maintenance over observation ($p=0.0039$ log-rank test). MABTHERA maintenance treatment reduced the risk of death by 56% (95% CI; 22%-75%).

The median time to new anti-lymphoma treatment was significantly longer with MABTHERA maintenance treatment than with observation (38.8 months vs. 20.1 months, $p < 0.0001$ log-rank test). The risk of starting a new treatment was reduced by 50% (95% CI; 30%-64%). In patients achieving a CR/CRu (complete response unconfirmed) as best response during induction treatment, MABTHERA maintenance treatment significantly prolonged the median disease free survival (DFS) compared to the observation group (53.7 vs. 16.5 months, $p=0.0003$) log-rank test (Table 5). The risk of relapse in complete responders was reduced by 67% (95% CI; 39%-82%).



Table 5 Maintenance phase: overview of efficacy results MABTHERA vs. observation (28 months median observation time)

Efficacy Parameter	Kaplan-Meier Estimate of Median Time to Event (Months)			Risk Reduction (95% CI)
	Observation (N=167)	MabThera (N=167)	Log-Rank p value	
Progression-free survival (PFS)	14.3	42.2	<0.0001	61% (45-72%)
Overall Survival	NR	NR	0.0039	56% (22-75%)
Time to new lymphoma treatment	20.1	38.8	<0.0001	50% (30-64%)
Disease-free survival ^a	16.5	53.7	0.0003	67% (39-82%)
Subgroup Analysis				
<u>PFS</u>				
CHOP	11.6	37.5	<0.0001	71% (54-82%)
R-CHOP	22.1	51.9	0.0071	46% (15-65%)
CR	14.3	52.8	0.0008	64% (33-81%)
PR	14.3	37.8	<0.0001	54% (33-69%)
<u>OS</u>				
CHOP	NR	NR	0.0348	55% (4-79%)
R-CHOP	NR	NR	0.0482	56% (-2-81%)

NR: not reached; ^a: only applicable to patients achieving a CR

The benefit of MABTHERA maintenance treatment was confirmed in all subgroups analysed, regardless of induction regimen (CHOP or R-CHOP) or quality of response to induction treatment (CR or PR) (Table 5). MABTHERA maintenance treatment significantly prolonged median PFS in patients responding to CHOP induction therapy (median PFS 37.5 months vs. 11.6 months, $p < 0.0001$) as well as in those responding to R-CHOP induction (median PFS 51.9 months vs. 22.1 months, $p = 0.0071$). Although analysed subgroups were small, and the median survival had not been reached after an overall median observation period of 47.2 months, a clinically meaningful benefit in terms of overall survival was observed for patients receiving MABTHERA maintenance treatment when compared to observation, in the overall population.

MABTHERA maintenance treatment provided consistent benefit in all subgroups tested [gender (male, female), age (≤ 60 years, > 60 years), stage (III, IV), WHO performance status (0 versus > 0), B symptoms (absent, present), bone marrow involvement (no versus yes), IPI (0-2 versus 3-5), FLIPI score (0-1, versus 2 versus 3-5), number of extra-nodal sites (0-1 versus > 1), number of nodal sites (< 5 versus ≥ 5), number of previous regimens (1 versus 2), best response to prior therapy (CR/PR versus NC/PD), haemoglobin (< 12 g/dL versus ≥ 12 g/dL), β_2 -microglobulin (< 3 mg/L versus ≥ 3 mg/L), LDH (elevated, not elevated) except for the small subgroup of patients with bulky disease.

Previously untreated follicular NHL

In a prospective, open label, international, multi-centre, Phase III trial 1193 patients with previously untreated advanced follicular lymphoma received induction therapy with R-CHOP



(n=881), R-CVP (n=268) or R-FCM (n=44), according to the investigators' choice. A total of 1078 patients responded to induction therapy, of which 1018 were randomised to MABTHERA maintenance therapy (n=505) or observation (n=513). The two treatment groups were well balanced with regards to baseline characteristics and disease status. MABTHERA maintenance treatment consisted of a single infusion of MABTHERA at 375 mg/m² body surface area given every 2 months until disease progression or for a maximum period of two years.

After a median observation time of 25 months from randomisation, maintenance therapy with MABTHERA resulted in a clinically relevant and statistically significant improvement in the primary endpoint of investigator assessed progression-free survival (PFS) as compared to no maintenance therapy in patients with previously untreated follicular NHL (Table 6). This improvement in PFS was confirmed by an independent review committee (IRC) (Table 6).

Significant benefit from maintenance treatment with MABTHERA was also seen for the secondary endpoints event-free survival (EFS), time to next anti-lymphoma treatment (TNLT) time to next chemotherapy (TNCT) and overall response rate (ORR) (Table 6).

Table 6 Overview of efficacy results for maintenance MABTHERA vs. observation (25 months median observation time)

Efficacy Parameter	Observation (N=513)	MABTHERA (N=505)	Log Rank P value	Risk reduction
Primary Efficacy				
PFS (median)	NE	NE	<0.0001	50%
Secondary Efficacy				
PFS (median)*	30.9 months	37.1 months	<0.0001	46%
EFS (median)	37.8 months	NE	< 0.0001	46%
OS (median)	NE	NE	0.7246	-
TNLT (median)	NE	NE	0.0003	39%
TNCT (median)	NE	NE	0.0011	40%
ORR**	55.0%	74.0%	< 0.0001	[Odds ratio = 2.33]
Complete Response (CR/CRu) rate**	47.7%	66.8%	< 0.0001	[Odds ratio = 2.21]

*As assessed by an independent review committee (IRC)

**At end of maintenance/observation; PFS: progression-free survival; EFS: event-free survival; OS: overall survival; TNLT: time to next anti-lymphoma treatment; TNCT: Time to next chemotherapy treatment

NE: Not estimable at time of clinical cut-off

MABTHERA maintenance treatment provided consistent benefit in all subgroups tested: gender (male, female), age (<60 years, >= 60 years), FLIPI score (1, 2 or 3), induction therapy (R-CHOP, R-CVP or R-FCM) and regardless of the quality of response to induction treatment (CR or PR).

There are currently no data to support superior efficacy for maintenance treatment given every 2 months over maintenance therapy given every 3 months, in either the relapsed/refractory or previously untreated setting.



Diffuse Large B-cell non-Hodgkin's Lymphoma

In a randomised, Phase III, open-label trial, a total of 399 previously untreated elderly ambulatory patients (age 60 to 80 years, ECOG performance status 0-2) with moderate to advanced (Ann Arbor stage II-IV) diffuse large B-cell lymphoma received standard CHOP chemotherapy (cyclophosphamide 750 mg/m², doxorubicin 50 mg/m², vincristine 1.4 mg/m² up to a maximum of 2 mg on day 1, and prednisone 40 mg/m²/day on days 1-5) every 3 weeks for eight cycles, or intravenous MABTHERA 375 mg/m² administered as an intravenous infusion plus CHOP (R-CHOP). MABTHERA was administered on the first day of the treatment cycle.

The final efficacy analysis included all randomised patients (197 CHOP, 202 R-CHOP), and had a median follow-up duration of approximately 31 months. The two treatment groups were well balanced in baseline characteristics and disease status. The final analysis confirmed that R-CHOP significantly increased the duration of event-free survival (the primary efficacy parameter, where events were death, relapse or progression of lymphoma, or institution of a new anti-lymphoma treatment) (p=0.0001). Kaplan Meier estimates of the median duration of event-free survival were 35 months in the R-CHOP arm compared to 13 months in the CHOP arm, representing a risk reduction of 41%. At 24 months, estimates for overall survival were 68.2% in the R-CHOP arm compared to 57.4% in the CHOP arm. A subsequent analysis of the duration of overall survival, carried out with a median follow-up duration of 38 months, confirmed the benefit of R-CHOP over CHOP treatment (p=0.0094), representing a risk reduction of 33%.

The analysis of all secondary parameters (response rates, progression-free survival, disease-free survival, duration of response) verified the treatment effect of R-CHOP compared to CHOP. The complete response rate after cycle 8 was 76.2% in the R-CHOP group and 62.4% in the CHOP group (p=0.0028). The risk of disease progression was reduced by 46% and the risk of relapse by 51%.

In all patient subgroups (gender, age, age-adjusted IPI, Ann Arbor stage, ECOG, Beta 2 Microglobulin, LDH, Albumin, B-symptoms, Bulky disease, extranodal sites, bone marrow involvement), the risk ratios for event-free survival and overall survival (R-CHOP compared with CHOP) were less than 0.83 and 0.95 respectively, although the benefit with R-CHOP was not always statistically significant.

A subsequent analysis of the duration of overall survival, carried out with a median follow-up duration of 60 months, confirmed the benefit of R-CHOP over CHOP treatment (p=0.0071), representing a risk reduction of 32%.

INDICATIONS

MABTHERA SC is indicated for treatment of patients with:

- CD20 positive, previously untreated, Stage III/IV follicular, B-cell non-Hodgkin's lymphoma,
- CD20 positive, relapsed or refractory low grade or follicular, B-cell non-Hodgkin's lymphoma,
- CD20 positive, diffuse large B-cell non-Hodgkin's lymphoma, in combination with chemotherapy.



CONTRAINDICATIONS

MABTHERA is contraindicated in patients with known hypersensitivity to rituximab, to any of its excipients or to murine proteins.

PRECAUTIONS

Progressive multifocal leukoencephalopathy (PML)

Use of MABTHERA may be associated with an increased risk of progressive multifocal leukoencephalopathy (PML). Patients must be monitored for any new or worsening neurological symptoms or signs suggestive of PML. Physicians treating patients should consider PML in the differential diagnosis of patients reporting neurological symptoms and consultation with a neurologist should be considered as clinically indicated.

Physicians should be particularly alert to symptoms suggestive of PML that the patient may not notice (e.g. cognitive, neurological or psychiatric symptoms). If such symptoms occur, further administration of MABTHERA should be immediately suspended until a diagnosis of PML has been excluded. To establish or exclude a diagnosis of PML evaluation including MRI scan, CSF testing for JC viral DNA and repeat neurological assessments, should be considered. Once PML has been excluded, the administration of MABTHERA may resume.

If a diagnosis of PML is confirmed MABTHERA must be permanently discontinued. Patients should also be advised to inform their partner or caregivers about their treatment, since they may notice symptoms that the patient is not aware of.

Cases of PML have been reported during use of intravenous MABTHERA in NHL. The majority of patients had received intravenous MABTHERA in combination with chemotherapy or as part of a haematopoietic stem cell transplant. (See BOXED WARNING, ADVERSE EFFECTS and *Post-Marketing Experience*.)

Infusion/administration-related reactions

MABTHERA is associated with infusion/administration-related reactions, which may be related to release of cytokines and/or other chemical mediators. Cytokine release syndrome may be indistinguishable from acute hypersensitivity reactions.

Administration-related reactions for MABTHERA SC

Local cutaneous reactions, including injection site reactions, have been reported in patients receiving MABTHERA SC. Symptoms included pain, swelling, induration, haemorrhage, erythema, pruritus and rash (see ADVERSE EFFECTS). Some local cutaneous reactions occurred more than 24 hours after the MABTHERA SC administration. The majority of local cutaneous reactions seen following administration of MABTHERA SC were mild or moderate and resolved without any specific treatment.



All patients must always receive their first dose of MABTHERA by intravenous administration, using the intravenous formulation, in order to avoid an irreversible administration of the full MABTHERA SC dose during cycle 1. During this cycle the patient would have the highest risk of experiencing an infusion-related reaction that can be treated effectively by slowing or stopping the infusion. MABTHERA SC should only be given at the second or subsequent cycles.

If patients were not able to receive one full MABTHERA intravenous infusion dose, they should continue the subsequent cycles with intravenous MABTHERA until a full IV dose is successfully administered. Therefore, the switch to MABTHERA SC can only occur at the second or subsequent cycles of treatment (see DOSAGE AND ADMINISTRATION). As with the intravenous formulation, MABTHERA SC should be administered in an environment where full resuscitation facilities are immediately available and under the close supervision of a healthcare professional. Premedication consisting of an analgesic/antipyretic and an antihistamine should always be administered before each dose of MABTHERA SC. Premedication with glucocorticoids should also be considered.

Patients should be observed for at least 15 minutes following MABTHERA SC administration. A longer period may be appropriate for patients with an increased risk of hypersensitivity reactions. Patients should be instructed to contact their treating physician immediately if symptoms that are suggestive of severe hypersensitivity reactions or cytokine release syndrome occur at any time after drug administration.

Infusion-related reactions for intravenous MABTHERA

Severe infusion-related reactions with fatal outcome have been reported during post-marketing use. Severe reactions usually manifested within 30 minutes to 2 hours after starting the first MABTHERA infusion, were characterised by pulmonary events and included, in some cases, rapid tumour lysis and features of tumour lysis syndrome in addition to fever, chills, rigors, hypotension, urticaria, angio-oedema and other symptoms. Patients with a high tumour burden or with a high number ($>25 \times 10^9/L$) of circulating malignant cells such as patients with mantle cell lymphoma may be at higher risk of developing severe infusion-related reactions. Infusion reaction symptoms are usually reversible with interruption of the infusion. Treatment of infusion-related symptoms with an antihistamine and an analgesic/antipyretic (such as paracetamol) is recommended. Additional treatment with bronchodilators or IV saline may be indicated. In most cases, the infusion can be resumed at a 50% reduction in rate (e.g. from 100 mg/h to 50 mg/h) when symptoms have completely resolved. Most patients who have experienced non-life threatening infusion-related reactions have been able to complete the full course of MABTHERA therapy. Further treatment of patients after complete resolution of signs and symptoms has rarely resulted in repeated severe infusion-related reactions.

Patients with a high number ($>25 \times 10^9/L$) of circulating malignant cells or high tumour burden such as patients with mantle cell lymphoma, who may be at higher risk of especially severe infusion-related reactions, should only be treated with extreme caution and when other therapeutic alternatives have been exhausted. These patients should be very closely monitored throughout the first infusion. Consideration should be given to the use of a reduced infusion rate for the first infusion in these patients, or a split dosing over two days during the first cycle and any subsequent cycles if the lymphocyte count is still $>25 \times 10^9/L$.



Hypersensitivity Reactions/Anaphylaxis

Anaphylactic and other hypersensitivity reactions have been reported following the intravenous administration of proteins to patients. Adrenaline, antihistamines and corticosteroids should be available for immediate use in the event of a hypersensitivity reaction to intravenous MABTHERA.

Pulmonary events

Pulmonary events have included hypoxia, lung infiltration, and acute respiratory failure. Some of these events have been preceded by severe bronchospasm and dyspnoea. In some cases, symptoms worsened over time, while in others initial improvement was followed by clinical deterioration. Therefore, patients experiencing pulmonary events or other severe infusion-related symptoms should be closely monitored until complete resolution of their symptoms occurs. Patients with a history of pulmonary insufficiency or those with pulmonary tumour infiltration may be at greater risk of poor outcome and should be treated with increased caution. Acute respiratory failure may be accompanied by events such as pulmonary interstitial infiltration or oedema, visible on a chest x-ray. The syndrome usually manifests itself within one or two hours of initiating the first IV infusion. Patients who experience severe pulmonary events should have their intravenous MABTHERA or MABTHERA SC administration interrupted immediately and should receive aggressive symptomatic treatment. Since initial improvement of clinical symptoms may be followed by deterioration, these patients should be closely monitored until the pulmonary event has resolved.

Rapid tumour lysis

MABTHERA mediates the rapid lysis of benign and malignant CD20-positive cells. Signs and symptoms (e.g. hyperuricaemia, hyperkalaemia, hypocalcaemia, acute renal failure, elevated LDH) consistent with tumour lysis syndrome (TLS) have been reported to occur after the first MABTHERA intravenous infusion in patients with high numbers of circulating malignant lymphocytes. Prophylaxis for TLS should be considered for patients at risk of developing rapid tumour lysis (e.g. patients with a high tumour burden or with a high number ($>25 \times 10^9/L$) of circulating malignant cells such as patients with mantle cell lymphoma). These patients should be followed closely and appropriate laboratory monitoring performed. Appropriate medical therapy should be provided for patients who develop signs and symptoms consistent with rapid tumour lysis. Following treatment for and complete resolution of signs and symptoms, subsequent intravenous MABTHERA therapy has been administered in conjunction with prophylactic therapy for TLS in a limited number of cases.

Cardiovascular

Since hypotension may occur during MABTHERA administration, consideration should be given to withholding antihypertensive medications 12 hours prior to and throughout MABTHERA administration. Angina pectoris or cardiac arrhythmia, such as atrial flutter and fibrillation, heart failure or myocardial infarction have occurred in patients treated with MABTHERA. Therefore patients with a history of cardiac disease should be monitored closely. Infusions should be discontinued in the event of serious or life-threatening cardiac arrhythmias.



Monitoring of Blood Counts

Although MABTHERA is not myelosuppressive in monotherapy, caution should be exercised when considering treatment of patients with neutrophil counts of $<1.5 \times 10^9/L$ and/or platelet counts of $<75 \times 10^9/L$, as clinical experience with such patients is limited. Intravenous MABTHERA has been used in patients who underwent autologous bone marrow transplantation and in other risk groups with a presumable reduced bone marrow function without inducing myelotoxicity.

Consideration should be given to the need for regular full blood counts, including platelet counts, during monotherapy with MABTHERA. When MABTHERA is given in combination with CHOP or CVP chemotherapy, regular full blood counts should be performed according to usual medical practice.

Infections

MABTHERA treatment should not be initiated in patients with severe active infections.

Cases of Hepatitis B virus (HBV) reactivation, occasionally with fulminant hepatitis, hepatic failure, and death have been reported in some patients with haematologic malignancies treated with intravenous MABTHERA. The majority of patients received MABTHERA in combination with chemotherapy. Isolated cases have been reported in patients who either had evidence of antibodies against Hepatitis B surface antigen before treatment or did not have any such antibodies. The median time to diagnosis of hepatitis was approximately 4 months after the initiation of MABTHERA and approximately one month after the last dose. Analysis of events revealed MABTHERA use has been associated with hepatitis B (HB) reactivation in patients with positive HB surface antigen (HBsAg+ve) as well as negative HB surface antigen and positive anti-HB core antibody (HBsAg-ve/HBcAb+ve), particularly when administered in combination with steroids or chemotherapy.

HBV screening should be performed in all patients before initiation of treatment with MABTHERA. At a minimum this should include HBsAg-status and HBcAb-status. These can be complemented with other appropriate markers as per local guidelines. Patients with active HB disease should not be treated with MABTHERA. Reactivation of HBV infection is a well-known complication in patients with chronic hepatitis B, especially in those receiving cytotoxic or immunosuppressive therapy. In addition, non-Hodgkin's lymphoma of itself may be an independent risk factor for HBV reactivation. Patients with positive HB serology should consult a liver disease specialist before the start of treatment and should be monitored and managed according to guidelines to prevent HB reactivation.

In patients who develop reactivation of viral hepatitis B, MABTHERA and any concomitant chemotherapy should be discontinued and appropriate treatment including antiviral therapy initiated. There are insufficient data regarding the safety of resuming therapy with MABTHERA in patients who develop hepatitis subsequent to HBV reactivation.

The following additional serious viral infections, either new, reactivated or exacerbated, have been identified in clinical studies or post-marketing reports. The majority of patients were profoundly immune-suppressed. These viral infections included JC virus [progressive multifocal leukoencephalopathy (PML)], cytomegalovirus, herpes simplex virus, parvovirus B19, varicella zoster virus, West Nile virus and hepatitis C. In some cases, the viral



infections occurred up to one year following discontinuation of MABTHERA and have resulted in death.

Skin Reactions

Severe skin reactions such as toxic epidermal necrolysis and Stevens-Johnson syndrome, some with fatal outcome, have been reported (see *Post-Marketing Experience - Non-Hodgkin's Lymphoma and Chronic Lymphocytic Leukaemia*). In case of such an event, treatment should be discontinued. Re-administration must be carefully assessed based on the individual patient's benefit-risk profile.

Pharmacokinetic differences between MABTHERA SC and IV formulations

Fixed 1400 mg dose MABTHERA SC results in a higher systemic exposure to rituximab than is seen with intravenous MABTHERA at recommended doses in NHL (see PHARMACOLOGY - *Pharmacokinetics*). This increase in systemic exposure is more pronounced in subjects with low body surface area (BSA), but is also apparent in those with average and high BSA. Currently available data from the MABTHERA SC clinical development program indicate that greater exposure occurring after MABTHERA SC administration, particularly in patients with low BSA, is not associated with a major increased risk of adverse effects.

Immunisation

The safety of immunisation with live viral vaccines, following MABTHERA therapy has not been studied and vaccination with live virus vaccines is not recommended.

Patients treated with MABTHERA may receive non-live vaccinations. However, with non-live vaccines response rates may be reduced. In a non-randomised study, patients with relapsed low-grade NHL who received intravenous MABTHERA monotherapy when compared to healthy untreated controls had a lower rate of response to vaccination with tetanus recall antigen (16% vs. 81%) and Keyhole Limpet Haemocyanin (KLH) neoantigen (4% vs. 76% when assessed for > 2-fold increase in antibody titer).

Mean pre-therapeutic antibody titers against a panel of antigens (*Streptococcus pneumoniae*, influenza A, mumps, rubella, varicella) were maintained for at least 6 months after treatment with intravenous MABTHERA.

General Precautions

In order to improve the traceability of biological medicinal products, the trade name of the administered product should be clearly recorded in the patient medical record.

Effects on Fertility

No animal studies have been performed to determine the effect of rituximab on fertility in males or females.

MABTHERA SC contains hyaluronidase (human recombinant) (see DESCRIPTION). There is the potential for anti-hyaluronidase antibodies to impair fertility. In the SABRINA clinical



study, anti-hyaluronidase antibodies were observed in 2/57 (4%) and 2/53 (4%) of patients in the IV and SC cohorts, respectively, among patients who were antibody-negative at baseline (see ADVERSE EFFECTS - *Subcutaneous formulation - Immunogenicity*).

Specific studies to determine the effects of the hyaluronidase or anti-hyaluronidase antibodies on fertility have not been performed. However, in general toxicity studies of hyaluronidase in cynomolgus monkeys, no deleterious effects on reproductive organs in males or females were observed and no effects on semen quality were shown.

Use in Pregnancy (Category C)

It is not known whether MABTHERA can cause foetal harm when administered to a pregnant woman. There are no adequate and well-controlled data from studies in pregnant women, however transient B-cell depletion and lymphocytopenia have been reported in some infants born to mothers exposed to rituximab.

In clinical studies in patients with rheumatoid arthritis, three pregnancies occurred following exposure to intravenous MABTHERA + MTX with two resulting in spontaneous abortions and the third ongoing at the time. In the SparkThera study, a pregnancy occurred following treatment with both MABTHERA SC and intravenous MABTHERA resulting in a spontaneous abortion. This event was not considered related to the study medication.

Rituximab has been shown to cause B-cell depletion in the monkey foetus. MABTHERA should not be given to a pregnant woman, unless the potential benefit outweighs the potential risk.

Women of child-bearing potential must use effective contraceptive methods during treatment and for 12 months following MABTHERA therapy.

Developmental toxicity studies with rituximab performed in cynomolgus monkeys revealed no evidence of embryotoxicity in utero at relative exposure levels (AUC) similar to that anticipated clinically. New born offspring of maternal animals exposed to MABTHERA during lactation and/or gestation showed no untoward toxicity except for depleted B cell populations during the post-natal phase at the same relative exposure. B cell levels in human neonates following maternal exposure to MABTHERA have not been studied.

MABTHERA SC contains hyaluronidase (human recombinant) (see DESCRIPTION). Developmental toxicity studies in mice demonstrate reductions in foetal weight and increases in the number of resorptions following injection of hyaluronidase. The no effect level (360,000 U/kg/day) is estimated to be at least 69 times the dose used clinically (based on body surface area).

To reduce the additional potential risk of embryofoetal toxicity resulting from exposure to hyaluronidase, patients who conceive whilst treated with MABTHERA SC should discontinue treatment with the SC formulation.

Use in Lactation



It is not known whether rituximab is excreted in human milk. In monkey studies, rituximab was excreted in the milk and was detected in the serum of breast-fed infants. Reversible B-cell depletion was observed in all monkey infants exposed to rituximab via maternal transfer during lactation and/or gestation. It is recommended that a nursing woman discontinue breastfeeding whilst undergoing treatment with MABTHERA.

Paediatric Use

The safety and effectiveness of MABTHERA in paediatric patients have not been established. Hypogammaglobulinaemia has been observed in paediatric patients treated with MABTHERA, in some cases severe and requiring long-term immunoglobulin substitution therapy. The consequences of long term B cell depletion in paediatric patients are unknown.

Genotoxicity

The genotoxic potential of rituximab has not been investigated.

Carcinogenicity

The carcinogenic potential of rituximab has not been investigated.

Driving and Operating Machinery

It is not known whether MABTHERA has an effect on the ability to drive and operate machines, though the pharmacologic activity and adverse events reported to date do not indicate that such an effect is to be expected.

INTERACTIONS WITH OTHER MEDICINES

Currently, there are limited data on possible drug interactions with MABTHERA.

Patients with human anti-mouse antibody or human anti-chimeric antibody (HAMA/HACA) titres may have allergic or hypersensitivity reactions when treated with other diagnostic or therapeutic monoclonal antibodies.

The tolerability of simultaneously or sequential combination of MABTHERA with chemotherapy other than CHOP or CVP, or agents which are liable to cause depletion of normal B cells is not well defined.

ADVERSE EFFECTS

Subcutaneous Formulation

Local cutaneous reactions, including injection site reactions were very common in patients receiving MABTHERA SC in the SparkThera and SABRINA studies; reported in up to 50% of patients at some time during treatment. Symptoms included pain, swelling, induration, haemorrhage, erythema, pruritus and rash. All events seen following subcutaneous administration were mild or moderate, apart from one patient who experienced one episode of Grade 3 injection site rash.



In the SparkThera and SABRINA studies, the 1400 mg MABTHERA SC dose lead to higher systemic rituximab exposures compared to the intravenous MABTHERA 375 mg/m² dose (see PHARMACOLOGY - *Pharmacokinetics*). In SABRINA, a numerically higher number of adverse events (including \geq Grade 3 and serious adverse events) were reported in MABTHERA SC arm, however the proportion of patients in each study arm experiencing such adverse events was comparable.

Preliminary analysis of safety results from pooled Stages 1 and 2 of SABRINA raises the possibility that neutropenia is more frequent with the use of fixed dose 1400 mg MABTHERA SC than with use of the IV formulation. In induction cycles 2 - 8 of the open-label SABRINA study, serious adverse events of neutropenia were reported in 1/210 (< 1%) in the IV arm vs. 5/197 (3%) in the SC arm; \geq Grade 3 adverse events of neutropenia were reported in 14% vs. 21% respectively.

The safety profile of MABTHERA SC was otherwise comparable to that of intravenous MABTHERA.

Immunogenicity

Data from the MABTHERA SC development program indicate that the formation of anti-rituximab antibodies (HACAs) after SC administration is comparable with that observed after IV administration. Throughout Stage 1 of the SABRINA study, anti-rituximab antibodies were observed in 1/57 (2%) and 1/57 (2%) of patients in the IV and SC cohorts, respectively, among patients who were antibody-negative at baseline. Anti-hyaluronidase antibodies were observed in 2/57 (4%) and 2/53 (4%) of patients in the IV and SC cohorts, respectively, among patients who were antibody-negative at baseline.

The overall proportion of patients found to have anti-hyaluronidase antibodies remained generally constant over the follow-up period in both cohorts. There was no apparent relationship between HACAs or anti-hyaluronidase antibodies and adverse events. The clinical relevance of the development of HACAs or anti-hyaluronidase antibodies after treatment with MABTHERA SC is not known.

Intravenous formulation

Information in this section reports data from the separate Product Information for intravenous MABTHERA.

Experience from Clinical Trials in Haemato-Oncology

The most common adverse reactions of MABTHERA (incidence \geq 25%) observed in patients with NHL are infusion-related reactions, fever, chills, infection, asthenia and lymphopenia. The most important serious adverse reactions of MABTHERA are infusion-related reactions, tumour lysis syndrome, mucocutaneous toxicities, hepatitis B reactivation with fulminant hepatitis, PML, other viral infections, cardiac arrhythmias, renal toxicity, and bowel obstruction and perforation.

The frequencies of adverse drug reactions (ADRs) reported with MABTHERA alone or in combination with chemotherapy are summarised in the tables below and are based on data from clinical trials. These ADRs had either occurred in single arm studies or had occurred with at least a 2% difference compared to the control arm in at least one of the major



randomised clinical trials. ADRs are added to the appropriate category in the tables below according to the highest incidence seen in any of the major clinical trials. Within each frequency grouping ADRs are listed in descending order of severity. Frequencies are defined as very common $\geq 1/10$ ($\geq 10\%$), common $\geq 1/100$ to $< 1/10$ ($\geq 1\%$ to $< 10\%$) and uncommon $\geq 1/1,000$ to $< 1/100$ ($\geq 0.1\%$ to $< 1\%$).

MABTHERA monotherapy/maintenance therapy

The ADRs in the table below are based on data from single-arm studies including 356 patients with low-grade or follicular lymphoma, treated with MABTHERA weekly as a single agent for the treatment or re-treatment of non-Hodgkin's lymphoma (see CLINICAL TRIALS). The table also contains ADRs based on data from 671 patients with follicular lymphoma who received MABTHERA as maintenance therapy for up to 2 years following response to initial induction with CHOP, R-CHOP, R-CVP or R-FCM (see CLINICAL TRIALS). The ADRs were reported up to 12 months after treatment with monotherapy and up to 1 month after treatment with MABTHERA maintenance.

Table 7 Summary of ADRs reported in patients with low-grade or follicular lymphoma receiving MABTHERA monotherapy (N = 356) or MABTHERA maintenance treatment (N = 671) in clinical trials

System Organ Class	Very Common ($\geq 10\%$)	Common ($\geq 1\% - < 10\%$)	Uncommon ($\geq 0.1\% - < 1\%$)
Infections and infestations	bacterial infections, viral infections	sepsis, ⁺ pneumonia, ⁺ febrile infection, ⁺ herpes zoster, ⁺ respiratory tract infection, fungal infections, infections of unknown aetiology	
Blood and the lymphatic system disorders	neutropenia, leucopenia	anaemia, thrombocytopenia	coagulation disorders, transient aplastic anaemia, haemolytic anaemia, lymphadenopathy
Immune system disorders	angioedema	hypersensitivity	
Metabolism and nutrition disorders		hyperglycaemia, weight decrease, peripheral oedema, face oedema, increased LDH, hypocalcaemia	
Psychiatric disorders			depression, nervousness
Nervous system disorders		paresthesia, hypoesthesia, agitation, insomnia, vasodilatation, dizziness, anxiety	dysgeusia
Eye disorders		lacrimation disorder, conjunctivitis	
Ear and labyrinth disorders		tinnitus, ear pain	
Cardiac disorders		⁺ myocardial infarction, arrhythmia, ⁺ atrial fibrillation, tachycardia, ⁺ cardiac disorder	⁺ left ventricular failure, ⁺ supraventricular tachycardia, ⁺ ventricular tachycardia, ⁺ angina, ⁺ myocardial ischaemia, bradycardia
Vascular disorders		hypertension, orthostatic	



		hypotension, hypotension	
Respiratory, thoracic and mediastinal disorders		bronchospasm, respiratory disease, chest pain, dyspnoea, cough, rhinitis	asthma, bronchiolitis obliterans, lung disorder, hypoxia
Gastrointestinal disorders	nausea	vomiting, diarrhoea, abdominal pain, dysphagia, stomatitis, constipation, dyspepsia, anorexia, throat irritation	abdominal enlargement
Skin and subcutaneous tissue disorders	pruritis, rash	urticaria, +alopecia, sweating, night sweats	
Musculoskeletal, connective tissue and bone disorders		hypertonia, myalgia, arthralgia, back pain, neck pain, pain	
General disorders and administration site conditions	fever, chills, asthenia, headache	tumour pain, flushing, malaise, cold syndrome	infusion site pain
Investigations	decreased IgG levels		

For each term, the frequency count was based on reactions of all grades (from mild to severe), except for terms marked with "+" where the frequency count was based only on severe (\geq Grade 3 NCI common toxicity criteria) reactions. Only the highest frequency observed in either trial is reported.

MABTHERA in combination with chemotherapy in NHL and CLL

The ADRs listed in the table below are based on rituximab-arm data from controlled clinical trials that occurred in addition to those seen with monotherapy/maintenance therapy and/or at a higher frequency grouping: 202 patients with diffuse large B-cell lymphoma (DLBCL) treated with R-CHOP, from 234 and 162 patients with follicular lymphoma treated with R-CHOP or R-CVP, respectively, and from 397 previously untreated CLL patients and 274 relapsed/refractory CLL patients treated with rituximab in combination with fludarabine and cyclophosphamide (R-FC) (see CLINICAL TRIALS).

The safety information of MABTHERA in combination with certain chemotherapy regimens is limited. When MABTHERA is used with other chemotherapy medicines, prescribers are advised to consider the adverse reaction profile of the component medicine(s).

Table 8 Summary of severe ADRs reported in patients receiving R-CHOP in DLBCL (N=202), R-CHOP in follicular lymphoma (N=234), R-CVP in follicular lymphoma (N=162) and R-FC in previously untreated (N=397) or relapsed/refractory (N=274) CLL

System Organ Class	Very Common ($\geq 10\%$)	Common ($\geq 1\% - < 10\%$)
Infections and infestations	bronchitis	acute bronchitis, sinusitis, hepatitis B*
Blood and the lymphatic system disorders	neutropenia# febrile neutropenia, thrombocytopenia	pancytopenia, granulocytopenia
Skin and subcutaneous tissue disorders	alopecia	skin disorder
General disorders and administration site conditions	-	fatigue, shivering



*includes reactivation and primary infections; frequency based on R-FC regimen in relapsed/refractory CLL
Frequency count was based on only severe reactions defined in clinical trials as \geq Grade 3 NCI common toxicity criteria. Only the highest frequency observed in any trial is reported.
#prolonged and/or delayed onset neutropenia after completion of an R-FC course in previously untreated or relapsed/refractory CLL

The following terms have been reported as adverse events, however, were reported at a similar (<2% difference between the groups) or lower incidence in the MABTHERA-arms compared to control arms: haematotoxicity, neutropenic infection, urinary tract infection, septic shock, superinfection lung, implant infection, septicaemia staphylococcal, lung infection, rhinorrhoea, pulmonary oedema, cardiac failure, sensory disturbance, venous thrombosis, mucosal inflammation nos, influenza-like illness, oedema lower limb, abnormal ejection fraction, pyrexia, general physical health deterioration, fall, multi-organ failure, venous thrombosis deep limb, positive blood culture, diabetes mellitus inadequate control.

Further information on selected, serious adverse drug reactions

Infusion/Administration-Related Reactions

Subcutaneous Formulation

The risk of acute reactions associated with MABTHERA SC was assessed in two open-label studies involving patients with follicular NHL during induction and maintenance (SABRINA) and during maintenance only (SparkThera).

In SABRINA, severe administration-related reactions (Grade \geq 3) were reported in two patients following MABTHERA SC administration (one patient reporting Grade 3 injection site rash, and one patient reporting Grade 3 dry mouth), both occurring after induction cycle 2 i.e. the first MABTHERA SC dose given to each patient.

In SparkThera, no severe administration-related reactions were reported.

Intravenous formulation

Information in this section reports data from the separate Product Information for intravenous MABTHERA.

Monotherapy – 4 weeks treatment

Signs and symptoms suggestive of an infusion-related reaction (IRR) were reported in more than 50% of patients in clinical trials, and were predominantly seen during the first infusion. Hypotension, fever, chills, rigors, urticaria, bronchospasm, sensation of tongue or throat swelling (angioedema), nausea, fatigue, headache, pruritus, dyspnea, rhinitis, vomiting, flushing, and pain at disease sites have occurred in association with MABTHERA infusion as part of an infusion-related symptom complex. Some features of TLS have also been observed.

Maintenance Treatment (NHL) up to 2 years

Non-serious signs and symptoms suggestive of an infusion-related reaction were reported in 41% of patients for general disorders (mainly asthenia, pyrexia, influenza like illness, pain) and in 7% of patients for immune system disorders (hypersensitivity). Serious infusion-



related reactions (defined as serious adverse events starting during or within one day of a rituximab infusion) occurred in < 1% of patients treated with MABTHERA maintenance.

Combination Therapy (R-CVP in NHL; R-CHOP in DLBCL; R-FC in CLL)

Severe IRRs occurred in up to 12% of all patients at the time of the first treatment cycle with MABTHERA in combination with chemotherapy. The incidence of infusion-related symptoms decreased substantially with subsequent infusions and is <1% of patients by the eighth cycle. The signs and symptoms were consistent with those observed during monotherapy. Additional reactions reported were dyspepsia, rash, hypertension, tachycardia, and features of TLS. Isolated cases of myocardial infarction, atrial fibrillation, pulmonary oedema and acute reversible thrombocytopenia were also reported.

Information in the following sub-sections of the ADVERSE EFFECTS section reports data from the separate Product Information for intravenous MABTHERA.

Infections

Monotherapy – 4 weeks treatment

MABTHERA induced B-cell depletion in 70% to 80% of patients and was associated with decreased serum immunoglobulins in only a minority of patients. Bacterial, viral, fungal and unknown etiology infections, irrespective of causal assessment, occurred in 30.3% of 356 patients. Severe infectious events (Grade 3 or 4), including sepsis occurred in 3.9% of patients.

Maintenance Treatment (NHL) up to 2 years

Higher frequencies of infections overall, including Grade 3 or 4 infections, were observed during MABTHERA treatment. The incidence of Grade 3 to 4 infections was 3% of patients on observation and 11% with MABTHERA maintenance. There was no cumulative toxicity in terms of infections reported over the 2-year maintenance period.

Data from clinical trials included cases of fatal PML in NHL patients that occurred after disease progression and retreatment (see BOXED WARNING and PRECAUTIONS).

Combination Therapy (R-CVP in NHL; R-CHOP in DLBCL; R-FC in CLL)

No increase in the frequency of infections or infestations was observed in the MABTHERA arm of the R-CVP study. The most common infections were upper respiratory tract infections which were reported for 12.3% patients on R-CVP and 16.4% patients receiving CVP. Serious infections were reported in 4.3% of the patients receiving R-CVP and 4.4% of the patients receiving CVP. No life threatening infections were reported during this study.

In the R-CHOP study the overall incidence of Grade 2 to 4 infections was 45.5% in the R-CHOP group and 42.3% in the CHOP group. Grade 2 to 4 fungal infections were more frequent in the R-CHOP group (4.5% vs. 2.6% in the CHOP group); this difference was due to a higher incidence of localised Candida infections during the treatment period. The incidence of Grade 2 to 4 herpes zoster was higher in the R-CHOP group (4.5%) than in the CHOP group (1.5%). The proportion of patients with Grade 2 to 4 infections and/or febrile neutropenia was 55.4% in the R-CHOP group and 51.5% in the CHOP group.



In patients with CLL, the incidence of Grade 3 or 4 during treatment or within 28 days of the end of treatment was 18% with R-FC in the first-line setting and 19% in the relapsed/refractory setting and comparable with the FC group. The incidence of Grade 3 or 4 hepatitis B infection (reactivation and primary infection) was 2% with R-FC vs. 0% with FC.

Haematologic Events

Monotherapy – 4 weeks treatment

Severe (Grade 3 and 4) neutropenia was reported in 4.2% of patients, severe anaemia was reported in 1.1% of patients and severe thrombocytopenia was reported in 1.7% of patients. A single occurrence of transient aplastic anaemia (pure red cell aplasia) and two occurrences of haemolytic anaemia following MABTHERA therapy were reported.

Maintenance Treatment (NHL) up to 2 years

There was a higher incidence of Grade 3-4 neutropenia (observation 5%, MABTHERA 11%) and leucopenia (observation 2%, MABTHERA 5%) in the MABTHERA arm compared to the observation arm. The incidence of Grade 3 to 4 thrombocytopenia (observation 1%, MABTHERA < 1%) was low. In approximately half of the patients with available data on B-cell recovery after end of MABTHERA induction treatment, it took 12 months or more for their B-cell levels to return to normal values.

Combination Therapy (R-CVP in NHL; R-CHOP in DLBCL; R-FC in CLL)

During treatment in studies of MABTHERA in combination with chemotherapy, Grade 3 and 4 leucopenia (R-CHOP 88% vs. CHOP 79%; R-FC 23% vs. FC 12%), neutropenia (R-CVP 24% vs. CVP 14%; R-CHOP 97% vs. CHOP 88%; R-FC 30% vs. FC 19% in previously untreated CLL), were usually reported with higher frequencies when compared to chemotherapy alone. However, the higher incidence of neutropenia in patients treated with MABTHERA and chemotherapy was not associated with a higher incidence of infections and infestations compared to patients treated with chemotherapy alone. Studies in previously untreated and relapsed/refractory CLL have established that in some cases neutropenia was prolonged or with a late onset following treatment in the MABTHERA plus FC group.

No relevant difference between the treatment arms was observed with respect to Grade 3 and 4 anaemia or thrombocytopenia. In the CLL first-line study, Grade 3 or 4 anaemia was reported by 4% of patients treated with R-FC compared to 7% of patients receiving FC, and Grade 3 or 4 thrombocytopenia was reported by 7% of patients in the R-FC group compared to 10% of patients in the FC group. In the relapsed/refractory CLL study, adverse events of Grade 3 or 4 anaemia were reported in 12% of patients treated with R-FC compared to 13% of patients receiving FC and Grade 3 or 4 thrombocytopenia was reported by 11% of patients in the R-FC group compared to 9% of patients in the FC group.

Cardiovascular Events

Monotherapy – 4 weeks treatment

Cardiovascular events were reported in 18.8% of patients during the treatment period. The most frequently reported events were hypotension and hypertension. Cases of Grade 3 or 4



arrhythmia (including ventricular and supraventricular tachycardia) and angina pectoris during a MABTHERA infusion were reported.

Maintenance Treatment (NHL) up to 2 years

The incidence of Grade 3 to 4 cardiac disorders was comparable between the two treatment groups (4% in observation, 5% in MabThera). Cardiac events were reported as serious adverse event in < 1 % of patients on observation and in 3% of patients on MABTHERA: atrial fibrillation (1%), myocardial infarction (1%), left ventricular failure (< 1%), myocardial ischaemia (< 1%).

Combination Therapy (R-CVP in NHL; R-CHOP in DLBCL; R-FC in CLL)

In the R-CVP study the incidence of serious adverse events cardiac disorders was low (1% R-CVP, 2% CVP).

In the R-CHOP study the incidence of Grade 3 and 4 cardiac arrhythmias, predominantly supraventricular arrhythmias such as tachycardia and atrial flutter/fibrillation, was higher in the R-CHOP group (6.9% of patients) as compared to the CHOP group (1.5% of patients). All of these arrhythmias either occurred in the context of a MABTHERA infusion or were associated with predisposing conditions such as fever, infection, acute myocardial infarction or pre-existing respiratory and cardiovascular disease. No difference between the R-CHOP and CHOP group was observed in the incidence of other Grade 3 and 4 cardiac events including heart failure, myocardial disease and manifestations of coronary artery disease.

In CLL, the overall incidence of Grade 3 or 4 cardiac disorders was low both in the first-line study (4% R-FC vs. 3% FC) and in the relapsed/refractory study (4% R-FC vs. 4% FC).

Hypogammaglobulinaemia

Maintenance Treatment (NHL) up to 2 years

After induction treatment, median IgG levels were below the lower limit of normal (LLN) (< 7 g/L) in both the observation and the MABTHERA groups. In the observation group, the median IgG level subsequently increased to above the LLN, but remained constant during MABTHERA treatment. The proportion of patients with IgG levels below the LLN was about 60% in the MABTHERA group throughout the 2 year treatment period, while it decreased in the observation group (36% after 2 years). Monitoring of IgG levels should be considered for patients treated with MABTHERA. IV Ig substitution may be indicated for patients with decreased IgG levels.

Neurologic Events

Combination Therapy (R-CVP in NHL; R-CHOP in DLBCL; R-FC in CLL)

During the treatment period 2% of patients in the R-CHOP group, all with cardiovascular risk factors, experienced thromboembolic cerebrovascular accidents during the first treatment cycle. There was no difference between the treatment groups in the incidence of other thromboembolic events. In contrast, 1.5% of patients had cerebrovascular events in the CHOP group, all of which occurred during the follow-up period.



In CLL, the overall incidence of Grade 3 or 4 nervous system disorders was low both in the first-line study (4% R-FC vs. 4% FC) and in the relapsed/refractory study (3% R-FC vs. 3% FC).

Subpopulations

The adverse events described below are only those considered by the investigator to be related to treatment with MABTHERA.

Elderly patients (³ 65 years)

Monotherapy – 4 weeks treatment: The incidence of any ADR and of Grade 3 and 4 ADRs was similar in elderly and younger patients (88.3% versus 92.0% for any ADR and 16.0% versus 18.1% for Grade 3 and 4 ADR).

Combination Therapy: The incidence of Grade 3 or 4 blood and lymphatic adverse events was higher in elderly patients (≥ 65 years of age) compared to younger patients, with previously untreated or relapsed/refractory CLL.

Bulky disease: Patients with bulky disease had a higher incidence of Grade 3 and 4 ADRs than patients without bulky disease (25.6% versus 15.4%). The incidence of any ADR was similar in these two groups (92.3% in bulky disease versus 89.2% in non-bulky disease).

Re-treatment: The percentage of patients reporting any adverse event and Grade 3 and 4 ADRs upon re-treatment with further courses of MABTHERA was similar to the percentage of patients reporting any ADR and Grade 3 and 4 ADRs upon initial exposure (95.0% versus 89.7% for any ADR and 13.3% versus 14.8% for Grade 3 and 4 ADRs).

Post-Marketing Experience

Information in this section reports data from the separate Product Information for intravenous MABTHERA.

Non-Hodgkin's Lymphoma and Chronic Lymphocytic Leukaemia

The reporting frequencies in this section (rare, very rare) are based on estimated marketed exposures and largely data derived from spontaneous reports.

Additional cases of severe infusion-related reactions have been reported during post-marketing use of intravenous MABTHERA.

As part of the continuing post-marketing surveillance of MABTHERA safety, the following serious adverse reactions have been observed:

- *Cardiovascular system:* Severe including fatal cardiac events, such as heart failure and myocardial infarction have been observed, mainly in patients with prior cardiac condition and/or cardiotoxic chemotherapy and mostly associated with infusion-related reactions.



Vasculitis, predominantly cutaneous, such as leucocytoclastic vasculitis, has been reported very rarely.

- *Blood and lymphatic system:* Rarely the onset of neutropenia has occurred more than four weeks after the last infusion of MABTHERA. Cases of infusion-related acute reversible thrombocytopenia have been reported.
- *In post-marketing:* Studies of rituximab in patients with Waldenstrom's macroglobulinaemia, transient increases in serum IgM levels have been observed following treatment initiation, which may be associated with hyperviscosity and related symptoms. The transient IgM increase usually returned to at least baseline level within 4 months.
- *Respiratory system:* Fatal bronchiolitis obliterans and pneumonitis (including interstitial pneumonitis) have been reported. Respiratory failure/insufficiency and lung infiltration in the context of IRRs. In addition to pulmonary events associated with infusions, interstitial lung disease, some with fatal outcome, has been reported.
- *Skin and appendages:* Severe bullous skin reactions including some fatal cases of toxic epidermal necrolysis and Stevens-Johnson syndrome have been reported rarely.
- *Nervous system:* Cases of posterior reversible encephalopathy syndrome (PRES) / reversible posterior leukoencephalopathy syndrome (RPLS) have been reported. Signs and symptoms include visual disturbance, headache, seizures and altered mental status, with or without associated hypertension. A diagnosis of PRES/RPLS requires confirmation by brain imaging. The reported cases had recognised risk factors for PRES/RPLS, including the patients underlying disease, hypertension, immunosuppressive therapy and/or chemotherapy. Cases of cranial neuropathy with or without peripheral neuropathy have been reported rarely. Signs and symptoms of cranial neuropathy, such as severe vision loss, hearing loss, loss of other senses and facial nerve palsy, occurred at various times up to several months after completion of MABTHERA therapy.
- *Body as a whole:* Serum sickness-like reactions have been reported rarely.
- *Infections and infestations:* Cases of hepatitis B reactivation have been reported in subjects receiving MABTHERA in combination with cytotoxic chemotherapy (see PRECAUTIONS). Other serious viral infections, either new, reactivation or exacerbation, some of which were fatal, have been reported with rituximab treatment. The majority of patients had received rituximab in combination with chemotherapy or as part of a haematopoietic stem cell transplant. Examples of these serious viral infections are infections caused by the herpes viruses (cytomegalovirus (CMV), Varicella zoster virus and Herpes simplex virus), JC virus (progressive multifocal leukoencephalopathy (PML) see BOXED WARNING) and Hepatitis C virus. Progression of Kaposi's sarcoma has been observed in rituximab-exposed patients with pre-existing Kaposi's sarcoma. These cases occurred in non-approved indications and the majority of patients were HIV (Human Immunodeficiency Virus)-positive.
- *Gastro-intestinal system:* Gastro-intestinal perforation, in some cases leading to death, has been observed in patients receiving rituximab in combination with chemotherapy for non-Hodgkin's lymphoma.



– *Renal and urinary system:* Renal failure has been reported.

Use in Children

Hypogammaglobulinaemia has been observed in paediatric patients treated with MABTHERA (see PRECAUTIONS).

DOSAGE AND ADMINISTRATION

MABTHERA SC is not intended for IV administration and should be given via SC injection only. It is important to check the product labels to ensure that the appropriate formulation (IV or SC) is being given to the patient, as prescribed.

MABTHERA may be administered in an outpatient setting. MABTHERA SC should be administered as an SC injection in an environment where full resuscitation facilities are immediately available, and under the close supervision of an experienced healthcare professional.

All patients must always receive their first dose of MABTHERA by intravenous infusion using the MABTHERA intravenous formulation. The subcutaneous formulation should only be given at the second or subsequent cycles.

Substitution by any other biological medicinal product requires the consent of the prescribing physician.

Dosage

The recommended dosage of MABTHERA SC is a fixed dose of 1400 mg, given as an SC injection, irrespective of the patient's body surface area.

Premedication, consisting of an analgesic/antipyretic (such as paracetamol) and an antihistamine should always be administered 30 to 60 minutes before each injection of MABTHERA SC. Premedication with glucocorticoids should also be considered, particularly if MABTHERA is not given in combination with steroid-containing chemotherapy.

Before starting MABTHERA SC injections, all patients must always receive beforehand, a full dose of MABTHERA by IV infusion, using the intravenous MABTHERA formulation (see PRECAUTIONS). If patients were not able to receive one full MABTHERA intravenous infusion dose, they should continue the subsequent cycles with intravenous MABTHERA until a full IV dose is successfully administered. Therefore, the switch to MABTHERA SC can only occur at the second or subsequent cycles of treatment.

Please refer to the separate Product Information for intravenous MABTHERA formulation for full instructions on dosing, method of administration, preparation and storage.

Relapsed or refractory Low Grade or Follicular non-Hodgkin's lymphoma

The recommended dosage of MABTHERA when used in monotherapy is: first cycle with intravenous MABTHERA 375 mg/m² administered as an intravenous infusion, followed by



subsequent cycles with MABTHERA SC at a fixed dose of 1400 mg per cycle, once weekly. In total: four weeks.

The recommended dosage of MABTHERA when used in combination with CHOP chemotherapy is: first cycle with intravenous MABTHERA 375 mg/m² administered as an intravenous infusion, followed by subsequent cycles with MABTHERA SC injected at a fixed dose of 1400 mg per cycle. In total: 6 cycles. MABTHERA should be administered on day 1 of each chemotherapy cycle.

Previously untreated stage III/IV Follicular non-Hodgkin's lymphoma

The recommended dosage of MABTHERA in combination with chemotherapy as induction therapy is: first cycle with intravenous MABTHERA 375 mg/m² administered as an intravenous infusion, followed by subsequent cycles with MABTHERA SC injected at a fixed dose of 1400 mg per cycle. In total: for up to 8 cycles. MABTHERA should be administered on day 1 of each chemotherapy cycle.

MABTHERA should be administered prior to the administration of chemotherapy. Any administration-related reactions should have settled before chemotherapy is instituted.

Maintenance treatment

Patients who have responded to induction treatment may receive maintenance therapy with MABTHERA SC. The recommended dose of MABTHERA SC is 1400 mg injected at a fixed dose once every 3 months until disease progression or for a maximum period of two years.

Diffuse large B-cell non-Hodgkin's lymphoma

The recommended dosage for MABTHERA in combination with CHOP chemotherapy is: first dose with intravenous MABTHERA 375 mg/m² administered as an intravenous infusion followed by subsequent cycles with MABTHERA SC injected at a fixed dose of 1400 mg per cycle. In total: for up to 8 cycles. MABTHERA should be administered on day 1 of each chemotherapy cycle.

Dosage adjustments during treatment

No dose reductions of MABTHERA are recommended. When MABTHERA is given in combination with chemotherapy, standard dose reductions for the chemotherapeutic drugs should be applied.

Special Populations

Elderly: No dose adjustment is required in elderly patients (aged > 65 years).

Preparation of MABTHERA SC formulation

MABTHERA SC vial is for single use in one patient only. Discard any residue.

Once transferred from the vial into a syringe, the solution of MABTHERA SC formulation is physically and chemically stable for 48 hours at 2 – 8 °C and subsequently for 8 hours at 30 °C in diffuse daylight. However, as MABTHERA SC formulation does not contain any



antimicrobial agent or preservative, use the product as soon as practicable after preparation to reduce microbiological hazard. If not used immediately, preparation should take place in controlled and validated aseptic conditions. In-use storage times and conditions prior to use are the responsibility of the user. If storage is necessary, hold at 2 – 8 °C for not more than 24 hours.

No incompatibilities between the SC solution and polypropylene or polycarbonate syringe material or stainless steel transfer and injection needles have been observed.

Method of Administration for MABTHERA SC formulation

MABTHERA SC should be injected subcutaneously into the abdominal wall and never into areas where the skin is red, bruised, tender, hard or into areas where there are moles or scars. No data are available on performing the injection in other sites of the body, therefore injections should be restricted to the abdominal wall.

MABTHERA SC should be injected over approximately 5 minutes. The hypodermic injection needle must only be attached to the syringe immediately prior to administration to avoid potential needle clogging.

Appropriate subcutaneous injection technique should be used. Inadvertent intramuscular injection may result in systemic exposure and overdose. To prevent inadvertent intravenous injection, draw back on the syringe once the needle has been inserted to ensure that the needle has not entered a blood vessel.

During the treatment course with MABTHERA SC, other medications for subcutaneous administration should preferably be administered at different sites.

If an injection is interrupted it can be resumed or another location may be used, if appropriate.

As with all parenteral products, appropriate aseptic technique should be used during the administration of MABTHERA.

MABTHERA SC should not be self-administered by the patient.

OVERDOSAGE

Limited experience with doses higher than the approved IV doses of MABTHERA is available from clinical trials in humans. The highest IV dose tested in humans to date is 5000 mg (2250 mg/m²). No additional safety signals were identified. Patients who experience overdose should have immediate interruption of their infusion and be closely monitored.

One patient in the MABTHERA SC study SABRINA inadvertently received a 2280 mg SC formulation dose via the IV route with no untoward effect. Patients who experience overdose or medication error should be closely monitored.

In the post-marketing setting 5 cases of intravenous MABTHERA overdose have been reported. Three cases had no reported adverse event. The two adverse events that were



reported were flu-like symptoms, with a dose of 1800 mg and fatal respiratory failure, with a dose of 2000 mg.

Consideration should be given to the need for regular monitoring of blood cell count and for increased risk of infections while patients are B cell-depleted.

Treatment of overdose should also consist of general supportive measures.

Contact the Poisons Information Centre (telephone 13 11 26) for advice on management of overdosage.

PRESENTATION AND STORAGE

Packs of 1:

- Single-use vials containing solution for subcutaneous injection, 1400 mg/11.7 mL

Storage

Store in a refrigerator (2 - 8°C. Do not freeze.) Keep the container in the outer carton in order to protect from light.

Do not use beyond the expiry date stamped on the carton/vial.

Disposal of Medicines

The release of medicines into the environment should be minimised. Medicines should not be disposed of via wastewater and disposal through household waste should be avoided. Unused or expired medicine should be returned to a pharmacy for disposal.

The following points should be strictly adhered to regarding the use and disposal of syringes and other medicinal sharps:

- Needles and syringes should never be reused.
- Place all used needles and syringes into a sharps container (puncture-proof disposable container).

Any unused medicinal product or waste material should be disposed of in accordance with local requirements.

POISON SCHEDULE

Prescription only medicine - Schedule 4

SPONSOR

Roche Products Pty Limited
ABN 70 000 132 865
4-10 Inman Road
Dee Why NSW 2099
AUSTRALIA

Attachment 1: Product information for AusPAR MabThera SC Rituximab Roche products Pty Ltd PM-2012-04453-1-4 Final 4 September 2014. This Product Information was approved at the time this AusPAR was published.



Customer enquiries: 1800 233 950

DATE OF FIRST INCLUSION IN THE AUSTRALIAN REGISTER OF THERAPEUTIC GOODS (THE ARTG)

6 October 1998

DATE OF MOST RECENT AMENDMENT

26 May 2014